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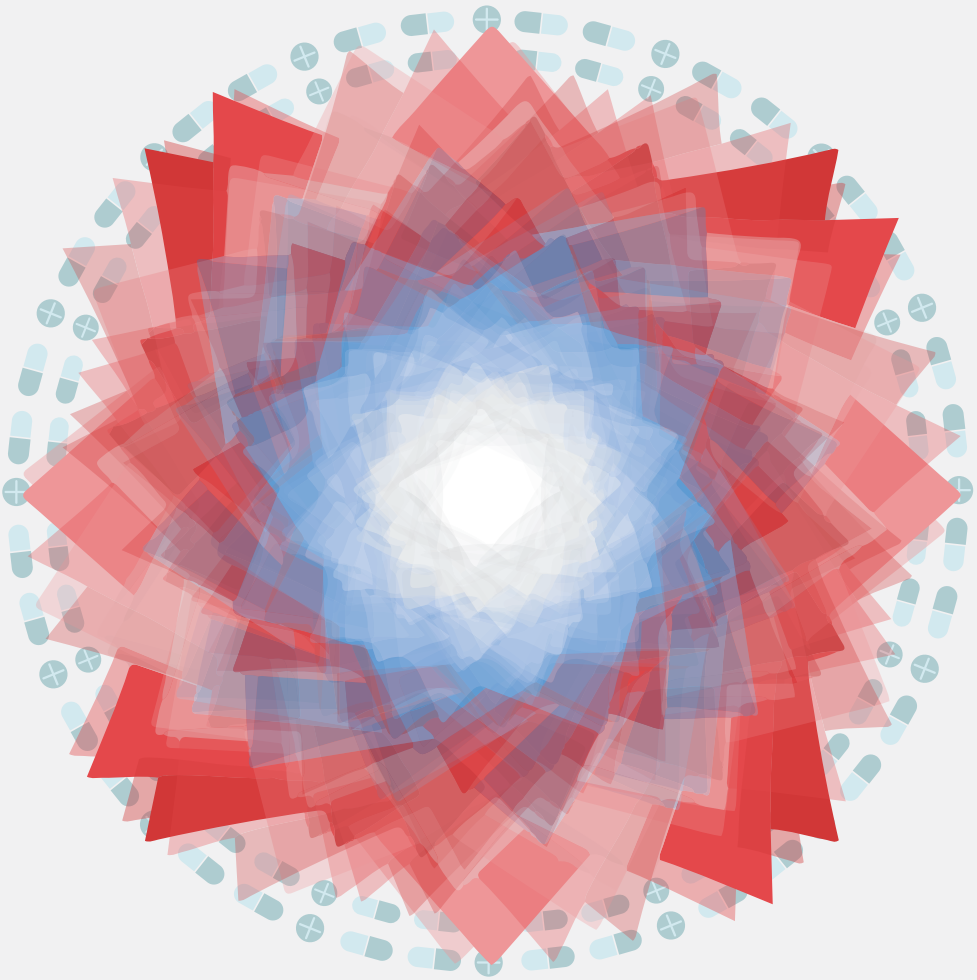

INDUSTRY EXPLORATIONS

UNITED STATES PHARMACEUTICALS 2015

Manufacturing | Generics | Regulations | Research and Development
Contract Services | Supply Chain | Distribution | Packaging

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Senior Vice President, Business Development

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Dear readers,

Welcome to CPhI and Global Business Reports' (GBR) joint report, United States Pharmaceuticals 2015 Industry Explorations.

It is with great pride and excitement that we present the first in-depth study of the U.S. pharmaceutical industry. Over the past six months, CPhI and GBR have conducted just under 80 interviews with key industry executives and experts, the findings of which are designed to elucidate strategic insights and provide a comprehensive picture of the world's most dynamic and preeminent pharmaceutical economy.

The United States accounts for one-third of total global spending on medicines—reaching a staggering peak of $70 billion in 2014—and leads the market in producing newly patented drugs, especially in areas such as oncology, diabetes and Hepatitis C.

CPhI Worldwide is similarly a driving force in pharma; it is by far the global pharmaceutical community's most important annual event, with more than 36,000 attendees and over 2,500 exhibitors expected from a truly remarkable total of more than 150 countries. Thus, it is a natural synergy to be launching a comprehensive study on the world's largest pharma market, at the world's largest pharma exhibition. The innovations and partnerships that emerge out of both of these ventures will define the industry over the next few years.

In the past 12 months, the pharmaceutical industry has continued to flourish, expand and innovate. The ability of this industry to push new boundaries within an evolving regulatory and economic landscape has been key to its development. Knowledge, information sharing, and analysis have never been as important in helping pharma companies achieve a competitive advantage, equipping them with the tools to enter or expand their reach within the U.S. pharmaceutical market.

Last year, some of the developments that we witnessed included the increased adoption and implementation of the principals for quality metrics, QbD and new manufacturing techniques. Outsourcing also continues to expand, with pharma players entering new markets and seeking the right distribution, sourcing, development, and manufacturing partners.

The CPhI U.S. report was produced following an exhaustive process of interviewing and discussing the industry with leading American governmental, institutional, and corporate stakeholders. As a result, CPhI and GBR are able to bring you the synthesis of these collective perspectives, combined with key facts and figures, challenges, and, crucially, the most vital and prosperous growth strategies.

Major themes include:

- The country's regulatory environment; for example, the heavily debated GDUFA fees—a reaction to a shift in the innovation cycle following increased generic competition;
- The evolution and adaptability of pharmaceutical companies in order to mitigate risk;
- The growth in outsourcing; and
- How the value chain is completed and medicines reach consumers

During our researchers' time on the East Coast of the United States, we saw first hand the impact of the dynamism in the pharmaceutical industry. We have also seen the repercussions of the Affordable Care Act in the form of a wave of mergers and acquisitions activity, as both buy- and sell-side companies restructure and consolidate.

This report can help your businesses make better-informed decisions within the United States. Through information sharing, we can push the boundaries of pharma, find new ways of working, and discover the right technologies and partners to further our businesses.

At CPhI events and through its online platforms, you have the opportunity to build, maintain, and nurture these essential connections that are the foundations to driving the industry forward through innovations, supplier relationships, and partnerships.

On behalf of UBM EMEA and GBR, we would like to thank all the companies, CEOs, associations and individuals involved in the creation of this report.

Please review the entire series of CPhI/GBR "Industry Explorations" reports at www.cphi.com

Many thanks and kind regards,

Rutger Oudejans,
Brand Director Pharma,
UBM

Agostina Da Cunha,
General Manager,
Global Business Reports

GBR
GLOBAL BUSINESS REPORTS

UBM

Introducing the United States' Pharmaceutical Industry

Ensuring Quality: U.S. Pharmaceutical Regulations

Competition Breeds Progress: U.S. Pharmaceutical Manufacturing

Show Me a Hero: Generics and Cost Savings in the United States

Regional Focus: The Northeast as Pharma Hub

Digging Deep: Research and Development

The Spokes in the Wheel: Contract Services

Safe on Arrival: The U.S. Logistics and Distribution Network

Into the Future

This research has been conducted by Irina Negoita, Harriet Bailey, James Hogan and Neha Premjee.

Edited by John V. Bowlus
Graphic design by Gonzalo Da Cunha and Leigh Johnson

A Global Business Reports Publication
For updated industry news from our on-the-ground teams around the world, please visit our website at gbreports.com, subscribe to our newsletter by signing up to our VIP list through our website, or follow us on Twitter: @GBReports.

Exclusive Interviews

Industry executives from all sizes and types of companies, associations, and government discuss market trends and opportunities.

12, 18, 20, 34, 51, and many more

Editorial Content

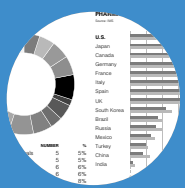
Global Business Reports' journalists provide unique insights into all aspects of the pharmaceutical industry by working on the ground for months and meeting face to face with industry leaders.

8, 16, 26, 48, 60, 68, 78, 93, 102

Quantitative Data and Maps

Quantitative data and maps highlight many of the underlying trends across all levels of the value chain in the U.S. pharmaceutical industry.

8, 9, 26, 48, 49, 68, 69



Company Profiles

An industry is only as strong as its companies, and GBR provides additional information on how key players are shaping both the domestic market in the United States and global pharmaceutical markets.

28, 29, 30, 31, 32, 33, 104

Future Outlook

The United States has historically been a leader in pharmaceuticals and the industry is building the drugs and delivery systems of the future. Companies share their visions for the future.

114


IP
103

Introducing the United States' Pharmaceutical Industry

"The United States is the largest market for the pharmaceutical industry in the world. In New Jersey, life sciences is the largest industry sector and the pharmaceutical industry accounts for nearly 71,000 direct jobs. In our last economic impact survey, HINJ member companies' New Jersey facilities spent nearly $8.7 billion for research and development in 2012, and $583 million in charitable donations. The direct and indirect economic impact proves that this industry is vital to the state and the country. The ripple effect includes a reduced burden on the health care system, because people are healthier."

- Dean J. Paranicas,
President and CEO,
HealthCare Institute of New Jersey
(HINJ)

Image: Amneal Pharmaceuticals LLC

A Role Model to the World

An Introduction to the U.S. Pharmaceutical Industry

By Harriet Bailey

The United States has long been the land of the American Dream—the opportunity available to all citizens to improve their quality of life with hard work and determination. A key theme in numerous works of classical American literature, it unites traditional opponents through its shared ideal that the next generation will enjoy prosperity not yet attained by the previous one.

Although often attributed to the pursuit of consumer goods, money and property, the American Dream clearly underpins the ideals at the heart of the U.S. pharmaceutical industry. In its relentless attempts to create drugs to improve an individual's health, prolong life and eradicate disease for future generations, Americans are able to harness their talents and energy to transform lives.

The United States leads the world in terms of research and development (R&D); spending on this area by research-based pharmaceutical companies amounts to more than 20% of sales, compared to an average of 17% in the European Union. The importance of the sector to the American psyche is evident when compared with other high-technology industries: annual spending by the pharmaceutical industry is five times greater than in aerospace, four and a half times more than in the chemicals industry and two and a half times more than in the software and computer services industries.

Throwing money at a problem, however, will only yield a positive outcome in the right environment. The United States' university system is world-renowned and contains seven of the top ten universities for the life sciences globally, drawing in not just the brightest minds from Alabama to Wyoming, but from around the world. Furthermore, stringent intellectual property protection laws, alongside the work of the U.S. Food and Drug Administration, ensure that the entire drug development process safeguards both innovation as well as health.

This may go some way to explaining the presence of so many of the world's leading pharmaceutical companies in the country. Pfizer, Merck and Johnson & Johnson—three of the United States' largest and best-known brands—regularly vie for top billing in lists of global pharmaceutical leaders. The presence of the latter two in the East Coast state of New Jersey since the late 1800s, combined with a marked increase in spending on pharmaceutical R&D in the United States a century later, have contributed to a shift in global power.

Since the early part of the twenty-first century, New Jersey has been labeled the "medicine chest of the world," overtaking Germany and its neighbors and stripping Europe of its prominence. Although the continent had given birth to the modern pharmaceutical industry by beginning the wholesale manufacture of drugs from initially small apothecary shops, the United States was able to pull ahead, thanks to its firm embrace of ambition and entrepreneurship. The American Dream mind-set proved more effective than the European tendency to wait for proven results.

Under Threat

Three factors threaten U.S. sovereignty in the pharmaceuticals space. As the second largest U.S. export sector behind the aerospace industry and one of the country's major employers supporting more than three million jobs, Asian markets are increasingly recognizing the importance of the pharmaceutical industry to overall economic growth. China is now estimated to be the second-largest R&D investor for pharmaceuticals behind the United States, thanks to the implementation of the Key Drug Innovation project in 2007. This project provided a total of $1 billion to the sector between 2011 and 2015 and is set to add a further $4.3 billion by 2020.

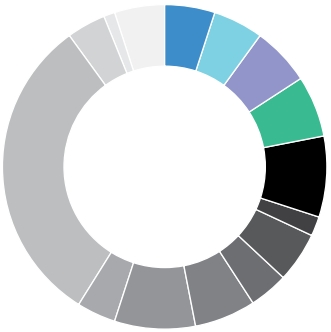
The U.S. pharmaceutical market has also experienced its first contraction in more than 50 years. Between 2008 and 2012, thirteen of the large pharmaceutical companies, including Eli Lilly and Forest, were all exposed to revenue decreases of more than $5 billion each because of patent expiration on their blockbuster drugs. The patent cliff continues to be an issue in 2015, with Bristol-Myers Squibb losing its rights to the antipsychotic drug Abilify.

Moreover, the January 2014 implementation of the major provisions of the Affordable Care Act, more commonly known as "Obamacare," has seen drug companies come under increased scrutiny by payers and regulators alike. A perceptible migration towards results-based reimbursement has arisen, placing increasing importance on the quality of care and the outcome of procedures. Future regulation will in large part be led by healthcare reform.

Despite these threats, however, the United States remains a bastion of innovation on a global level. Pharmaceutical companies are becoming more aware of the need to share information

GLOBAL NEW MOLECULAR ENTITIES 2008-2012, AVAILABLE 2013

Source: IMS

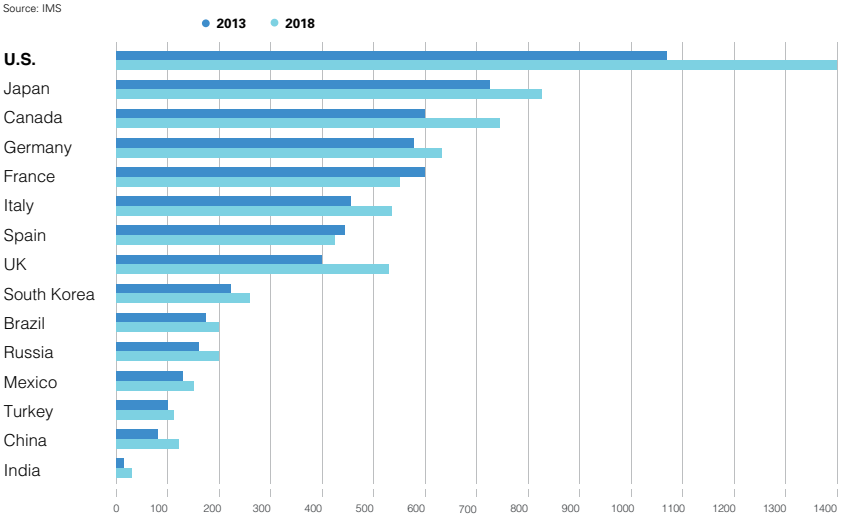


	NUMBER	%
Anti-infectives & Antivirals	5	5%
Arthritis/Pain	5	5%
Blood	6	6%
Cardiovascular	6	6%
CNS	8	8%
Dermatology	2	2%
Diabetes	5	5%
Gastrointestinal	4	4%
GU & Hormones	6	6%
Immune System	8	8%
Metabolic	4	4%
Oncologics	31	31%
Opthalmics	4	4%
Other	1	1%
Respiratory	5	5%

The United States has the highest availabilty of NMEs (68%) of any country in the world

PHARMACEUTICAL SPENDING PER CAPITA ($) BY COUNTRY, 2013 VERSUS 2018

Source: IMS



47,1%

Government Expenditure on Health as % of Total Expenditure on Health (2013)

Source: WHO

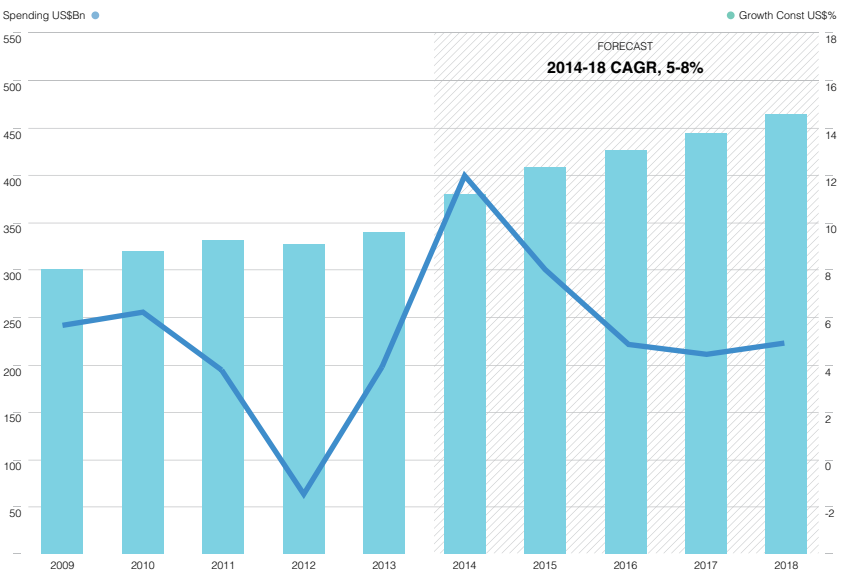
52,9%

Private Expenditure on Health as % of Total Expenditure on Health (2013)

Source: WHO

U.S. PHARMACEUTICAL SPENDING ($ BILLION) AND GROWTH (%), 2009-2018

Source: IMS



to stay ahead of the curve, resulting in an unprecedented level of collaboration. Merger and acquisition activity is high, as companies reorganize their business units to focus on their strengths and bolster areas of interest with up-and-coming technologies from the biotech arena. The patent problem is being solved by large pharmaceuticals establishing their own generics arms, such as Pfizer's Greenstone, which has been busy launching authorized generic versions of Pfizer's own drugs, such as the antidepressant Zoloft. Companies are also aware of the increasing trend towards self-diagnosis by the patient and are attempting to establish greater links between themselves and the end-users of their products through digital technologies. Mobile apps, wearables, and social media will all play a part in the advancement of what has been termed "precision medicine."

Simply being a player on the global stage is not good enough for the United States; its natural position is as a role model for not only the well-established European pharmaceutical industry, but also the emerging markets of India, China and Mexico, among others. Steve Jobs—a man who epitomizes the ideals of the American Dream, progressing from high school dropout to founder of the personal computer industry—once said: "Innovation distinguishes between a leader and a follower." The United States' pharmaceutical industry may have competitors hot on its heels, but it will continue to think outside of the box to retain its crown. •

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CPhI Worldwide hosts over **36,000+** visiting **pharma professionals, 2,500+ exhibitors** from **150+ countries** and more than **100 free industry seminars**, covering every sector under one roof. Attending CPhI Worldwide is the most cost effective way to establish new business relationships, meet with global partners and stay updated on the latest industry trends.

"Being part of the CPhI family to me is about being part of the very best the industry has to offer. With opportunities to meet suppliers, distributors, logistic specialists and customers all at one time all in one place, CPhI offers us the prospect to exponentially grow our business."

Matthew Rosen
CEO Global Pharmaceuticals Relief, LLC

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Organised by UBM

Margaret M. Timony

Executive Director
DRUG, CHEMICAL & ASSOCIATED TECHNOLOGIES ASSOCIATION (DCAT)

Could you provide us with a brief history of DCAT and any recent major milestones the association has undergone?

The Drug, Chemical & Associated Technologies Association (DCAT) is a non-profit business association for the pharmaceutical manufacturing industry. It was founded in 1890 by 50 charter members, including George Merck and Charles Pfizer. This year DCAT celebrated the 125th anniversary of its founding, a milestone which was formally recognized in March 2015, when the association held its flagship event, DCAT Week, in New York City.

What is DCAT's overarching goal within the pharmaceutical industry?

From its founding, the goal has been to be the premier business development association for the global pharmaceutical manufacturing industry. Its core mission is to foster business relations by helping members expand their network of customers, suppliers, and industry knowledge. DCAT continually strives to achieve this through offering forums for face-to-face meetings, networking events, and education programs at events, such as DCAT Week, Sharp Sourcing and others.

What are the principle benefits for DCAT's member companies?

The benefits of global membership are many and include deeply discounted registration fees for, or exclusive access to, programs and networking events; access to business meeting space, suites and lounges at official DCAT Week hotels; one-of-a-kind branding opportunities; a career center; and highly visible advertising and sponsorships. In addition, member representatives may participate in DCAT Connect, the association's online member community, webinars, and receive DCAT Value Chain Insights, a weekly e-newsletter on pharmaceutical manufacturing, sourcing/procurement and supply management.

Can you tell us more about the association's annual event, DCAT Week?

The DCAT organization's flagship event, DCAT Week, is one of the largest gatherings in the world for the pharmaceutical manufacturing industry. Its unique model fosters high-level business meetings and strategy sessions between customers and suppliers. DCAT Week attracts industry CEOs, CPOs, and presidents, as well as business development, sales, supply management, sourcing, procurement and marketing professionals. It also provides an opportunity for industry professionals to attend various education programs. These sessions focus on key issues and trends impacting the pharmaceutical manufacturing value chain. They are developed in a non-biased, non-commercial fashion to challenge the audience's critical thinking and engage them in discussion both during and after the sessions.

Do you have a final message?

The DCAT organization is unique among industry associations, not simply because it is inclusive of both customers and suppliers. Members know and appreciate that the organization is a lifelong, collegial community for industry representatives and their companies, who are working towards and contributing to the need for safe and effective global healthcare. •

Angeliki Cooney

Director, Strategic Planning
IMS HEALTH

A recent study by IMS showed that 2014 was a record year in terms of medicine spending in the United States. Can you explain some of the contributing factors?

From our perspective, the figure of 13.2% growth in 2014 was an outlier. On the surface, it appears that the majority of the increase came from growth in spending on new products and rising prices. Having said that, the United States does not have the level of price transparency found in other markets, and it is impossible to know the exact discounts agreed between healthcare providers and insurers. It does, however, appear that real price increases are coming in at roughly 3%, much lower than what growth in list prices may indicate.

In terms of expenditure on new brands, nearly the entire growth in that area came from Sovaldi, Gilead's breakthrough Hepatitis C drug. If you remove Sovaldi from the equation, the real growth in the market was around 3%, making 2014 a solid year, where we saw normal growth relative to previous years. The Affordable Care Act (ACA) has also played a part. We saw many more scripts last year than previously, as more people signed up for insurance through the expansion of the Medicare and Medicaid programs. This raises some interesting questions about profitability, which companies are attempting to resolve by moving into specialty areas.

With rising consumer concerns regarding quality, will we see a return of generics production to the United States?

There is definitely a move towards increasingly regulating, auditing, and testing the quality of drugs that are produced outside of the United States, but it appears that near-shore production is taking precedent. Mexico, as a close neighbor to the United States that has a strong bilateral relationship, is easier to supervise. The labor arbitrage is also not as important as it used to be, as China and India are becoming increasingly more expensive. This issue is increasingly dependent on the types of skills and the total costs of production and delivery that come into play.

What is happening in the industry on the larger scale in terms of the interaction between generics and branded products?

More than 90% of the prescriptions written in the United States are for generic products. By and large, pharmaceutical companies realize gains in specialty areas; the vast majority of research and development (R&D) spending is on Hepatitis C, oncology, and multiple sclerosis. Two thirds of the current drug pipeline is in specialty areas including molecules with orphan drug designation, as these are the most profitable products on the sell-side.

Pricing of specialty products has become a critical topic of discussion given the government's pressure to reign in healthcare costs. Prices, however, are significantly reduced once a competitor enters the market with an alternative. We begin to see discounts that can even reach 50% of the initial price point. Novartis' new heart failure drug Entresto is being put on an outcomes-based contract with hospitals, guaranteeing a certain decline in the re-hospitalization rate of patients; Novartis will not be

paid unless Entresto meets certain criteria. This type of outcomes-based reimbursement is progressively becoming more common as companies try to justify the prices of their branded products. On the flip side, we also see firms entering the generics market instead. Acquisition of generics' products and portfolios is sometimes followed by significant increases in their prices that can reach even 1,000% in some cases. On a small basis of the original price, the impact of the price increase is barely felt by the market, but leads to meaningful increases in the manufacturer's profitability.

We have recently seen a high volume of mergers and acquisitions (M&A) activity. Why is the environment ripe for this now and what effect is it having on smaller players?

Pharmaceutical companies are trying to refine their portfolios. They know that the greatest investment opportunity is in specialty areas, so it is important for them to find the gems under development that will, in time, provide them with a significant revenue stream. Many larger companies are therefore buying small biotech companies in order to acquire assets that they have been unable to develop themselves. Another reason for the high volume of activity is that companies are streamlining their portfolios to meet their strategic needs. They are focusing their efforts on certain therapeutic areas where they feel they have greater strength and probability of succeeding.

Could you give us some instances where mobile heath and wearables are being leveraged to positive effect?

Digital health is a rapidly growing area. There is a widespread feeling that it is absolutely necessary to get into it in order to make this an integral part of treatment. Most of this work has been conducted in diabetes; Novartis, for example, is developing a contact lens that measures glucose levels. There is not yet sufficient data, however, to prove that there has been a positive effect on outcomes, although observational studies have reported good feedback.

Digital health will prove effective in telemedicine, particularly in certain areas of the United States. There are physicians who, by default, have to work with their patients from a distance. The ability to monitor vitals and being able to facilitate a conversation between the patient and the physician is very important. Healthcare providers and payers will definitely want to leverage wearables, as long as they are clinically proven to work and enhance patient outcomes.

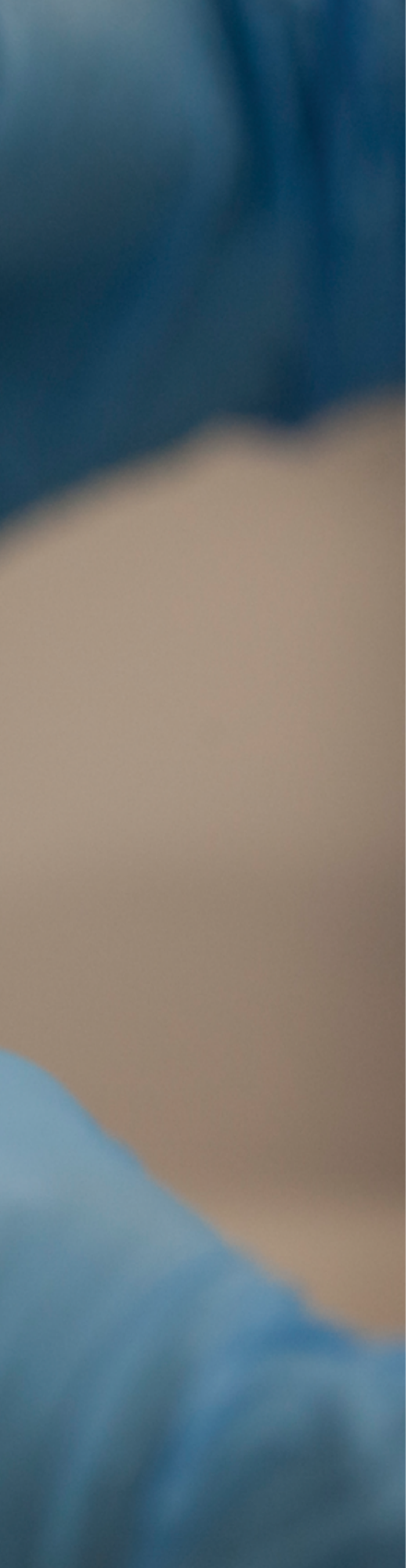
Similarly, pharmaceutical companies are looking at their business models and the role that they want to play in the provision of healthcare. For some that are aiming to be the leaders in a particular therapy area, they will want to deliver the product itself with associated services such as wearables. Other companies will choose to focus on R&D and coming up with breakthrough treatments.

What major milestones can we expect to see in the U.S. pharmaceutical industry in the next five years?

M&A activity in all areas will be robust. The more financial risk sharing that has to happen because of the ACA, the more we are going to see the rise of local markets being shaped by local dynamics. We are still going to see a bipolar approach to pricing. The majority of products in the pipeline are in the specialty and orphan drug designations, so we will see a lot more debate about appropriate pricing. Typically, negotiations have been between pharmaceutical companies and payers, but at this stage negotiations have to happen between pharmaceutical companies and integrated health networks as well. These are relationships that are only now beginning to develop, as providers take on the financial burden of healthcare as well.

Discounting will continue to be heavy, and we expect real prices to differ from list prices significantly, at least in the near future. A key aspect of this has to do with the support of new patients in the marketplace, who do not have the means to easily stay adherent to their medications. Pharmaceutical companies are starting to pick up the tab via coupons, co-pay programs and vouchers.

The last issue is biosimilars. There is almost $80 billion of revenue at risk because of patent expiration on drugs such as Abbvie's Humira, Pfizer's Enbrel and Teva's Copaxone, among many others. It is really the manufacturers themselves who are best placed to make a biosimilar, so it is increasingly likely they will set up their own biosimilars' arms. The United States is looking to Europe, which has been a pioneer in adopting biosimilars, but the United States is essential to drive the growth of biosimilars given its size. Because of that, I am very interested to see what happens from a regulatory standpoint in the U.S. market. •



Ensuring Quality U.S. Pharmaceutical Regulations

"One big theme is the impact of healthcare reform, which does not just cover the extension of insurance provision to those who did not previously have access to it; it also covers a wide range of other areas, all of which have regulatory implications. The market is not only going to be larger, it is also going to be more competitive. There is also the issue of quality of care and the fundamental shift from a system based on quantity of procedures to a system based on the outcome of those procedures."

- Matthew Hudes,
U.S. Managing Principal, Biotechnology,
Deloitte

Image: Clinical Supplies Management Inc.

The Powers That Be: Legislation and Regulation

Ensuring quality through regulation and the challenges of educating the lawmakers

By Harriet Bailey

The United States enjoys a leading position in the global pharmaceutical industry; nowhere is this more evident than in the country's reputation for the quality of its manufactured drugs. The mainstay of the industry's regulatory requirements is the U.S. Food & Drug Administration (FDA), and in particular its Center for Drug Evaluation and Research (CDER). Not only does this organization regulate drugs and facilities at home, it also sends out inspectors to facilities abroad which produce drugs destined for the U.S. market.

The FDA itself can trace its roots back almost 160 years to the Drug Importation Act of 1848, which enabled the inspection of imported drugs. A further key milestone was reached in 1906, when the original Food and Drugs Act was passed in order to combat the high volumes of adulterated and misbranded drugs from reaching patients. With the FDA name formalized in 1930, further consolidation of the right of the general population to safe and effective drugs was firmly on the agenda. An update to the decades old Food and Drugs Act came in the form of the Federal Food, Drug and Cosmetic (FDC) Act in 1938; this required new drugs to be proven safe before marketing, set tolerance levels for unavoidable poisonous substances and authorized factory inspections. After its first tentative steps into the regulatory area 90 years earlier, the FDA was in business.

While the CDER's current role is "to protect and promote public health," this mission encompasses a wide range of other needs: the requirement for competition in the industry to ensure that drugs are available for all; that a culture of innovation and development be fostered in order to safeguard treatment for specific illnesses as well as more widespread diseases; and an efficient and ethical system of drug approval be followed so that lifesaving drugs can reach the market as soon as possible.

Within the CDER are a number of offices that work on various aspects of the center's overall mission of ensuring that only "safe and effective drugs are available to Americans." The Office of Compliance, for example, "minimizes consumer exposure to unsafe, ineffective, and poor quality drugs" by monitoring drug quality through inspections and testing. In January 2015, the CDER established the Office for Pharmaceutical Quality (OPQ), in response to global challenges to pharmaceutical quality. Dr. Lawrence Yu, deputy director of the OPQ, explained: "Within the last several years, we have all seen a number of public health crises that are tied to issues of pharmaceutical quality, such as drug shortages and high rates of product recall. FDA strategies to meet these challenges are crystallized within the OPQ."

The OPQ aims to work in a consistent and transparent manner and strives "to be a global benchmark for regulation of pharmaceutical quality," according to Yu. It has implemented a system of team-based Integrated Quality Assessment (IQA), focusing on integrated review and communication by a group of specialists: "We draw in a concerted way from the entire scope of OPQ expertise and resources," said Yu. The reorganization of the CDER, however, has come at a time when it already faces an unprecedented number of applications for Abbreviated New Drug Approvals (ANDAs) following the implementation of the Generic Drug User Fee Amendment in 2012. "The rigor of regulatory review and scientific development must be applied equally to both generic and innovator drugs," said Yu.

> "The biopharmaceutical research sector is committed to patients who depend on us to uncover the next treatment and cure. Critical to this mission are policies that will support one of the most innovative sectors of our economy."
>
> - John J. Castellani, President and CEO, Pharmaceutical Research and Manufacturers of America (PhRMA)

The new standards that the FDA has set itself, including achieving inspection parity of domestic and foreign facilities by 2017, has had the knock-on effect of lengthening approval times. Not only is the OPQ ramping up its inspection levels, it is also introducing an entirely new model for the pharmaceutical industry in the United States. Its Vision for 21st Century Manufacturing has the ultimate aim of creating, in Yu's words "a maximally efficient, agile, flexible pharmaceutical manufacturing sector that reliably produces high quality drugs without extensive regulatory oversight."

In conjunction with this, the OPQ is also designing a set of quality metrics for the facilities and processes used in manufacturing drugs, placing the onus more heavily on the manufacturers themselves to put quality at the forefront of their operations. "All stakeholders have a role to play in quality," confirmed Yu. "We have to promote relationships to promote the evolution of pharmaceutical quality, and we must work to involve stakeholders and innovators from industry, federal partners, and professional and patient organizations."

The formulation of these metrics has been in conjunction with not only the manufacturers themselves, but also the trade associations representing them.

No Legislation Without Representation

For almost as long as the pharmaceutical industry has been regulated, it has had some kind of representative body looking out for its best interests. The oldest of these still in existence today is the Consumer Healthcare Products Association (CHPA), founded in 1881 to represent manufacturers and distributors of over-the-counter drugs and nutritional supplements. The association claims to provide "leadership and guidance on regulatory and scientific issues to Congress; state legislatures; and federal, state and international government agencies."

The Drug, Chemical and Associated Technologies Association (DCAT) followed less than a decade later, in 1890. Founded by 50 charter members including George Merck and Charles Pfizer, it now counts more than 400 companies from the pharmaceutical manufacturing industry among its members. Its flagship event is DCAT Week, held annually to foster business relationships and educate its members on the latest trends. "[These education programs] are developed in a non-biased, non-commercial fashion to challenge the audience's critical thinking and engage them in discussion both during and after the sessions," explained Margaret M. Timony, DCAT's executive director.

The Pharmaceutical Research and Manufacturers of America (PhRMA) was established in 1958 to represent biopharmaceutical companies in the United States, focusing on ensuring alignment between public policy and medical research both on a federal level and around the world. "The biopharmaceutical research sector is committed to patients who depend on us to uncover the next treatment and cure. Critical to this mission are policies that will support one of the most innovative sectors of our economy," said PhRMA president and CEO, John J. Castellani. Its work on ensuring strong IP protection for research carried out in the United States provides a compelling argument for the future of research of development on U.S. shores. "We will continue to work with the Administration and members of Congress on bipartisan solutions that can help spur growth in the U.S. economy, ensure patient access to new medicines, and foster future development of life-saving medicines," said Castellani.

New organizations advocating for the pharmaceutical industry continue to spring up. In 2000, the Generic Pharmaceutical Association (GPhA) was created to provide representation for the large number of generics manufacturers on the market, which are required to meet the same demands as their branded counterparts in terms of regulation and development. "GPhA is a strong voice in advocating the interests of its member companies before federal and state lawmakers, regulatory policymakers and international agencies," said Ralph G. Neas, the association's CEO.

> Within the last several years, we have all seen a number of public health crises that are tied to issues of pharmaceutical quality, such as drug shortages and high rates of product recall. FDA strategies to meet these challenges are crystallized within the OPQ.
>
> - Dr. Lawrence Yu, Deputy Director, Office of Pharmaceutical Quality, U.S. Food and Drug Administration (FDA)

It regularly presents to the FDA on various issues affecting the generics industry and has secured a regulatory scheme that both ensures patient safety while removing barriers to entry.

The issue of biosimilars is of such importance to the generics industry as a whole that the GPhA launched the Biosimilars Council in April 2015. Neas added: "[It] will include manufacturers and stakeholders working to ensure a positive regulatory, reimbursement, political and policy environment – an effort that supports patient access to biosimilars."

The Council's work has seen rapid results: in September 2015, the FDA approved its first biosimilar, paving the way for further FDA approvals and the launch of a robust biosimilars marketplace in the United States. (Novartis' Sandoz developed Zarxio as the biosimilar version of Amgen's oncology drug Neupogen.)

Not to feel left out, the contract manufacturing segment has representation in the form of the Pharmaceutical and Biopharmaceutical Outsourcing Association (PBOA). Established in March 2014, it quickly gained membership and began its advocacy work. "In 2015, people are starting to see the work we are doing and the tangible effects it is having. They read about the congressional meetings we are having and the FDA workshop that we held in March," said Gil Roth, PBOA's founder and president. "Our main goal is to establish a regulatory and legislative advocacy for the contract manufacturing industry."

Although representing a different section of the pharmaceutical industry, the challenges within it are universal, with Roth confirming that the PBOA will work with the FDA on upcoming issues such as GDUFA II, serialization and track-and-trace regulations.

The fact that the FDA and industry-representing associations are in regular dialogue over legislation can only be viewed as a positive. Not only are these bodies able to present the requirements of their members to the FDA to ensure new and existing legislation is in the best interests of the patient, they are also able to use their constant contact with the lawmakers to educate and inform. Both the FDA's pursuit of ensuring quality products, and the companies themselves going to ever greater lengths to provide patients with access to breakthrough products at affordable prices, demonstrates that patient well-being is a unified aim. •

Dr. Lawrence Yu

Deputy Director,
Office of Pharmaceutical Quality
U.S. FOOD AND DRUG ADMINISTRATION (FDA)

Can you provide a brief history explaining the evolution of the Office of Pharmaceutical Quality?

I had been working with the FDA for over 15 years before I was asked to lead the launch of the Office of Pharmaceutical Quality (OPQ). The FDA has for many years been watching and weighing the implications of modern, global challenges to pharmaceutical quality. Within the last several years, we have all seen a number of public health crises that are tied to issues of pharmaceutical quality, such as drug shortages and high rates of product recall. FDA strategies to meet these challenges are crystallized within the OPQ. OPQ staff comprises professionals from a number of disciplines and business and technical specialties, with many of our scientists holding PhDs or other advanced degrees. The integrated teamwork that cuts across our offices makes the OPQ work environment very exciting and dynamic, as does the shared sense of mission we have to ensure that quality medicines are available to the American public. OPQ staff play important roles in inspections, both abroad and in the United States, and our review specialists are integrated not only into the inspection of establishments that contribute to drug manufacturing, but also into quality-related concerns in surveillance, policy, and scientific research across a pharmaceutical landscape. Our depth of specialization is matched by our commitment to integrating our knowledge and approaches in safeguarding clinical performance. This combination of specialization and integration is the hallmark of OPQ. We have an exciting sense of working to ensure that the patients of today and tomorrow will have access to the best medicines possible.

Can you elaborate on your policies?

Being a large organization and working in a biomedical environment that is constantly advancing, it is crucial that we have consistency and transparency in our policies. For example, one of OPQ's goals is to maintain the parity between generic drugs, which currently make up the great majority of prescribed medication in our country, and new drugs, which entail enormous innovative challenges. The rigor of regulatory review and scientific development must be applied equally to both generic and innovator drugs, and, accordingly, FDA policies must meet the demand for parity in generic–innovator regulation and development. Our policies must also recognize global realities in drug manufacturing, so that our inspection activities remain effective and make best use of our resources. Integrating resources and developing methods to assess pharmaceutical quality around the world have entailed important policy changes. We regulate a wide array of medical products and must constantly be prepared (1) to review product and process design, development, and control; (2) to assess the facilities where drugs and drug components are manufactured; and (3) to survey a great number of products on the market. A major thrust in OPQ policy is to integrate appropriate specialists into teams, so that our review activities in each of these three areas are efficient and properly informed. We stress collaboration and communication in OPQ, which is reflected in our motto, "One quality voice."

What are some major challenges that OPQ faces today?

We have a very high workload, much of which predated our launch in January of this year. We are well into tackling the backlog of generic drug product applications. Integrating disciplines and professionals is always a huge challenge, and our work culture is still in flux, which is both exciting and challenging. OPQ is fortunate to comprise many highly talented people who by nature are eager to learn and inclined to take on new challenges.

How have your relationships with your manufacturers evolved, and how have you incorporated innovation?

Our vision is to be a global benchmark for regulation of pharmaceutical quality. We are working under the motto, "One quality voice." All stakeholders have a role to play in quality. In OPQ, we have to support relationships that promote the evolution of pharmaceutical quality and must work to involve stakeholders and innovators from industry, federal partners, and professional and patient organizations. Modern technology will cause a shift in terms of doing business, and emerging methods will both challenge and advance our missions, whatever our sector may be. The stakes are too high for any one of us to fall behind. In OPQ, we have an emerging technology team, whose job is to encourage the development and implementation of new technology in the pharmaceutical field. The team is deeply engaged with several major pharmaceutical players, and these meetings help us gauge industry trends and move technology in the right direction.

Where will OPQ be in five years?

We have developed and implemented the team-based integrated quality assessment. When we practice surveillance, do inspections, conduct examinations, perform reviews, and make suggestions to industry, we draw in a concerted way from the entire scope of OPQ expertise and resources. We are working to build a future in which manufacturing quality throughout the industry recapitulates the standards of product efficacy and safety reflected in product approval by the FDA. •

John Oroho

Executive Vice President and
Chief Strategy Officer
PORZIO LIFE SCIENCES

Could you give us some background into the reasons behind establishing Porzio Life Sciences?

Porzio Life Sciences is a wholly owned subsidiary of the law firm Porzio, Bromberg & Newman. At the turn of the millennium, we began to see a real development of regulation in the United States, in which life sciences companies did not only have to concern themselves with Congress and the FDA, but also state-level regulation. The states license healthcare practitioners with prescriptive authority. It became very difficult to maintain oversight of these varying state laws and we realized we needed to create a tool to track all of the relevant laws and regulations, as well as all pending legislation, for the benefit of the life sciences companies. We started building databases in 2003 and Porzio Life Sciences was launched in 2004.

Could you explain how Porzio Life Sciences has developed over the past decade?

We started with three databases and now have a total of 16, covering a myriad of issues relating to the states and federal governments. Our most recent databases cover international laws. We aggregate information about all these laws, analyze it and populate our databases. We are then able to inform companies about how to operationalize these regulations.

Our parent company has had a big impact on our operations because it is a well-known company within the life sciences industry, particularly in New Jersey. When we started building these databases, companies approached us about assisting them on various projects and building systems so that they could outsource their requirements to us. We then look at the technology we can build to enable that, or at how we can work in conjunction with the companies to assist them with various aspects of compliance.

How does Porzio Life Sciences work with its clients both on a domestic level and internationally?

Here in the United States we work with distributors and vendors in the pharmaceutical, biotechnology and medical device segments. Overseas, most of the work we do is for pharmaceutical and medical device manufacturers. We assist US companies trying to commercialize a product in Europe and we have a group dedicated to that. This is especially useful for emerging companies that do not have operations in Europe and are not connected to distribution networks.

There has been a global push for transparency, following the lead of the Affordable Care Act in the United States. The European Federation of Pharmaceutical Industries and Associations created its own Code and is pushing for its member country associations to adopt a version of it, to remove the need for country-specific regulations. As that developed, companies started approaching us to assist with their reporting; this spawned Porzio GST, our global compliance database, and is the reason why we established our operations in the Netherlands in spring 2015.

Could you talk us through Porzio's various technologies and how it utilizes them to service client requirements?

Our databases include color-coded maps, matrices and granular regulatory detail, as well as our analysis as supporting documents. This means they can drill down further into the regulatory detail if they are interested. We also push information out on a daily basis in the form of information center updates. The information that our regulatory analysts upload is first put through a quality review and then overseen by attorneys, to give the client peace of mind.

We built our first aggregate spend system that captured information from the various states and we worked with companies to file reports on an annual basis. Even before the Affordable Care Act there was a push from the industry to have a uniform federal law because companies were concerned they would have to deal with different data formats from the individual states.

We have a database that covers licensing; we look at pending laws and anticipate how companies will have to comply with them when they come into effect. We also have a distribution database informing companies what licenses they require across the country, the types of records they are required to maintain and the types of violations involved with failures in licensing and recording.

Looking ahead, how do you expect Porzio Life Sciences to develop?

I think over the next three to five years our business is going to grow because of the growth of international transparency. We need to ensure that our clients' interactions, worldwide, are appropriate and compliant and we will continue to be driven by their needs. •

Vishal Gupta

Partner
STEPTOE AND JOHNSON LLP

Can you provide a brief history of Steptoe and Johnson?

Steptoe is a 600-attorney international law firm with specialists in various areas of the law and offices in Washington D.C, New York, Palo Alto, Phoenix, Chicago, Los Angeles, Brussels and London. Steptoe has a robust IP practice including more than 60 practitioners concentrating on patent litigation, patent prosecution, counseling, due diligence, trademarks and copyrights. We have been steadily expanding as a firm, especially in the life sciences segment of our intellectual property (IP) department. With respect to the life sciences, our attorneys have deep technical expertise and extensive experience in subject matter encompassing pharmaceuticals, biologics, and medical devices.

What services does Steptoe offer the life sciences industry?

Steptoe regularly handles all aspects of IP for the life sciences industry, inclusive of patent litigation, patent prosecution, post grant proceedings, licensing, and due diligence. Some of our attorneys have focused their entire careers on life sciences-related IP matters and have advanced technical degrees in areas such as molecular biology, chemistry, chemical engineering, and biomedical engineering.

We litigate patent cases relating to key biologic and pharmaceutical products in federal district and appellate courts throughout the country. These cases are highly complex, not only because of the technology involved but also because of regulatory interplay with patent litigation. For example, we always make sure to consider the timing of regulatory approvals and business considerations when formulating our litigation strategies. We have also handled numerous post-grant proceedings before the U.S. Patent and Trademark Office, separately and in conjunction with litigation depending on a client's desired outcome.

Steptoe also has attorneys that specialize in patent prosecution (procurement) and strategic counseling to help our client obtain patents and assemble/build portfolios. We also strategically advise on patent life cycle management for various products (e.g. different patents can cover different aspects of a product and have different expiration dates).

Additionally, transactional work is an area that Steptoe focuses on. We represent our clients in matters such as due diligences for mergers/acquisitions and the licensing of IP.

I personally focus on complex patent litigation, transactional matters and counseling in the life sciences arena.

What are some of the complexities of dealing with biosimilars as opposed to small-molecule generics?

Biosimilars have added complexities from both a development standpoint as well as litigation. First, since biosimilars are synthesized in living cells and are very large, they are more difficult to work with and are more costly to develop than small molecules.

When filing biosimilars—just as for generic drugs—there is an abbreviated process to gain approval from the Food and Drug Administration, relying on clinical studies of a reference-listed drug. With the associated litigations, however, biosimilars generally involve more patents than in small molecule generics (thus adding further complexity to litigation associated with biosimilars).

Is the strength of American patent protection and regulatory exclusivity encouraging companies to invest in R&D and develop new drugs?

Generally speaking, the United States grants a limited monopoly for a claimed invention to a patent owner, which encourages innovation. In the pharmaceutical space specifically, additional regulatory market exclusivity (i.e. a period where a generic drug or biosimilar cannot enter the market) associated with novel small molecules and biologics also promotes innovation. Based on the benefits of being the first to file for patent protection and develop a new drug, pharmaceuticals and biologics R&D remains lucrative. Yet it should be noted that many pharmaceutical companies, particularly in biotech, are making strategic patent/product acquisitions of companies with projects and patents in the pipeline, which also encourages large and smaller players to innovate.

In the future, what issues will arise in the pharma space?

Due to the highly lucrative nature of biologics, more biologics patents/products are being generated, which will lead to increased litigation. We will continue to see non-traditional scenarios in terms of the litigants involved; for example, brand versus brand companies and generic versus generic companies, whereas in the small molecule space, it is generally brand versus generic.

Another interesting trend that is the increased use of Inter Partes Review (IPR). IPR is a proceeding before the U.S. Patent and Trademark Office that exists to review the patentability of a claim that generally has the advantages of being quicker and of lower cost than a litigation. Depending on the scenario, pharmaceutical companies are filing IPRs as an alternative to litigation or in addition to litigation, as a strategy to get to a desired outcome such as patent invalidation or settlement.

Many IPRs have already been filed for small molecule drugs, and, due to the high volume of patents involved in biologic and biosimilar disputes, IPR filings will continue to rise. •

Matthew Hudes

U.S. Managing Principal, Biotechnology
DELOITTE

Could you give us an introduction to Deloitte's biopharmaceutical segment and its importance to the company's overall strategy?

Our biopharmaceutical segment spans all of our businesses: audit, tax, and business advisory. Since I arrived at Deloitte 11 years ago, we have been building the practice significantly and are now ranked as the number one professional services firm in the life sciences and healthcare industry. In terms of our strategy, we analyze six life events that our clients typically go through and how Deloitte can service their needs. One of the events typically occurring early on in a company's life is a major alliance or licensing deal. We have experience with valuing and structuring those deals, as well as with the tax implications. Subsequently, a company may take on manufacturing capacity by building a plant, for example. Tax implications play a role in that, but the considerations regarding location, the actual building project and fitting it out with the required information systems are capabilities that Deloitte can aggregate across all of its businesses. We are also able to implement and realize the strategies that we develop, which is the key differentiator for Deloitte against its competitors.

Could you talk about Deloitte's client base and the dynamics of building relationships?

Our client base is fairly evenly split between the United States and the rest of world and stems from both our operations in other business areas as well as organic growth in the life sciences area. With regards to developing relationships, we like to follow the science. If a company's model is going to change the practice of medicine or change patients' lives, we want to be involved. Our involvement can begin at a very early stage, enabling us to identify transformational companies and provide the kinds of services they require, all the way up to the very largest corporations that are completing mergers and acquisitions. The clients themselves want to understand the best practices, and we can bring a global perspective.

In terms of regulation, what are some of the major challenges faced by your clients and how is Deloitte able to provide assistance?

One big theme is the impact of healthcare reform, which not only covers the extension of insurance provision to those who did not previously have access to it but also a wide range of other areas, all of which have regulatory implications. The market is not only going to be larger, it is also going to be more competitive. There is also the issue of quality of care and the fundamental shift from a system based on quantity of procedures to one based on the outcome of those procedures. Sharing the diagnostics used by life sciences companies to determine outcomes will in turn enable the regulators to determine the best method of reimbursement. It is an area of regulation that is inextricably linked to healthcare reform.

Biosimilars bring further challenges. We now have the ability to bring these types of product to market and it is being actively encouraged under the Affordable Care Act in order to lower overall costs. However, unlike their generic counterparts, biosimilars are not classed as completely interchangeable with branded drugs. The impact of this on consumer perception is as yet unknown.

From the push to internalize operations in 2009, we are now seeing an increase in demand for outsourcing. Is this the future?

From one perspective, both the largest and smallest pharmaceutical companies are all looking to optimize non-core areas by outsourcing to CROs, CMOs, and the like. Furthermore, in the last few years we have been seeing a trend towards not only looking externally to license a product, but also to actually stimulate external innovation. Some are sponsoring start-ups without expectation of further collaboration, while others are taking entire research groups out of the academic setting and funding them in order to own the rights to their results. There is diverse activity across the spectrum.

What trends are occurring in M&A activity and what knock-on effects will they have on the industry?

Traditionally, M&A has been a way to step up a company's level of growth. Valuations are based not only on their current revenue stream, but also on their future pipeline and projected earnings. Today, we are seeing an increase in smaller acquisitions that epitomizes the scientific transformation of the biopharmaceutical industry, as it moves towards a more biotechnology-oriented one. Larger molecule products, and the expertise required to design, develop, and manufacture them, are fuelling the latest wave of acquisitions. In 2014, we saw 82 IPOs in the industry; at some point, those companies will also be looking to license their products, form commercial alliances or make outright acquisitions.

What will the next five years hold for Deloitte in terms of expansion of capabilities offered and market exposure?

A key area will be what I term digital health. At present, the interaction between biopharmaceutical companies and patients is indirect, through healthcare providers and insurance companies. There is, however, an opportunity to bypass the middleman through digital health with social media, wearable devices, and mobile apps, which can connect patients and their families with healthcare. •

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Lawrence D. Sloan

President and CEO
SOCIETY OF CHEMICAL MANUFACTURERS AND AFFILIATES (SOCMA)

Can you talk about some of the recent developments within SOCMA and tell us how the association has evolved since we last met with you in 2012?

One major step for us since 2012 has been to take our ChemStewards® program, which is celebrating its 10th anniversary this year, to "the cloud." ChemStewards®, our environmental, health, safety and security (EHS&S) program, is similar to Responsible Care (a program designed generally for large multinational chemical companies). ChemStewards® was launched at the request of our members and tailored to meet the unique needs of batch chemical companies. By taking this program to "the cloud," it allows every SOCMA member who participates in the program to have a web portal specific to their company that can be accessed from anywhere in the world. This move has been successful in making program compliance easier for our members and in facilitating the third-party auditing process. We are also developing our chemical operator-training program, which is an overview course used both within industry and is now being promoted to offer community colleges for people who have little to no knowledge of the chemical industry. We have taken the program to the web and are now looking to refine it.

Can you outline the key areas on which SOCMA is focusing today as a legislative advocate for its members?

Last fall, we saw the successful passage of the Chemical Facility Anti-Terrorism Standards program, which was reauthorized in its current form. Today, we are focusing on a number of legislative areas, three of which are Toxic Substance Control Act (TSCA) reform, free trade and the Miscellaneous Tariff Bill (MTB).

True, meaningful TSCA reform is within reach, and we are very pleased with efforts from both the U.S. Senate and the U.S. House of Representatives on this issue. In the Senate, the Frank R. Lautenberg Chemical Safety for the 21st Century Act (S. 687) will be considered by the full Senate before the August recess. In the House, the TSCA Modernization Act of 2015 (H.R. 2576) recently passed out of the House Committee on Energy and Commerce and will be voted on by the full chamber during the week of June 22. There is strong consensus now across the chemical industry and across non-governmental environmental groups, and these are certainly the best chances of seeing some tangible change that we have had in more than a decade.

With regard to free trade, we are actively advocating for passage of the Transatlantic Trade Investment Partnership (TTIP) between the U.S. and the E.U. and the Trans-Pacific Partnership (TPP), which involves the countries that ring the Asia-Pacific. The specialty chemical industry has more to gain than any other manufacturing sector from the pending free trade agreement with the E.U. The U.S. chemical industry spent more than $1 billion in export tariffs in 2011, and $600 million was spent by organic chemical manufacturers. Both free trade agreements are currently being negotiated, but before their passage, Congress must pass Trade Promotion Authority (TPA). This will give the President authority to negotiate these two trade agreements. Once TPA is approved, it will be much easier to have TTIP and TPP passed by Congress. The Senate has already approved TPA, with a House vote scheduled for June 12.

The MTB expired in 2012 and has yet to be reauthorized. Currently, any company importing a raw material of which there is no domestic supplier is obliged to pay a tariff of up to 6.5%. According to SOCMA's recent Business Outlook Survey, conducted in conjunction with UBM, owner of the InformEx trade show, 80% of respondents reported they import raw materials for which there is no duty suspension procedure in place. Of those who utilize the MTB, nearly 30% saved between $500,000 to more than $1 million per year on duty suspensions. This underscores the need for SOCMA to play a leading role to advance the MTB in Congress. For more than 30 years, Congress had supported American manufacturers by suspending duties on imported products that are not made in the United States. These savings allowed the U.S. specialty chemical industry, as well as a number of other U.S. manufacturing industries, to keep their products at globally competitive prices and pass the duty suspension savings along to their customers. However, we have yet to find the right vehicle to pass this important legislation.

Do you have a final message for GBR's readers?

SOCMA continues to meet the needs of specialty chemical manufacturers across the globe, from small and medium-sized enterprises (SMEs) to large international companies. All our members are equal stakeholders. With so many complicated regulations and laws governing our industry, we are a resource for our members and are their voice on Capitol Hill, advocating for laws and regulations that are based on sound science. For those companies that rely on Chemstewards®, we are pleased to report the program is celebrating its 10th anniversary. With the development of its new web interface and an upcoming national conference being held in Houston this October, this is a banner year for the program. •

Competition Breeds Progress U.S. Pharmaceutical Manufacturing

"The industry is evolving and there is clearly consolidation happening at the moment. I think this is actually a very positive trend for patients because, as investment in R&D and infrastructure becomes ever more demanding, companies require critical mass in order to bring new products to the marketplace. Considering the recent major concerns regarding products hailing from emerging markets, having that critical mass also allows us to be at the forefront of quality and compliance."

- Carlo De Notaristefani,
President and CEO, Global Operations,
Teva Pharmaceutical Industries Ltd.

Image: Merck & Co, Inc.

International Giants Versus the Rising Stars

The dynamics of a free pricing market and its players

By James Hogan

$1 trillion

Global Revenues, U.S. Pharma Industry

Source: WHO

3.4 million

Number of Jobs, U.S. Pharma Industry

Source: WHO

The U.S.-based pharmaceutical industry conducts the majority of the world's research and development (R&D) in pharmaceuticals. In 2012, of the approximately $137 billion spent globally on pharmaceutical research and development (R&D), around $50 billion was from the United States. By comparison, European countries spent on aggregate around $34 billion in the same year. The industry supports nearly 3.4 million jobs across the United States. Globally, the pharmaceutical market has reached nearly $1 trillion in revenues, of which the United States has generated more than 40%.

However, no environment is as constantly changing as that of the pharmaceutical industry and, as such, no environment is as competitive. The high levels of risk and astronomical amounts of money that go into new drug R&D makes for poor sleep for the C-suite members of this industry. Although still dominated by the instantly recognizable names of the few "big pharma," the rising importance of biotechnology and the constant stream of innovation and new drug development methods means that the space is providing a wealth of opportunity for rising stars.

Johnson & Johnson (J&J) is once again at the top of the list of the largest pharmaceutical companies in the world in terms of revenue, reaching $74.3 billion in 2014 and boasting $16.3 billion in profits. Headquartered in New Jersey, the "medicine chest of the world," J&J has been a world leader in this industry for well over a century. Other notable names in the top 10 are Pfizer, Merck and Abbott Laboratories, all U.S.-based companies.

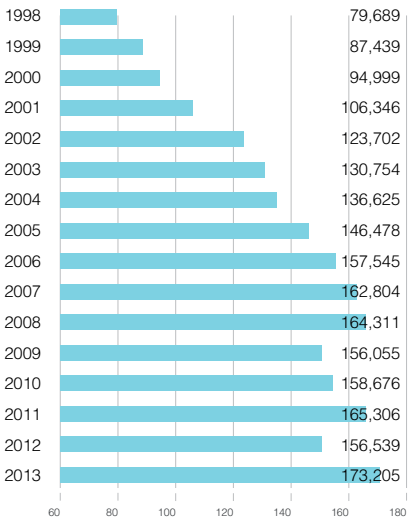
Behind the massive profits of these giants lies a fundamental fact: saving lives costs money. Though the actual manufacturing of a pharmaceutical product is relatively inexpensive, the development of a drug costs millions. This process is steeped with risk and the vast majority of new drug candidates never reach FDA approval. According to PhRMA, the cost of developing a single pharmaceutical amounts to more than $1.3 billion. Latest research by the Tufts Center for the Study of Drug Development doubles that estimate, at $2.6 billion.

Developing a new drug is a gamble and the stakes are high—as are the prices for such medicines, which is a cause for debate. Critics argue that just because a profit can be made from something does not make it right, particularly in regards to public health, while the argument from the pharmaceutical companies, free to set their own prices, is that these costs are necessary to fund their research. Drug prices are rising annually and health care insurers are becoming stricter in their reimbursement policies. Even the price of generics is rising, though from a much lower initial price point.

The Patient Protection and Affordable Care Act, commonly known as Obamacare, is aimed at bringing healthcare to those in the U.S. unable to afford it. This move by the government has become a top concern for pharmaceutical companies. The changes that the bill will enforce have already begun to be addressed, with companies adjusting to cope with imminent price reductions and making efforts to become more transparent. This bill led to a much-needed healthcare reform, but companies must now ensure their future operations in a brave new world of healthcare provision.

U.S. PHARMACEUTICAL PREPARATION MANUFACTURING GROSS OUTPUT, 1998-2013 ($ MILLION)

Source: Statistica

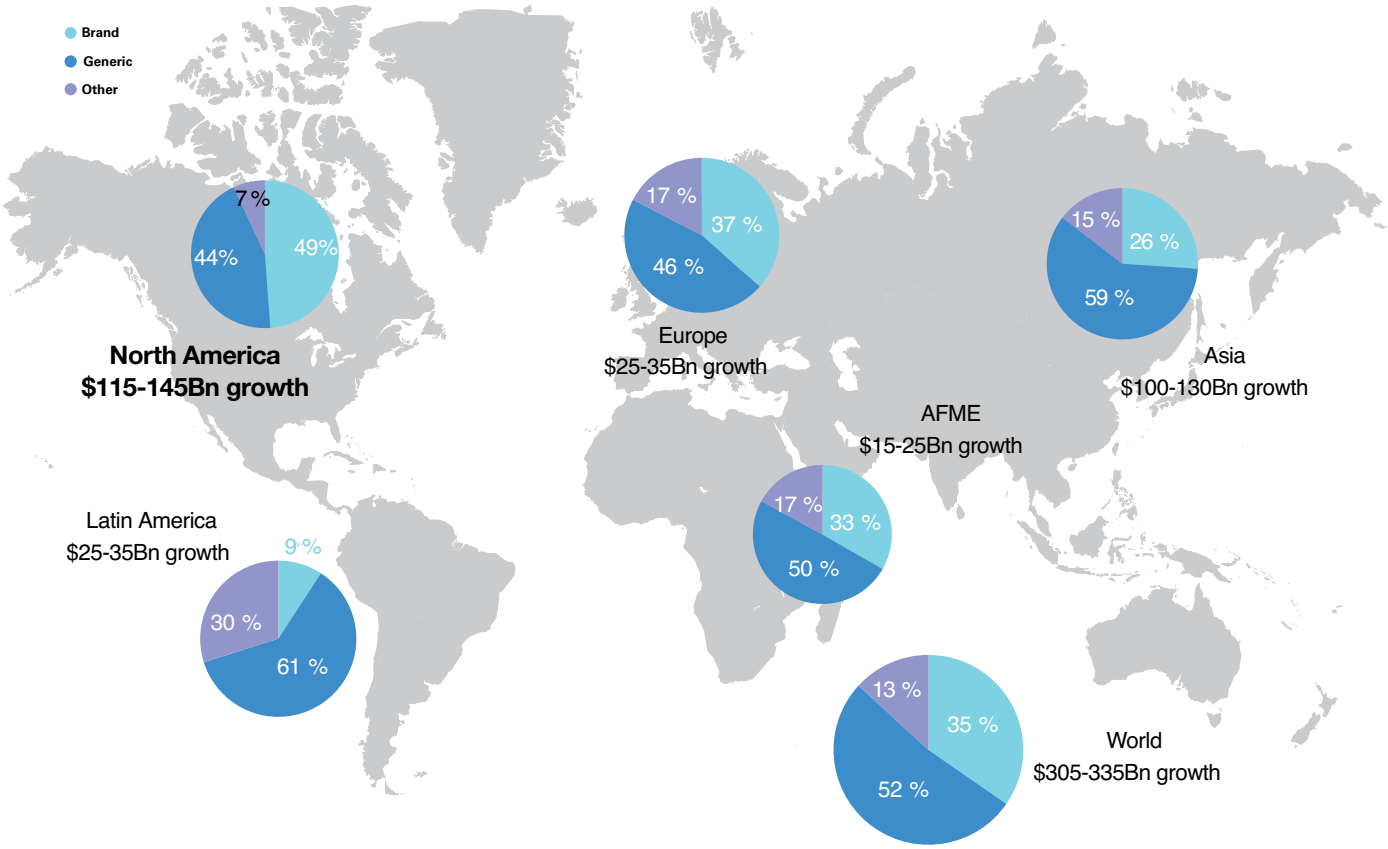


Pharma Chameleon

In a push to offset any risks to their prescription drug profits, a number of the large pharmaceutical companies have diversified to maintaining other healthcare-related business units, such as a consumer healthcare product line or a medical devices division. Abbott Laboratories, for example, is split into three main areas: pharmaceuticals, hospital products and nutritional products. This diversification has also fu-

GEOGRAPHIC DISTRIBUTION OF MEDICINE SPENDING (2014)

Source: IMS



eled mergers and acquisitions (M&A) activity in this sector, with companies trading business arms in order to refine their focus. German company Bayer last year closed a deal with Merck to take over its over-the-counter (OTC) business segment, while GlaxoSmithKline and Novartis conducted a swap of assets worth $20 billion in early 2015. Such deals can radically alter the playing field. "As a service provider we always have to be one step ahead and understand market needs," said Ramesh Subramanian, vice president of strategic marketing for Piramal Healthcare. "Recently, we have seen two of our customers merge and we have seen another customer spin out a segment and sell it to another of our customers."

Another major driver for M&A activity is large players ensuring the future of their drug candidate pipelines. New drug development has picked up, with the FDA approving 51 new medicines in 2014, the highest number since 1996. Research is also tending towards the specialty area—in the same year, 41% of those new drug approvals were for first-in-class mechanisms, with a further 41% approved for the treatment of rare diseases—highlighting the overall shift towards biotechnology. R&D looks then to be falling into the hands of the start-ups and virtual companies, or a single individual with an idea. It is these small entities and pipelines that the few at the top are fighting to acquire. "Pharmaceutical companies are trying to refine their portfolios. They know the greatest investment is in specialty areas," said Angeliki Cooney, director of strategic planning at IMS Health. "Many larger companies are therefore buying small biotechs in order to acquire assets they have been unable to develop themselves."

But what effects does this rapidly changing landscape have on the market and what does the nature of the acquisitions forecast for the future of the industry? "Traditionally, M&A has been a way to step up a company's level of growth," said Matthew Huddes, U.S. managing principal for Deloitte's biotechnology business segment. "At present we are also seeing an increase in smaller acquisitions. This epitomizes the scientific transformation of the biopharmaceutical industry as it moves towards a more biotechnology-oriented one. Larger molecule products, and the expertise required to design, develop and manufacture them, are fueling the latest waves of acquisition."

2014 saw levels of M&A activity in the pharmaceutical industry at their peak. This record is set to be matched this year as M&A activity shows no sign of slowing and companies continue to use this as a strategy to achieve their goals. It is evident that this sector is in a period of rapid upheaval. Deceleration in U.S. market growth and dramatic healthcare reforms are significant factors at play in the country's pharmaceutical industry. With the restructuring of the developers and manufacturers, coupled with consolidation on the consumer side, it can be expected that 2016 will see a very different market in place. •

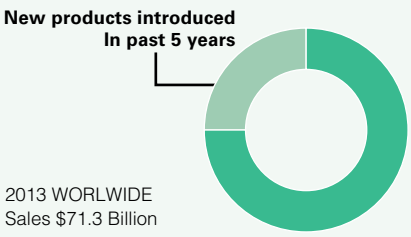
Johnson & Johnson

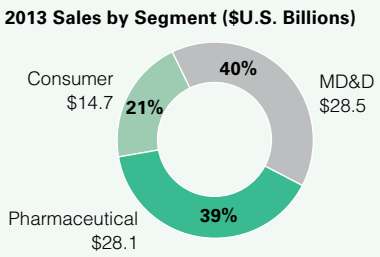
FOUNDER

James Wood Johnson
Robert Wood Johnson
Edward Mead Johnson

LEADERSHIP

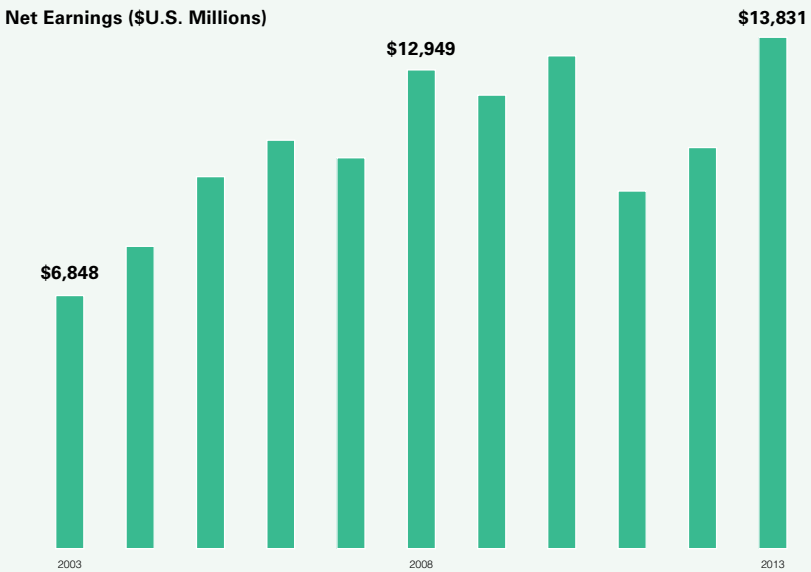
Alex Gorsky-
Chairman of the Board and CEO





R&D FOCUS AND APPROVALS

The Pharmaceutical segment of Johnson & Johnson invested $6.2 billion in R&D in 2014. The Janssen Pharmaceutical Companies of Johnson & Johnson are dedicated to addressing and solving the most important unmet medical needs of our time. including oncology (e.g., multiple myeloma and prostate cancer), immunology (e.g., rheumatoid arthritis, irritable bowel disease and psoriasis), neuroscience (e.g., schizophrenia, dementia and pain), infectious disease (e.g., HIV/AIDS, Hepatitis C and tuberculosis), and cardiovascular and metabolic diseases (e.g., diabetes). Driven by our commitment to patients, we develop sustainable, integrated healthcare solutions by working side-by-side with healthcare stakeholders, based on partnerships of trust and transparency. We collaborate with the world for the health of everyone in it. To learn more, visit: Janssen.com.



UPCOMING PRODUCTS

The last five years have been exceptionally nice for investors, as J&J has introduced 14 novel compounds to market – seven of which have turned into blockbuster drugs. Recently, Johnson & Johnson also outlined plans to file for an additional 10 drugs between 2015 and 2019, all of which it believes could hit blockbuster status of $1 billion or more in annual sales. Not surprisingly, J&J's pharmaceutical segment, sans currency effects, grew by 10.2% on an operational basis in the first quarter, including a whopping 16.9% in the United States, the world's largest and most in-demand pharmaceutical market.

CORPORATE SOCIAL RESPONSIBILITY

Healthy Future 2015 is both an extension of and departure from our past goals. It builds on our previous environmental goal setting and performance, while also incorporating social- and transparency-related priorities that our stakeholders expect of us. These range from environmental sustainability and enhanced supply chain stewardship, to greater transparency and commitments to address diseases in the developing world – areas in which we believe we can make a meaningful contribution to society. These are not new priorities for us, yet it's the first time we have established social goals and targets as part of our overall strategy. •

Pfizer Inc.

FOUNDER

Charles Pfizer and Charles Erhart founded Charles Pfizer & Company

LEADERSHIP

IAN C. READ- Chairman And CEO

REVENUE AND GROWTH

The majority of our revenues come from the manufacture and sale of biopharmaceutical products.

Revenues in 2014 were $49.6 billion, a decrease of 4% compared to 2013, which reflects an operational decrease of $1.1 billion, or 2%, and the unfavorable impact of foreign exchange of $912 million, or 2%.

R&D FOCUS AND APPROVALS

Pfizer is prioritizing its research and development efforts in areas with the greatest scientific and commercial promise: immunology and inflammation, oncology, cardiovascular and metabolic diseases, neuroscience and pain, and vaccines. Through major research efforts across multiple modalities — including small molecules, biologics and vaccines — Pfizer is developing the medical solutions that will matter most to the people we serve. Specialized efforts in biosimilars as well as rare diseases also illustrate our dedication to developing and delivering innovative medicines and vaccines that will benefit patients around the world.

Key Programs in Registration / Phase 3

- A potential biosimilar to Humira® (adalimumab): Rheumatoid Arthritis
- A potential biosimilar to Avastin® (bevacizumab): Non-Small Cell Lung Cancer
- A potential biosimilar to Remicade® (infliximab): Rheumatoid Arthritis
- A potential biosimilar to Rituxan®/MabThera (rituximab): Follicular Lymphoma
- Rivipansel: Sickle Cell Disease
- A potential biosimilar to Herceptin® (trastuzumab): Breast Cancer

Key Programs in Phase 2

- Anti-IL-6 Antibody: Crohn's Disease, Lupus
- Anti MAdCAM: Crohn's Disease, Ulcerative Colitis
- PDE5 inhibitor: Diabetic Nephropathy
- PDE10 Inhibitor: Huntington's Disease
- Prophylactic Vaccine for Clostridium difficile Colitis
- Prophylactic Vaccine for Staphylococcus aureus
- SMO Inhibitor: Acute Myeloid Leukemia
- Xeljanz® (tofacitinib): Crohn's Disease, Ankylosing Spondylitis

KEY PRODUCTS

Advil (ibuprofen)

Advil® temporarily relieves minor aches and pains due to: headache, toothache, backache, menstrual cramps, the common cold, muscular aches and the minor pain of arthritis. Advil®also temporarily reduces fever.

One of the main classes of chemicals that the body produces as part of the inflammatory process is prostaglandins, which produce pain and fever. Advil® acts by blocking the body's production of prostaglandins, reducing pain and fever.

Caltrate (calcium + Vitamin D)

Vitamin D helps your body absorb calcium. Vitamin D is either derived from the diet or produced by skin exposure to sunshine, which can vary throughout the year. So in addition to getting enough calcium in your diet through food or supplements, you must be sure to get enough vitamin D as well, to help calcium absorption.

Calcium is an essential nutrient that helps build and maintain healthy teeth and bones. Calcium also plays a role in muscle contraction, blood clotting and nerve function.* Most notably, as part of a healthy diet, adequate calcium throughout life may reduce the risk of osteoporosis, a disease that's characterized by a decrease in bone mass and an increase in bone fractures.

Centrum (multivitamin)

Multivitamins are intended to be used as part of an overall healthy lifestyle and can help fill the gaps in one's diet to help ensure people get the recommended amount of key vitamins and minerals needed each day.

CORPORATE SOCIAL RESPONSIBILITY

COMMERCIAL PROGRAMS TO IMPROVE ACCESS

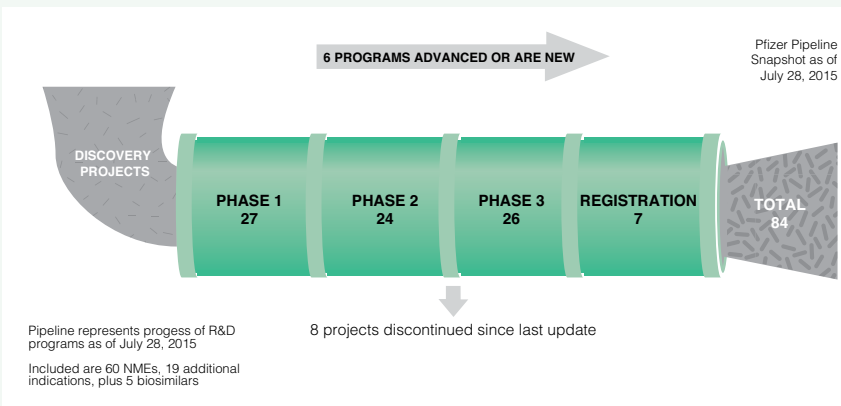
We are developing a portfolio of innovative business approaches as part of our strategy to increase access to our medicines in both developed and developing countries.

BUILDING HEALTH CARE CAPACITY AROUND THE GLOBE

Weak or non-existent health care infrastructures represent a significant impediment — among the largest — to access. We continue to explore and implement models and approaches tailored to the diverse needs of patients in different geographies. Seeking holistic approaches, we work closely with governments, health organizations and other stakeholders to address the complex challenges around improving health for the underserved.

GLOBAL PARTNERSHIPS TO EXPAND ACCESS

Pfizer helps expand access worldwide by working in partnership with non-governmental organizations, government agencies, multilateral aid organizations and other global health stakeholders to strengthen health care systems and improve care. Our investments also include programs that provide direct assistance, such as product donations and steep discounts, to help bridge current gaps in health care delivery to various underserved populations. •



Merck & Co, Inc.

FOUNDER
George W. Merck (1894-1957)

LEADERSHIP
Kenneth C. Frazier- Chairman and Chief Executive Officer

REVENUE AND GROWTH
Full-year 2014 sales were $42.2 billion.

R&D FOCUS AND APPROVALS
The company has four core areas of focus - Diabetes, Hospital Acute Care, Vaccines and Oncology. We had six new products approved in the United States in 2014, including novel medicines KEYTRUDA (pembrolizumab) for the treatment of advanced melanoma in patients whose disease has progressed after other therapies and BELSOMRA (suvorexant) for the treatment of insomnia. This year the European Commission approved KEYTRUDA for the treatment of advanced melanoma.

MARKET SHARE AND PRODUCT GROWTH
In 2014, the company experienced sales growth in the areas of Immunology, Diabetes, Hospital Acute Care, Vaccines and Animal Health.

UPCOMING PRODUCTS
The recently FDA accepted a Supplemental Biologics License Application (sBLA) for KEYTRUDA in advanced non-small cell lung cancer, as well as a sBLA for KEYTRUDA for first-line treatment of advanced melanoma, and granted priority review. Grazoprevir/Elbasvir, the company's chronic Hepatitis C combination regimen, was accepted for regulatory review in both the United States and European Union.

CORPORATE SOCIAL RESPONSIBILITY
Corporate responsibility is our commitment to discovering innovative solutions to the world's greatest health challenges while growing our business in a sustainable way. It is demonstrated as we apply our scientific and operational expertise, resources and diverse talents to addressing some of the world's biggest health, social, environmental and economic challenges. And it allows us to deliver greater value to both shareholders and society. •

AbbVie

FOUNDER

AbbVie began as the pharmaceutical leader, Abbott, which was founded in 1888 by Chicago physician, Dr. Wallace Abbott.

LEADERSHIP

Richard A. Gonzalez-
Chairman of the Board and CEO

REVENUE AND GROWTH

2014 Revenue: $19.9 billion

R&D FOCUS AND APPROVALS

>30% pipeline focused on biologics

UPCOMING PRODUCTS

IMMUNOLOGY

As leading experts in autoimmune diseases and therapies, AbbVie is focused on developing new medicines to address chronic progressive diseases in the field of immunology, including rheumatology and dermatology. AbbVie is investigating several diseases which have few or no treatments, including uveitis, hidradenitis suppurativa, pediatric Crohn's disease, osteoarthritis and lupus. In addition, we are progressing next-generation therapies in rheumatoid arthritis with the objective to improve the current standard of care.

THERAPEUTIC AREA	PHASE II	PHASE III/SUBMITTED
Immunology	ABT-494 *Rheumatoid Arthritis* ABT-122 *Rheumatoid Arthritis* ABT-981 *Osteoarthritis* ALV-003 *Celiac Disease* ALX-0061 *Rheumatoid Arthritis* *Systemic lupus erythematosus* *Tregalizumab* *Rheumatoid Arthritis* *Psoriasis* Filgotinib *Rheumatoid Arthritis* *Crohn's Disease*	HUMIRA (adalimumab) *Hidradenitis Suppurativa* *Uveitis*
Kidney Disease		Atrasentan *Diabetic Nephropathy*
Liver Disease	Next-Gen HCV Combination (ABT-493, ABT-530)	HCV 2-DAA Combination (genotype 1b) (Japan)
Neuroscience		Zinbryta (daclizumab) *Relapsing Remitting Multiple Sclerosis*
Oncology	ABT-414 *Glioblastoma Multiforme* Duvelisib *Indolent non-Hodgkin's Lymphoma* Veliparib *Other Cancers* Venetoclax *Acute Myelogenous Leukemia and Other Hematologic Malignancies*	Duvelisib *Chronic Lymphocytic Leukemia* Elotuzumab *Multiple Myeloma* Veliparib *BRCA-Deficient Breast Cancer Neoadjuvant Treatment of Triple Negative Breast Non-Small Cell Lung Cancer (NSCLC)* Venetoclax *Chronic Lymphocytic Leukemia*
Women's Health	Elagolix *Uterine Fibroids*	Elagolix *Endometriosis*

KIDNEY DISEASE

Kidney Disease affects 50 million people in the U.S. and Europe alone. We are researching potential therapies for CKD resulting from diabetes and for acute kidney injury in association with major surgeries.

LIVER DISEASE

Our antiviral program focuses on the development of treatments for chronic hepatitis C virus (HCV), a liver disease that affects more than 160 million people worldwide, with approximately three to four million new cases of infection every year. HCV infections potentially lead to long-term complications and chronic liver disease. AbbVie scientists are investigating a new all oral combination treatment regimen that is interferon-free for patients with genotype 1 HCV. Genotype 1 HCV represents the most prevalent patient type in the U.S. and Western Europe. We are committed to advancing science while finding the best treatment options for patients.

NEUROSCIENCE

Our current innovative research focuses on compounds that have the potential to treat a variety of chronic disabling neurological conditions. We have several compounds in the early and advanced investigational phases for diseases such as cognitive impairment associated with schizophrenia, Alzheimer's disease, Parkinson's disease, and multiple sclerosis (MS) — all of which affect millions of people worldwide.

ONCOLOGY

Our research is committed to discovering and developing targeted therapies that work against the processes cancer cells need to survive. AbbVie's oncology pipeline includes multiple new molecules in clinical trials being studied in more than 15 cancers and tumor types, including some of the most widespread and difficult-to-treat, such as multiple myeloma and chronic lymphocytic leukemia.

WOMEN'S HEALTH

AbbVie is currently investigating a treatment for symptoms related to endometriosis and uterine fibroids. Each affects more than 16 million women throughout the world. Both conditions are highly prevalent and are associated with a number of symptoms including pain, bleeding and infertility.

CORPORATE SOCIAL RESPONSIBILITY

AbbVie was named to the Dow Jones Sustainability World Index for our strategy to improve access to drugs and corporate citizenship. •

Allergan, Inc.

FOUNDER

Actavis plc (NYSE: ACT) has completed the acquisition of Allergan, Inc. (NYSE: AGN) in a cash and equity transaction valued at approximately $70.5 billion. The combination creates one of the world's top 10 pharmaceutical companies by sales revenue, with combined annual pro forma revenues of more than $23 billion anticipated in 2015.

Actavis was founded in 1984 by Dr Allen Chao and Dr David Hsia

LEADERSHIP

Brenton L. Saunders –
President and CEO

REVENUE AND GROWTH

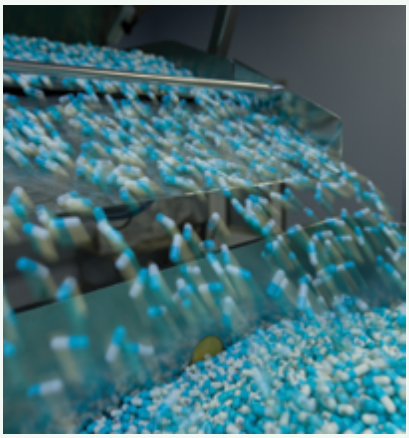
Q1 2015 Revenue: $4.2 billion

KEY PRODUCTS

Allergan is a $23 billion diversified global pharmaceutical company and a leader in a new industry model - Growth Pharma. The company is anchored by strong and sustainable brand franchises, a leading global generics business, a premier pipeline, highly efficient operations and an experienced management team creating an unrivaled foundation for long-term growth.

Brand Portfolio

Allergan's branded pharmaceutical business features six blockbuster franchises in key therapeutic categories, including Dermatology and Aesthetics; CNS; Eye Care; Women's Health and Urology; GI and Cystic Fibrosis; and Cardiovascular and Infectious Disease.



Generics Portfolio

The Company's Generics portfolio features more than 1,000 generics, branded generics, established brands and OTC products. Allergan is the third largest generic manufacturer in the U.S. where it continues to operate as Actavis. The Company also holds a top 5 leadership position in nearly 20 International markets.

Biosimilars

Additionally, Allergan's biosimilars program is developing treatment options within the Oncology therapeutic category.

RESEARCH AND DEVELOPMENT

Allergan's strategically focused R&D engine is built on novel compounds in specialty and primary care markets where there is significant unmet medical need, and fueled by an investment of approximately $1.7 billion in 2015. With an innovative product development portfolio exceeding 20 near-term projects and a world-class generics pipeline, which continues to hold an industry-leading position in First-to-File opportunities in the U.S. and more than 1,000 marketing authorizations globally, we are uniquely positioned within our industry to ensure our development activities support sustainable long-term organic growth.

CORPORATE SOCIAL RESPONSIBILITY

At Allergan, corporate social responsibility (CSR) is more than just a "good idea." We maintain some of the highest CSR standards in the industry, focusing our efforts on sustainability initiatives in the areas of energy use, environmental protection and employee health and safety.

Our employees around the world are encouraged to "think local," to develop innovative programs that respond to the needs and concerns of local communities as well as continuing our broader efforts to create a greener, healthier environment.

In addition, Allergan is one of only a handful of pharmaceutical companies to be a part of the United Nations Global Compact, which sets important guidelines in the areas of human rights, labor, the environment and anti-corruption. •

Gilead Sciences, Inc.

FOUNDER

Gilead was founded in June 1987 by Michael L. Riordan.

LEADERSHIP

John C. Martin –
President and CEO

REVENUE AND GROWTH

2014 Revenue: $24.474 billion

PRODUCTS

Since the founding of Gilead in 1987, we have focused on developing and delivering medications that advance the treatment of life-threatening diseases. The commercial success of our products provides us with the resources to generate new clinical data defining their profiles and supports our development of new therapeutic advancements. As we bring new products into clinical development, our goal remains the same - to discover, develop and commercialize therapeutics that advance patient care.

UPCOMING PRODUCTS

Gilead's research and development program identifies and evaluates investigational compounds that show potential to advance the treatment of life-threatening diseases in areas of unmet medical need. Gilead currently has products undergoing clinical trials in the following therapeutic areas HIV/AIDS, liver diseases, haematology/oncology, cardiovascular and inflammation/respiratory. •

• 2014

Harvoni®

Tybost®

Vitekta®

Zydelig®

• 2013

Sovaldi®

• 2012

Stribild®

Truvada® (for PrEP)

• 2011

Complera®

• 2010

Cayston®

• 2008

Lexiscan®

Viread® (for HBV)

• 2007

Letairis®

• 2006

Atripla®

Ranexa®

• 2004

Macugen®

Truvada® (for HIV)

• 2003

Emtriva®

• 2002

Hepsera®

• 2001

Viread® (for HIV)

• 1999

Tamiflu®

• 1996

Vistide®

• 1990

AmBisome®

Carlo De Notaristefani

President and CEO, Global Operations
TEVA PHARMACEUTICAL INDUSTRIES LTD.

Could you give us an overview of Teva Pharmaceuticals and the importance of U.S. operations to its global business strategy?

Teva Pharmaceutical Industries Ltd. was founded in 1902 in Jerusalem, Israel. Over the last century it has grown to become the largest generics manufacturer in the world. The business is evenly balanced between specialty products on the one hand and our generics business on the other. Our specialty business is worth almost $10 billion today and is focused on two main therapeutic areas: CNS and respiratory diseases, with some assets in oncology and women's health. Teva operates in more than 100 countries worldwide, with approximately 45,000 employees and a turnover in excess of $20 billion. The United States is our largest market and we are the number one supplier of biopharmaceutical generics products in the country. We also have a significant research and development (R&D) presence here, based out of our Pennsylvania headquarters, as well as manufacturing operations across the country.

Could you tell us more about your facilities in North America and the products you offer?

Our presence in North America is significant. We have three manufacturing facilities in Canada and two in Puerto Rico, while we have seven overall in the United States. One is dedicated to devices, two are focused on antibiotics, and the remaining four are in pharmaceutical products. We supply almost every pharmaceutical dosage form existing in the market, from more common delivery forms such as tablets and capsules in the oral solid dosage space, to more complex products such as injectables, biologics products, and sustained or modified release products and therapeutic proteins.

What has been the impact of Teva's recent acquisitions on your operations?

The most recent purchases have been Auspex Pharmaceuticals and Labrys Biologics to strengthen our specialty business, and the announced acquisition of Allergan Generics. Investment in the former two companies was for future growth and they have provided us with important technologies and pipeline assets. The proposed Allergan acquisition will strengthen our position as the number one generics provider not only worldwide, but particularly in the U.S. market.

What effect is the recent high volume of mergers and acquisitions (M&A) activity having on the industry as a whole?

The industry is evolving, and there is clearly consolidation happening at the moment. This is actually a very positive trend for patients because, as investment in R&D and infrastructure becomes ever more demanding, companies require critical mass in order to bring new products to the marketplace. Considering the recent major concerns regarding products hailing from emerging markets, having that critical mass also allows us to be at the forefront of quality and compliance.

What are your thoughts on the impact of the Generic Drug User Fee Amendments (GDUFA) fees and the associated challenges?

It has been a critical issue for the industry. We have seen huge investment from the industry to bring generics products to the market, with very little visibility about the FDA's internal evolution in terms of processing applications; having greater certainty about timings of drug approvals will provide a significant improvement in our ability to plan. The reality of GDUFA does not yet match the promise, but it is clearly a major step in the right direction.

With the onset of the patent cliff, what opportunities does this present for generics companies looking to capitalize on the end of patent protection for branded drugs and how can these companies overcome this challenge?

Obviously there are very large innovative companies that have been severely hit by the impact of pending patent expirations. However, they have evolved into what I would define as more of a mature, genericized brand rather than a pure generics company. In general, I do not believe that expanding into the

generics space has been a particularly successful or even popular strategy for them; generics and branded companies have different competencies, business models, and infrastructure needs. Teva is unique in that, over several decades, it has developed both businesses. If you look at the portfolio that we manage, the breadth and complexity of our products and technologies are at least double or triple that of the largest and most diversified of innovative companies. It is extremely difficult for a branded company to move into the generics space and vice versa.

Regarding opportunities for generics companies, Teva has been extremely successful in this area. We plan our investments in R&D to maximize the specific commercial opportunities involved with patent expirations and this contributes to our long-term plan. U.S. legislation has allowed this successful model to occur, to the benefit of both the industry and the patient.

How have new drug trends, in areas such as personalized medicine, affected the industry?

This concept has been around for several years but we have not yet seen many examples of commercial success. There has clearly been an evolution towards niche therapeutic areas, but the vision of individual products customized for a particular patient has not yet become reality. However, there are clearly signs of evolution in that direction, such as gene testing to identify suitable therapies, particularly in oncology. Teva has made recent investments in personalized medicine through M&A to further strengthen the company's leadership in this area. Over time, some of these new concepts have moved into the generics space, creating opportunities for us to evolve our technologies.

Looking ahead, where can we expect to see Teva and the industry in the next five years?

Hopefully we will continue to be in everybody's medicine cabinet! In the specialty business, we are exploring therapies in areas within CNS, such as migraine, which, although one of the most debilitating diseases, is not very well understood. Also, within CNS, we are moving into new areas such as movement disorders and pain, in addition to our established position in the MS category. In respiratory, we have a strong pipeline and are developing innovative patient technologies for asthma and chronic obstructive pulmonary disease that will continue to make Teva competitive in this therapeutic area. In the generics space, we hope we can be a key component in solving the question of how to provide effective, affordable, high-quality healthcare in an environment of constrained resources. •

Michael Raya & Spiro Gavaris

MR: President and CEO
SG: Vice President Sales and Marketing
WEST-WARD PHARMACEUTICAL CORP.

MR

SG

Could you give us a brief overview of West-Ward and its history since being taken over by Hikma Pharmaceuticals in 1991?

MR: West-Ward was formed on the corner of West 156th Street and Ward Avenue in the Bronx in 1946. It was privately owned by the Green family until 1988, when it was purchased by distribution company Moore Medical. West-Ward was then sold to Hikma in 1991 and the company quickly became the U.S. agent for all of Hikma's sister companies worldwide. I joined West-Ward about seven months after the purchase, in 1992. Today, West-Ward manufactures about 70% of everything that Hikma sells in the United States and imports about 30% of its business from its Hikma sister companies worldwide.

What is the role of West-Ward within Hikma's wider corporate strategy?

MR: West-Ward is the company name of the U.S. operations for Hikma and the business is divided into two product lines: injectables and non-injectables. West-Ward mostly serves the U.S. market, although we do export some of our injectable products worldwide. Hikma's strategy is to become one of the top-five generic drug manufacturers in the United States. For the injectables side of the business, our strategy continues to be broadening our product pipeline, through internal research and development (R&D) and external business development, and portfolio; we have more than 30 pending applications with the FDA and we purchased the Ben Venue site and the Bedford injectable business in 2014, which gave us the largest injectables portfolio in the United States. We are also finalizing a specialized drug delivery system with a company called Unilife Corporation, which will commercialize in the next couple of years.

Expanding the non-injectables side of our business is now an area of focus following Hikma's recent agreement to purchase Roxane Laboratories. This will make Hikma the sixth largest overall generics player in the United States and will create more balance between the two product line divisions. Roxane will provide us with a variety of differentiated, non-injectable product types including sustained release, Paragraph IV opportunities, controlled drugs, products requiring complex bioequivalence studies, and risk evaluation and mitigation strategy (REMS) programs. It also provides us with a variety of dosage forms to expand on the solid oral dosage forms in which we are already strong. In addition, we are evaluating the market for transdermals, dermatologicals, inhalants, ophthalmics and optics.

Although the U.S. market makes up 90% of West-Ward's business, two years ago we established West-Ward International, leveraging the Hikma footprint in the MENA region to sell where there is a demand for FDA-approved products. Our differentiated portfolio and high-speed injectables capability, combined with the lack of injectables manufacturing capacity available worldwide, means that we are able to respond to market shortages in countries around the world. This aspect of our business will continue to grow moving forward.

Could you give us an overview of Hikma's facilities both in the U.S. and worldwide and how they serve your needs?

MR: Many of our controlled drug injectable products are manufactured in our Cherry Hill, New Jersey facility, which was purchased in 2011. This acquisition catapulted Hikma from the number 11 injectable generics company in terms of volume to the second largest in the United States. We also import sterile bags, lyophilized products, vials, ampules and sterile cephalosporins from Portugal as well as oncological injectables from Thymoorgan Pharmazie in Germany, both of which are Hikma sister companies. In terms of our non-injectable products, we manufacture these at our Eatontown facilities, as well as importing penicillins and other oral products from Jordan and cephalosporins from Saudi Arabia, both of which are also sister companies. All of these Hikma centers of excellence are FDA-approved. Hikma also enjoys vertical integration with raw material manufacturing in our facilities in Jordan, India, and China.

In a highly competitive market, what are some of the main challenges facing the injectables industry?

SG: One of the main challenges is the commercial aspect of the industry; the way the market is structured leads to volatility and a requirement for constant readiness among our plants to be able to respond to demand. As such, West-Ward foregoes some efficiency, choosing instead to invest in high touch customer engagement, analytics, excess plant capacity and inventory of materials and finished goods to quickly identify and respond to shifts in market demand, enabling patients to receive the medicines they need when they need them. Life cycle management is more important in the injectables business than in the non-injectables arena.

What effect is the increase in collaborations between large pharmaceutical companies and research-based organizations having on the industry?

MR: FDA requirements for R&D have become quite burdensome and to have your own internal R&D is becoming more difficult. Our previous strategy has been to partner with companies specializing in this area. Partnering with research-based companies is also a way to 'buy time'. Instead of developing a product from the start, partnering with a company that has already spent a number of years on developing that product removes the time expenditure requirement. For West-Ward/Hikma it has already proven quite lucrative, and has been the origin of some of our biggest products.

With the Roxane acquisition, we will now have a fully staffed mature R&D team to focus on our non-injectable pipeline. This is complemented by a fully staffed, injectable R&D team of 70 dedicated people that we acquired with the Bedford acquisition.

SG: These collaborations are also beneficial to the specialized research companies who are looking at high-risk products. By partnering, they are able to share some of the financial risk, as well as the financial reward, and to move product forward. They are also able to benefit from the commercial and distribution arms at West-Ward, which are very attractive to companies with no commercial capabilities.

Looking ahead, where can we expect to see West-Ward in the next three to five years?

MR: Hikma is honing in on its original strategy of becoming one of the top five generic pharmaceutical players in the United States. We will continue to either acquire or build centers of excellence for Hikma for the other types of dosage forms that we will eventually commercialize. We will also develop sales teams for our specific new dosage forms as we move increasingly closer towards becoming a specialty pharmaceuticals company. We are also looking to expand into other emerging markets and to build on the platforms that Hikma has already created worldwide. •

Robyn Duda

Brand Director
INFORMEX

Can you give us a brief introduction to the InformEx brand and talk about some of your recent milestones?

InformEx has been around for 31 years and is the global home of the fine and specialty chemical industry. It was originally run by the Society of Chemical Manufacturers and Affiliates (SOCMA) and it was their flagship event for around 20 years. UBM took it over 10 years ago from the association in order to expand the brand beyond just SOCMA members and open it up to the entire industry. The industry itself has changed considerably, certainly over the 31 years that it has been around, but also within the 10 years it has been under UBM, and InformEx constantly has to evolve and adapt accordingly. We aim to be the location at which both newcomers to the industry and legacy companies are able to learn something new about their field.

Why is it important for a company to exhibit at InformEx and what are the principle benefits they will stand to gain?

InformEx is very much the home of innovative chemistry. Through our platform, companies are able to meet with potential clients and vice versa, thus advancing the industry as a whole. From an exhibitor standpoint, it is a first quarter event and a place for them to do business at the beginning of the year. Companies will conduct multiple meetings at the event and gauge the success of exhibiting based on how many meetings they are able to arrange.

What are the main sectors within the industry that this event aims to represent?

Our largest percentage is from the specialty chemical sector. The other major areas from which companies choose to exhibit are pharmaceuticals, personal care and energy. Other sectors, such as agrochemicals and biotechnology, also exhibit but form smaller segments. The breakdown of those attending more or less marries up to that of those exhibiting. Currently our exhibitors are predominantly based in the United States, but we also have a growing international presence, with China being the second largest exhibitor and India the second largest country represented in attendees.

What recent trends within the industry have you noticed and how is InformEx keeping pace with them?

There is an immense amount of innovation happening in the fine and specialty chemical industries today. The companies who are here at InformEx are creating unique solutions to a broad spectrum of society's needs, from energy and food to medicine and electronics. These are markets that matter to everyone, and that's where we see the growth.

Because the industry is so dependent on the changing needs in these various end markets, our event is absolutely essential—not only for staying on top of important trends and regulations that affect profitability, but also for connecting with the right business partners.

That's what InformEx is all about. Over the next three years, we're going to continue to emphasize innovation across these verticals through our conference programming and educational initiatives. We are committed to bringing in the foremost experts in various end markets to share insights and trends with our attendees and exhibitors.

Looking ahead, what are your key strategies in expanding your exhibitor portfolio?

The first key has been to recognize where the future growth lies for our exhibitors. We have effectively done that and are building programs around verticals like energy, biotechnology, electronics and agrochemicals to drive business partnering and commercialization for our audience.

We are focused on bringing in new attendees from these growth markets, which will not only give our existing exhibitors more opportunities, but also bring in new exhibitors from these verticals. We have really prioritized education and content, and have taken big strides in bringing in thought leaders to address some of the hottest industry trends. Our conference program really drives excitement and creates a buzz that will bring in more attendees and exhibitors alike.

Finally, we have also seen growth in our international exhibitor portfolio, and are set to build on the strides we've made in India and China.

Do you have a final message for our GBR readers?

I never end one of these interviews without making sure to thank the industry. 31 years is a long time to have an established brand in any form, let alone an event. If it were not for the loyalty of the companies within this industry, InformEx would not be here today. The entire InformEx team looks forward to not only making an event that completely satisfies all of our participating companies' needs, but also being part of an organization and brand that is on the cusp of where this industry is heading. •

David Hoffman

President, U.S. Operations
HOVIONE

Could you talk us through Hovione's background since inception in Portugal?

Three Hungarians founded Hovione in Portugal in 1949: Nicholas de Horthy, Andrew Onody, and Ivan Villax's wife Diane. Together this formed the name Hovione. Villax himself was still an employee of Instituto Pasteur de Lisboa (IPL) and was very interested in antibiotics, specifically semi-synthetic tetracycline antibiotics. This knowledge and expertise became a cornerstone of Hovione and remains important today. The first industrial manufacturing plant was established near Lisbon, which set Hovione on the path to becoming a key player for active pharmaceutical ingredients (APIs) worldwide.

Hovione is now a worldwide operation. Could you talk us through its expansion process?

Hovione's first commercial sales outside of Europe were to clients based in Japan. Villax wrote several articles on anti-inflammatory corticosteroids, which interested the Japanese market. He was then contacted about producing some derivatives for them. In order to establish a physical presence in Asia, he opened our Hong Kong facility in 1979.

Over the years, the company continued to grow and a second manufacturing site was opened in Macau, China in 1986. In 2000, Hovione made a strategic decision to set up offices and construct a Technology Transfer Center in the United States. Hovione furthered its expansion in Asia by forming a joint venture with a Chinese partner, Hysin, in 2008. The company was already providing us with intermediates for our x-ray contrast media, so it was an ideal situation allowing us to further expand our x-ray contrast business. We then established an R&D centre in Shanghai. In 2009, we opened our fourth facility in Cork, Ireland, which we bought from Pfizer. The site was the home of a PSD5 spray dryer, which enabled Hovione to further expand its offering in spray drying technology. Today, we employ around 1,200 people worldwide.

How did you become involved with the company and how do the company's U.S. operations fit within its corporate strategy?

In the early 1990s, I met Guy Villax, Ivan and Diane's son at a trade show. From 1993 to 2000, Hovione began to provide manufacturing services as well as manufacture its own generic products, and I assisted with that process. The company was aware that there was a significant difference between providing a service and a catalogue of products. I was then hired in 2000 under the provision that Hovione would open a technical facility in the United States. I chose New Jersey, designed the building, and ran the new facility, which opened in 2002, for the first few years. The site remains a research and development (R&D) facility, but it also commercially manufactures one API. At present, 50% of our sales are in the continental United States. This country will help drive innovative research in the industry. Many people, including venture capital investors, are willing to take risks and invest here.

We are hearing about a renaissance for the United States in terms of sourcing APIs, particularly as costs have decreased following the shale gas boom. Are we seeing more of a focus on the United States as a manufacturing hub?

This is a large volume, low cost region. Companies are now focusing on orphan drugs; there are potentially a few blockbuster drugs still waiting to be discovered, but the norm now is going to be specialty pharmaceuticals, in the sense of targeted therapeutics. Specific health problems will be addressed, which will result in low volume demand. As the volumes for new APIs decrease, the price differential will become smaller between the United States and India and China. Furthermore, the quality and regulatory concerns pertaining to China and India make the U.S. market look increasingly attractive. As such, I think we are in a renaissance for European and U.S. manufacturing.

What benefits or challenges will the Generic Drug User Fee Amendments (GDUFA) fees bring to the pharmaceutical industry?

The GDUFA fees have brought some new credibility to the industry, as companies are now forced to pay fees for a variety of activities associated with the approval of a new generic product. These include the API manufacture upon Drug Master File (DMF) submission, as well as annual fees and the Drug Product Manufacturer submission including annual fees. The Abbreviated New Drug Applicant (ANDA), in order to have their ANDA reviewed, is also important. These fees have enabled the FDA to hire more inspectors to assure the public that the generic product is being produced with the same rigor as the branded product. I also believe the actual number of warning letters issued by the FDA to generic drug manufacturers and API producers has risen exponentially over the last two years. Although the European health authorities have not implemented exactly the same system, they now require all manufacturers to be CEP-licensed, which has had an incredible effect on assuring a quality supply chain.

Do you have a final message?

Hovione is in it for the long-term. We have had plenty of suitors, but we are not for sale. Our branding is 'In it for Life' and we really care about both our future as a family-owned company, as well as the lives of our end-customers, the patients. •

Evan Singer

President
PL DEVELOPMENTS, INC.

PL Developments has a strong family tradition. Could you give us an overview of its evolution over the last quarter of a century and outline any recent key milestones?

The company was founded 25 years ago by my father Mitch Singer, who remains CEO, and his late partner Mort Rezack. They founded the business with the intention of finding products to which they could add value in the private label sector. We are now a national business with more than 1,000 employees and around one million sq ft in operational area. Our core competency is servicing U.S. retailers and their store brands, but we take on contract manufacturing opportunities for national brands on a strategic basis. Our private label business makes up more than 85% of our total operations.

The most recent big change was the acquisition of Aaron Industries in November 2013. Historically, we had always been a provider of solid dose products but, as we looked to grow and add more capabilities, liquid dose products became an important part of our overall story. Aaron was similar to us in that it sold private label products, with the only difference being it exclusively sold liquids. It was a natural progression and one that has doubled the size of the business, giving us additional capabilities across the United States.

Could you give us an overview of your various locations and how they serve both your domestic and international markets?

Our Westbury, NY facility is both our corporate HQ and the location of all of our solid dose packaging and distribution. We acquired our Clinton, SC facility from Aaron Industries and it is where we conduct all of our liquid first aid manufacturing, packaging and distribution. This covers products such as rubbing alcohol, hydrogen peroxide, mineral oil and witch-hazel. Another former Aaron Industries facility is located in Los Angeles and is where all of our ingestible liquids are manufactured, packaged and distributed. In Miami, we have our centre of excellence for R&D, for both solid and liquid dose products. Our solid dose manufacturing operations are also located in Miami, but this is a relatively small part of our overall solid dose business as most of these products are in-sourced.

Most of our sales are to domestic companies. Although we do not actively sell in foreign markets, some of our clients do, taking our products to as far afield as the Middle East and Latin America.

What target indications do your products treat and could you explain why you chose them?

We have a broad product portfolio of around 300 unique products. We classify a product as an active ingredient in a dose form. For example, a tablet, a soft gel and a caplet of three unique products, even if they are all 200 mg of ibuprofen. Regarding the target indications themselves, we cover digestive indications, allergy products, pain relief, sleep aids, first aid, motion sickness relief and paediatric electrolytes. We are looking to expand our portfolio within those categories to ensure we are offering a complete breadth of product, as well as looking at new categories and capabilities.

With the introduction of NSURE, does PLD have any plans to expand into the area of Rx to OTC switch?

The Rx to OTC switch paradigm is very important for us. It is very healthy for the overall cost of healthcare to be lowered. Current forecasts suggest $15 to 25 billion worth of drugs that are currently Rx will become OTC in the coming years. We are actively pursuing internal development programs as well as external partner development programs in order to be at the forefront of switch products.

Is consumers' increasing preference for self-medication having a positive impact on the sales of private label products or does brand loyalty remain an obstacle?

In the United States, the penetration of private label products has been steadily increasing during the last ten years. There is greater consumer awareness about the value proposition made by private brands, thanks in large part to the education efforts of the retailers. However, in Europe, store-branded products have a penetration of more than 50%, whereas we are below 50% in the United States. As much as it has improved, there is still a long way to go. Many people do not appreciate that Ibuprofen 200 mg is the same as Advil and clinical tests prove it. On average, store brand products will either be 20% cheaper or will contain 20% more product.

Looking ahead, what is the future for PLD in the next three to five years?

On the private label side, I see us continuing to serve our customers well, focusing on executing a complicated supply chain and adding new capabilities. We are also launching some brands ourselves, with the first being Nicofi. It is our proprietary product, based on a novel, patented drug delivery platform. It has a rapid onset of action using sublingual technology, which delivers 1 mg of nicotine to the consumer at about the same speed as a cigarette. We are starting with nicotine delivery but will eventually use it for other indications, such as pain management, allergy relief, and sleep medication. •

Kelsey Achenbach

Healthcare & Life Sciences Strategic Marketing Manager
CELANESE EVA PERFORMANCE POLYMERS

Could you give us a brief overview of Celanese and explain VitalDose's role in the corporation?

Celanese is a leading global technology company, headquartered in Texas, working in the areas of differentiated chemistry solutions and specialty materials. Our products are used both in major industrial applications as well as consumer applications. Celanese focuses on some key market areas, one of which is Healthcare. The VitalDose® team excels at manufacturing custom pharmaceutical excipients for our clients' specific needs. Celanese has manufacturing plants worldwide, with VitalDose® and other EVA products being manufactured in Canada. We also have R&D teams in Kentucky and Germany.

The excipients we manufacture are used in implantable and topical drug delivery devices, particularly in women's health. They are used in products such as intravaginal rings, intrauterine devices, various types of subcutaneous implants, and in transdermal patches. EVA is very durable and inert to the body, and can remain implanted with a consistent drug delivery profile for several years.

In terms of client relationships, how do you develop and maintain these and what is your typical client profile?

We have clients all over the world, but the United States and Europe account for most of our pharmaceutical customer base. We work with large pharmaceutical companies as well as small companies and technology startups. We also work with universities and educational institutions, as we find this very beneficial for innovating new products and creating custom solutions. We tailor our business model to our customers' needs. For smaller companies and startups, for example, we can implement creative processes, such as revenue-sharing business models. This enables the new venture to be beneficial for both the startup and for Celanese. We strive to meet our customer needs and customize our services on every level.

What are some of the challenges that you face in terms of regulation as a globally operating excipient company?

One key challenge is the ever-changing requirements of our customers. For example, there is a significant focus at present on Quality by Design (QbD) guidelines for regulatory submissions. The second challenge that we have is helping our customers understand that our specialty lies in manufacturing custom pharmaceutical excipient polymers. There is EVA in the market that is industrial grade material, but this is not for drug delivery applications. We take the risk of being in the pharmaceutical industry very seriously, and we make high-quality, custom polymers that are suitable for human use. It is a very different model from an industrial-use chemical business.

What is the role of excipients in new drug development and the shift from small to large molecule activity?

With technological advancements being made, we develop and produce polymers specific to each customer's requirements, giving them an advantage in the marketplace. We have also recently developed a foamed excipient, which is an innovative delivery vehicle that can lead to a more efficient and effective administration of biologics. We are really looking for innovations that can help our customers to battle major market challenges, such as improving patient compliance and reducing side effects.

Another shift we see is repurposing, either for a new indication or delivering a molecule in a new, improved form. Rather than focusing on the development of new chemical entities (NCEs), there is a growing focus on repurposing molecules that already exist. EVA can be a solution in this case, for example reformulating an oral drug for use in a long-term implant. EVA polymers themselves are compatible with a variety of drugs so, in terms of processing and safety, it is a useful polymer to employ.

Could you give us an overview of hot-melt extrusion technology and other ways of using technology and innovation to benefit the drug manufacturing industry?

Hot-melt extrusion is a technology that has been around for quite some time. However, one of the reasons it has taken off recently in the pharmaceutical industry is because it can enhance the bioavailability of drugs. EVA is an advantageous polymer to use in this process for a number of reasons; it is relatively simple in terms of its chemistry, it can enhance the bioavailability of the drug by keeping it in an amorphous state, and it has minimal solvents that can harm the drug in processing. It also has a relatively low melting temperature compared to other similar durable polymers. Hot-melt extrusion is a significant part of the innovation and technological advancements we are seeing in the industry as a whole.

Looking ahead, where will Celanese be in the future?

Our main goal is to continue to supply our customers with high quality polymers for their applications, and we have a leading polymer in the implant market now. In three to five years, we want to be the first-choice solution the pharma industry turns to when looking for a controlled-release excipient. •

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UBM

Drew Brennan & Thierry Van Nieuwenhove

DB: General Manager USA Operations
TVN: President, Synthesis
NOVASEP

DB

How has the focus of Novasep's business evolved since 2012 and can you mention some key milestones along the way?

TVN: Over the last year, there has been a significant change within the company, coming in the form of strategic initiatives from our shareholders. We have refocused Novasep to become a purely innovative and research-driven company, with a promise to bring these innovative technologies to our customers. This has required us to redefine our strategy, called "Back to Basics," placing the customer at the center. We also changed most of the executive management committee, bringing in experts from different areas of the industry with customer service experience. One of the key aspects of our strategy was to increase our presence in different countries. Over the past three years, Novasep has developed globally and, today, we serve the North American, European and Chinese markets. We also have a presence in Thailand and South America. We are constantly asking ourselves what we can do differently to better serve our local customers, and we are planning to expand our activities in manufacturing and purification.

DB: In the United States, we are trying to improve our relationships with our customers. The new organizational structure is geared towards developing better working relationships and ensuring that we understand our customers' needs. We call our strategy "Back to Basics," as customer needs are the basis of our business, and we are centering our organizational focus on this. The best way to overcome the obvious differences, such as language and culture, between our American subsidiary and the rest of the company is to present the company as a whole to customers. Since the majority of our assets are in Europe, we work towards acting as a liaison between the American consumer market and our facilities in Europe.

Which segments does Novasep work in and how is each segment related to the pharmaceutical industry?

TVN: Novasep is a €250 million business globally, across all segments. The pharma field, including small and large molecules, comprises €180 million of this total. The United States contributes a little over one third of the overall revenue.

DB: In the United States, the business of contract manufacturing services for the pharmaceutical small molecules industry is the largest. In the biopharmaceuticals field, we are mostly involved as a contract manufacturing organization (CMO) in gene therapy. Additionally, our board recently approved an antibody drug conjugate facility to increase our capacities in conjugation. As well as these CMO activities, Novasep runs an equipment business that is mainly involved with High Pressure Liquid Chromatography (HPLC) equipment and continuous chromatography. Outside of the pharmaceutical sphere, we have contract manufacturing services for the fine chemical and agricultural industries. We also have an industrial biotechnology business, which involves processes and equipment into the food and fermentation industries.

How does your facility in the United States complement those in France?

DB: We have sales operations and technical expertise in the United States. This works well as far as clients are concerned, because it is our job to reassure them that we can handle their projects given our qualified staff and facilities in Europe. The American market is extremely competitive, so we focus on differentiating our technologies and creating innovations that can help our customers with their manufacturing processes, making the process more economically feasible and ensuring the products are quickly deliverable to the market.

What are some of the challenges of manufacturing products to different batch sizes, and is Novasep moving towards continuous processing?

TVN: Chromatography and purification are techniques that would classify under continuous processes. To support our customers switching from batch to continuous, we recently developed lab scale equipment to test continuous processes for manufacturing. On the CMO side, we have been seeking continuous operations in different reactions, such as low temperature reactions, in an attempt to avoid investing in large amounts of machinery. We have seen positive results and are ready to move to the pilot phase with shifting our manufacturing process.

Looking ahead, where can we expect to see Novasep in the next three to five years?

TVN: We have an aggressive growth plan globally, and we have defined our strategy to include two new segments. With our new plans, we hope to continue our growth worldwide in Thailand, India, China, Latin America, Europe, and the United States.

DB: Part of our strategy is to increase our capabilities in the United States, especially for early stage projects, so that we can develop relationships with these clients from the start. Speed and flexibility are key for American customers, and we have to be reliable for our customers in this regard. We are hoping to establish a basis for long-term relationships with our customers and a strong pipeline of projects for the future. •

Peter Werth

CEO
CHEMWERTH INC.

Can you talk about what was behind your inspiration to found Chemwerth in 1982?

Following the Hatch-Waxman Bill, when generics took off, I recognized the high growth potential this industry offered so I decided to start my own business. It was in the mid-1980s that I identified the opportunities that China offered. We focused on the most important part of the generic pharmaceutical supply chain: the API. With my experience and expertise I started developing exclusive products for a range of finished formulation generics companies by partnering and working with Chinese manufacturers. As the agent, I would be the one responsible for ensuring all quality and compliance measures were met by the supplier.

How and where does Chemwerth primarily operate today?

China is still the main focus of our manufacturing and regulatory operations. It is important to note that Chemwerth is not simply a representative for API manufacturers; rather, it is a product development company that works exclusively with a factory on a particular product. Our highly trained staff work to provide our partners with all regulatory services and documentation needed to become GMP compliant. In China, we also have our own FDA-approved laboratory to support our work. Our lab provides a range of capabilities from analytical services to methods development and methods validation. The ultimate goal we try to achieve with the factories we work with is to gain FDA approval - the most globally recognized approval. Working with our customers, to date Chemwerth has managed to receive 45 first-to-file FDA approvals.

What was your strategy behind remaining competitive and ensuring your growth and success over the past 33 years?

We realized early on in our operations that working with more complex and specialty products would give us a strong advantage over our competitors. We focused on APIs in the high potency area and started our work in injectables, oncology products and antibiotics. Today, there is a general shift towards these more complex products. Having over the years built a strong understanding of and expertise in this field, Chemwerth is able to boast a firm leadership position.

Can you talk about the role Chemwerth is playing in raising awareness of the standard of global quality?

Four years ago, the main consideration finished formulation companies would take when sourcing an API was cost. However, these past four years have seen a rapid rise in quality concerns, which are now at the forefront of everyone's minds. Quality is something that Chemwerth has always regarded as of the utmost importance and our company has evolved around the philosophy of 'One world. One Quality.' As I noticed the increase in the number of inspections our facilities were receiving - not just from the FDA, but also from other countries' regulatory bodies - I decided to start a program that would aim to help our manufacturers achieve globally recognized and approved quality. This would then allow them to sell that product to any market in the world. We are now operating in 34 countries and are about to expand into another six. The quality that we achieve with the factories we work with is always the same, be it for regulated or non-regulated markets. We believe all customers deserve high quality products.

How are companies monitoring their supply chain when sourcing their pharmaceutical ingredients from a number of locations?

Ultimately, it is through the use of an agent. However, there needs to be a deep level of trust built between the agent and the company to make certain that all products are sourced on time and, of course, are of the highest quality. What makes Chemwerth such an effective agent is that we are fully integrated with our API manufacturers as well as having our own laboratory to support the product development process. Beyond that, we are capable of working with the FDA and other countries' agencies and, as such, are very in tune to the latest compliance issues. Our experience is what sets us apart and this year we are filing our 50th DMF available for reference.

What are some of the major milestones you want to achieve over the coming years?

With regards to our product expertise, polypeptides is something that we see as being an area for growth. As more companies look to these products we believe that Chemwerth will be able to provide excellent service, product capacity and a world-class, fully compliant factory. Geographically we have recently put agents on the ground in Mexico and are looking to do the same in Brazil. Following our success in the Middle East and Europe we believe that Latin America will not only offer a wealth of opportunity for Chemwerth, but will also put us closer to our goal of achieving one world, one quality. •

Garrett Dilley

Senior Director, Business Development, Sales and Marketing
JOHNSON MATTHEY PHARMA SERVICES

As a UK-based company, why has Johnson Matthey chosen to enter the field of pharmaceutical services and locate itself in the United States, and what have been some recent major milestones for the company?

Johnson Matthey (JM) has been around for more than 200 years and was an innovator in advanced materials and technology from the outset. JM moved into pharmaceuticals nearly 40 years ago and, by virtue of developing the anti-cancer agent Cisplatin, JM entered pharmaceutical manufacturing. The United States has long been the largest pharmaceutical market in the world, so it was pragmatic for JM to establish the pharmaceutical materials business in the United States to align with the client base. We have experienced steady demand for our products and, over time, added development and manufacturing services. Strong demand for our products and services over the last few years has enabled us to grow further and to expand. We recently installed an additional manufacturing suite in our facility in Massachusetts and, in December 2014, we announced the acquisition of a manufacturing facility in Scotland. In addition, we added a development and manufacturing facility in China a few years ago and have been steadily expanding our pharmaceutical client relationships there.

Could you give us an overview of the different segments within JM Pharma Services?

We are a premier provider of API development services and manufacturing to the pharmaceutical industry. Our offerings include expert process and analytical chemistry development, scale-up, and full-scale commercial manufacturing. Our unique capabilities and technologies include controlled substances, highly potent APIs, polymer drug conjugates, antibody drug conjugate linker technology, solid form sciences, PAT and manufacturing scale chromatography. We have R&D labs, kilo-labs and pilot plant operations in Massachusetts, in proximity to the Boston biotech hub, as well as in Yantai, China. We also have an R&D facility in Cambridge, England. We have full-scale manufacturing operations in New Jersey, Pennsylvania and Scotland. All our facilities work in an integrated manner and are centered on customer solutions.

We are hearing about a renaissance in terms of sourcing from the United States. Are we are seeing an increased focus on North America as a manufacturing hub?

We believe so. Clients are increasingly looking externally for manufacturers with a focus on sourcing new active pharmaceutical ingredients primarily within the United States. This push has been fueled in part by the Section 199 tax deduction for domestic manufacturing which allows for significant tax savings on the profits generated from active ingredients which are manufactured in the United States. While companies continue to source globally, we are seeing that they are procuring APIs in the United States and Europe, and raw materials and intermediates in Asia. Cost used to be the main driver, however, the industry has evolved from this mentality over the years. There has been a realization in the market that working with quality global suppliers, who also have an Asian presence, and who operate to world class standards of quality, offers a distinct advantage and the required security of supply and competitive costing. The industry is no longer willing to consider just any facility in Asia for raw materials and intermediates, as transparency, quality track records and reputation are of prime importance today.

What are some of the challenges of manufacturing products to lab and commercial scales and is there a pressure to move from batch to continuous processing methods?

Typically when we think of lab scale we think of development. During clinical development the focus is on speed, problem-solving, depth of knowledge, and delivering a product that ultimately meets specifications. This requires a certain type of group with a specific set of skills. Our development group are experts in evaluating, developing and scaling up processes that are fit for purpose, based on the stage of clinical development of the active ingredient. When we think of commercial scale, we think of the ultimate scale at which an active ingredient will be produced to supply the market. The focus here is on expertise in the launch of a product and security of supply. This means reliability and quality and having strong backward integration for raw material and intermediates supply. Johnson Matthey has a proven track record as a world-class supplier of APIs and, with its global footprint in commercial scale manufacturing facilities, is able to provide the right solution for the specific needs of the client.

The pharmaceutical industry has been focussing a great deal over the past few years on developing continuous processing. This is an area in which Johnson Matthey already has 25 years of experience, in applications for petrochemicals. We are in the process of converting that knowledge into an offering that is suitable for the pharmaceutical industry. The capabilities and experience that we have throughout our broader organisation make us uniquely qualified to provide the vision and direction needed for the pharmaceutical industry to move forward with continuous processing. •

Adam Grose

Vice President and General Manager
W.R. GRACE AND CO.

Can you provide a brief history explaining the evolution of Grace and its federal corporate strategy?

W.R. Grace is based in Columbia, Maryland. We were founded in 1854 and have evolved from being a diverse conglomerate to focusing on specialty chemicals. We were the first company to commercialize silica gel, back in 1919. Silica is used in a broad range of pharmaceutical development and manufacturing applications. To provide a timeline of Grace's involvement in the pharmaceutical industry, in 1965, Syloid® excipients were first used in a commercial drug. In 1980, we entered the field of chromatography with Davisil® silica. From the 1980s to the 2000s, Grace underwent an evolution from being a conglomerate to a more focused specialty chemical company. From 2000 onwards, we have continued to expand our portfolio by introducing innovative technologies and making numerous strategic acquisitions to offer new solutions and capabilities to pharmaceutical customers.

In February 2015, we announced the planned separation of Grace into two industry-leading public companies. Grace will continue with the materials technologies and catalysts businesses, while the construction products and Darex packaging businesses will be handled by GCP Applied Technologies in the future. This is the best way to achieve growth in these diverse industries. Discovery sciences are part of the materials technologies business, which is my responsibility. Discovery sciences focus primarily on the pharmaceutical market with our line of pharmaceutical excipients, and chromatography/purification technologies. In addition, our fine chemicals business does custom manufacturing of pharmaceutical intermediates.

What is Grace doing to help pharma companies navigate the regulatory framework?

The Grace fine chemicals business has seen a strong return in demand for custom manufacturing in the U.S. pharmaceutical companies that were once lured by offshore inexpensive manufacturing are coming back to the United States for simplified supply chain and western quality. Also, molecules are becoming increasingly more complex. Our experience in complex synthesis and scale-up makes us a trusted partner for many pharmaceutical companies. To expand on our commitment to customers in the pharmaceutical industry, we have made several investments by adding GMP-release capabilities, upgraded quality systems, and other equipment and site improvements to meet compliance requirements.

Working in a very specialized domain, what differentiates Grace from other similar companies?

We have had a long-standing presence in the industry and our products have proven performance that customers can trust. Our large-scale global manufacturing capabilities give us the ability to meet commercial needs of pharmaceutical companies worldwide and we have the flexibility to scale up or down according to their requirements. As the original manufacturer of our chromatographic silica, purification products, and custom intermediates, our customers benefit from a simplified supply chain and the knowledge and expertise that comes from being an inventor and leading manufacturer in these technologies, which gives us a competitive advantage.

Could you talk to us about your facilities within the United States and how these are complemented by your global operations?

Our primary silica manufacturing facilities are located in Worms, Germany and Curtis Bay, Maryland, with additional manufacturing sites in Sorocaba, Brazil and Kuantan, Malaysia. As far as our instrumentation and chromatography is concerned, we have facilities in Chicago and India. Our Fine Chemicals business is in Albany, Oregon where we custom manufacture pharmaceutical intermediates. This site was added after we acquired Synthetech in 2010.

We are observing an increasing trend towards drug innovation and large molecule development. What are the challenges in this space?

Due to the growth of biologics, we are introducing new solutions to meet the needs of customers developing these types of large molecule drugs. One of the big challenges is in downstream processing and purification of large molecules. Single-use technologies can provide major productivity and flexibility benefits to these customers. While there has been a great deal of innovation in single-use technologies for upstream, downstream has lagged behind, in particular with chromatography and purification solutions. To address this bottleneck, Grace recently introduced Provance® columns that are designed specifically for single-use purification of monoclonal antibodies.

Looking ahead, where do you expect to see Grace in the next three to five years?

Our main priority is to expand along with this growing industry and strive to continuously meet its evolving needs. We are interested in and passionate about this industry and are partnering with our customer base and investing in the technologies they require to expand. This is an exciting growth business for Grace, and we are committed to addressing our customers' challenges and ensuring a very high standard of quality. •

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Show Me a Hero
Generics and Cost Savings in the United States

"The generic drug industry puts more affordable medicines in reach for millions of Americans. In fact, $239 billion was saved in 2013 alone, according to the Generic Drug Savings in the U.S. report, conducted by IMS Health on behalf of GPhA."

- Ralph G. Neas,
CEO,
Generic Pharmaceutical Association
(GPhA)

Image: Amneal Pharmaceuticals LLC

Providing the Affordable Alternative: The U.S. Generics Industry

By James Hogan

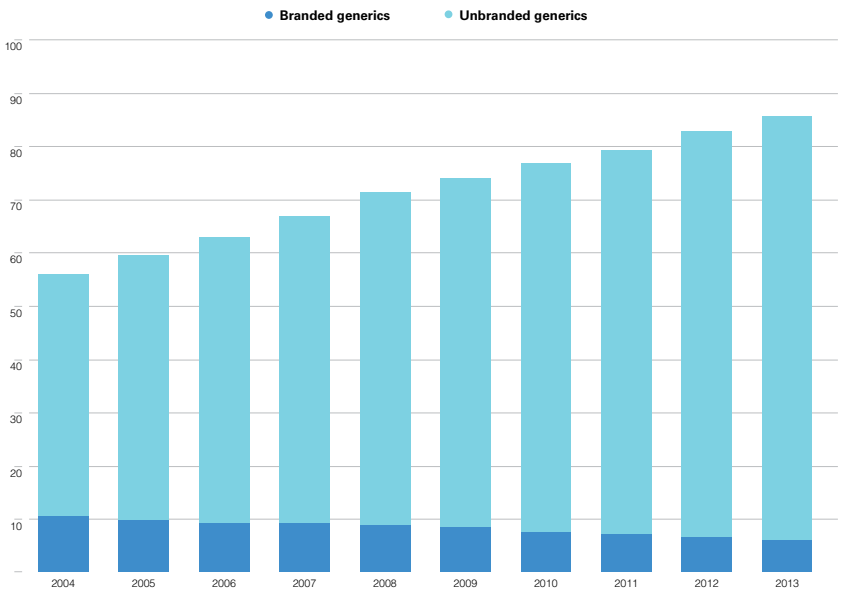
In 1984, the Drug Price Competition and Patent Term Restoration Act was passed. More commonly known as the Hatch-Waxman Act, named after the sponsoring representative and senator, this act enabled generic manufacturers to develop a duplicate of a patented drug product without re-undertaking a clinical study program or risking liability for patent infringement damages. All a company had to do was demonstrate the bio-equivalency of their product to the innovator. This heralded the start of the generics industry proper and it has seen substantial growth in the last two-and-a-half decades.

Today, the generics industry accounts for more than 90% of all prescription drugs consumed in the United States and, according to the Generic Pharmaceutical Association (GPhA), the use of generic drugs has saved the U.S. healthcare system approximately $1.07 trillion between 2002 and 2011. The generics market is dominated by giants such as Teva, Mylan and Sandoz, but still offers opportunity to smaller players and rising stars from the generics global super-hub of India. Current high levels of M&A activity, combined with the high numbers of products coming off patent, make this industry incredibly dynamic and fiercely competitive.

The generics industry has developed considerably during the last century, thanks in large part to the work of the GPhA, headed by CEO Ralph G. Neas: "GPhA is the nation's leading trade association for manufacturers and distributors of generic prescription drugs, manufacturers of bulk active pharmaceutical chemicals, and suppliers of other goods and services to the generic industry. Distributors, pharmacy benefits managers,

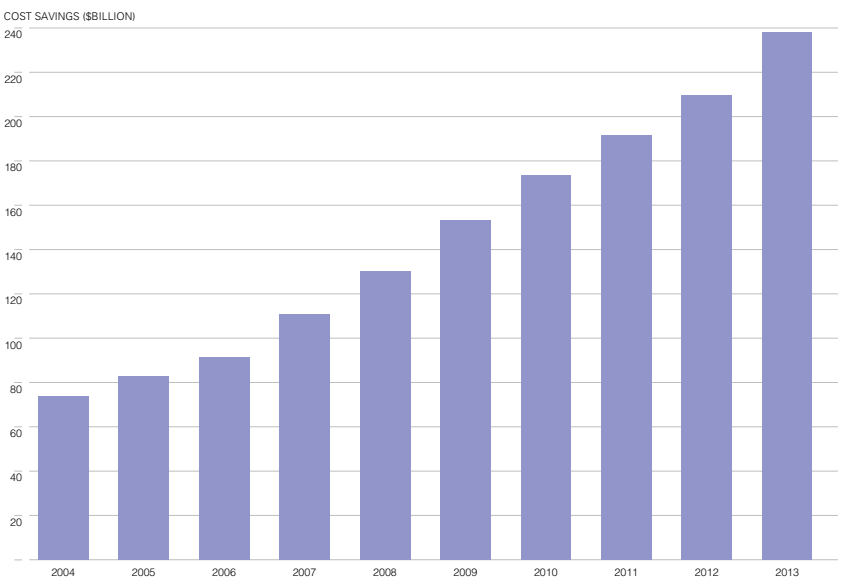
GENERICS SHARE OF PRESCRIPTIONS (2004-2013)

Source: GPhA



GENERICS COST SAVING BY YEAR (2004-2013)

Source: GPhA



contract research organizations, packagers and legal counsel groups also benefit from the value of belonging."

The Generic Drug User Fee Amendments (GDUFA) of 2012 is one of many issues the GPhA is currently addressing. The GDUFA system was implemented to alleviate the backlog of ANDA filings that existed within the FDA and to enable companies to bring their product to market at a much faster rate than before. Initial results and benefits were non-apparent and players across the industry have complained that their contributions have not borne fruit. Naturally, the smaller companies have found the GDUFA burden hardest to bear, being required to pay the same fee as the generics giants, "certainly it is a burden for smaller companies like Citron" said Vimal Kavuru, CEO at Citron Pharma, "[we] are being taxed at the same rate as larger companies." For some, these non-means-tested fees were simply too high a price to pay and were subsequently forced to cease operations. However, three years on from the amendments, it is not just small enterprises that are unhappy with the fees, with many larger companies claiming that the speed of the approval process still needs to be addressed. According to Chirag Patel, co-CEO and chairman, Amneal Pharmaceuticals: "We continually work with the FDA to ensure the agreed-upon performance targets are being met; however, there have been road bumps along the way. We are hopeful that the recent increase in personnel, combined with the fees, will ensure that the next three years run more smoothly."

However, Patel adds that the introduction of the GDUFA fees has also highlighted problems with company filings themselves, the quality of which must be re-evaluated in order to speed up processing times. With GDUFA 2 currently being negotiated, many will be keenly awaiting its outcome and its effect on the market.

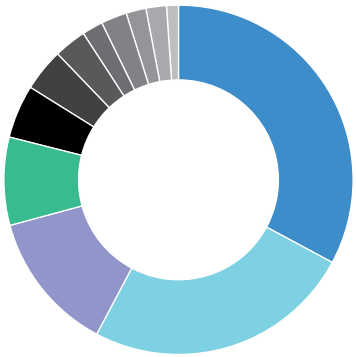
As with any industry, M&A activity is a key part of most players' strategies. This tends to fluctuate within the generics industry and we are currently witnessing a particularly dynamic period. In mid-2015, Israeli-headquartered Teva Pharmaceuticals spent around three months courting Mylan, its Netherlands-based competitor, before abruptly withdrawing its proposal in favor of homegrown Allergan's generics arm, in a deal worth $40 billion. Mylan is still in hot pursuit of Ireland's Perrigo, which continues to threaten a hostile takeover. Teva's president and CEO of global operations, Carlo De Notaristefani, argues that the recent heating up of M&A activity "is actually a very positive trend for patients because, as investment in R&D and infrastructure becomes ever more demanding, companies require critical mass in order to bring new products to the marketplace."

> "Our advantage comes from our core strength of being vertically integrated. [Acquiring additional business arms] was a way for us to strengthen our hold on this market and build on our economies of scale."
>
> - Bob Cunard, CEO, Aurobindo USA Inc.

Image: Dr. Reddy's Laboratories Inc.

GENERICS COST SAVINGS BY THERAPEUTIC AREAS (2004-2013)

Source: GPhA



Nervous System	33%
Cardiovascular	25%
Metabolism	13%
Anti-Infectives	8%
Musculo-Skeletal	5%
GU System	4%
Respiratory	3%
Dermatology	2%
Systemic Hormones	2%
Cancer	2%
Sensory Organs	2%
Blood Disorders	1%

Many consider this current high volume of activity, however, to be an indirect result of the aforementioned backlog of approvals, coupled with rising concerns over existing drug patent expirations. Companies are seeking to offset their pending drop in revenues by either consolidating their businesses or seeking acquisition targets. The outcome then is a period of significant opportunity for consolidation.

Aurobindo, an Indian generics company with its own API manufacturing arm, has been rapidly growing through its acquisition strategy. Pricing pressures and the need for supply chain control are common challenges for generic pharmaceutical companies, but for Aurobindo this issue has been averted. Taking advantage of its domestic, cost-competitive manufacturing landscape, as well as its years of experience in supplying APIs to regulated markets throughout the world, the company has successfully established itself as a strong player in the U.S. generics industry. "Our advantage comes from our core strength of being vertically integrated," said Bob Cunard, CEO of Aurobindo USA. "[Acquiring additional business arms] was a way for us to strengthen our hold on this market and build on our economies of scale."

Looking ahead, concerns that such high M&A activity may yet stifle the market remain speculation. It is safe to say that the generics industry will continue to show substantial growth. Longer life expectancies, coupled with the government's efforts to address rising healthcare expenditures, will certainly pave the way for increased demand for generic products. Sales in the United States have more than tripled since the turn of the century and are currently in excess of $51 billion. The next step for this industry will be to follow in the footsteps of the branded companies, by delving deeper into the realm of biologics. A biologics generic, or a biosimilar, is both relatively novel and hotly contested. With branded biologic products heralding the next wave of drugs to come off patent in the coming years, the GPhA and the country's generics companies must now shoulder the burden of establishing a sustainable, FDA-approved market for their lower-cost alternatives. •

Ralph G. Neas

CEO
GENERIC PHARMACEUTICAL ASSOCIATION (GPHA)

Can you introduce the GPhA and tell us what mission the association is trying to achieve?

GPhA is the nation's leading trade association for manufacturers and distributors of generic prescription drugs, manufacturers of bulk active pharmaceutical chemicals, and suppliers of other goods and services to the generic industry. GPhA is a strong voice in advocating the interests of its member companies before federal and state lawmakers, regulatory policymakers, and international agencies. GPhA's mission is to create and maintain a political and regulatory climate that is most conducive to the continued growth of our member companies.

GPhA member companies supply 86% of the generic prescription drugs dispensed in the United States each year. Our membership includes the world's largest generic finished dose manufacturers and active pharmaceutical ingredient suppliers. Distributors, pharmacy benefits managers, contract research organizations, packagers, and legal counsel groups also benefit from the value of belonging to GPhA.

In April, you launched the Biosimilars Council, a division of GPhA. Can you talk about what role this division will play?

The Biosimilars Council will include manufacturers and stakeholders working to ensure a positive regulatory, reimbursement, political, and policy environment — an effort that supports patient access to biosimilars. One major priority of the Biosimilars Council is to be the go-to educational resource for health professionals and patient groups seeking information about the safety and effectiveness of biosimilars. Among the first offerings of the Biosimilars Council is a new educational handbook, The Next Frontier for Improved Access to Medicines: Biosimilars and Interchangeable Biologic Products. This publication explains the benefits and science behind biosimilar medicines— safe, effective alternatives to costly biologic therapies. It explains who will benefit from access to these medicines, outlines the legal and regulatory framework, and illuminates the quality manufacturing and development process in approachable language.

Is there not a risk that a low cost generic alternative could threaten the research and development (R&D) work of branded pharmaceutical companies?

Thirty years ago, Congress sought to create a balance between access to lower cost generic medicines and incentives to innovate new and better medicines by passing the Drug Price Competition and Patent Term Restoration Act (the Hatch-Waxman Act) of 1984. This balance has now been in place for three decades and has delivered public health and economic benefits far greater than ever could have been imagined when the law was enacted. Today, 86% of all prescription medicines dispensed in the United States are generic. Millions of patients across the country rely on them to provide safe, affordable choices to improve their health. Last year, we celebrated the 30th anniversary of the Hatch-Waxman Act. This milestone offers the opportunity to both reflect on the true effect of the law over the past 30 years, and to look forward to future growth, innovation and progress for affordable medicines.

How can a patient be assured that a generic will always be of the same quality and efficacy of the branded equivalent?

The FDA consistently confirms the safety of generic medicines. Physicians, pharmacists, and patients can expect that FDA-approved generic drugs have the same quality, efficacy, and safety as a brand product. The FDA's approval process for generic drugs is as stringent and rigorous as the process followed to approve brand drugs. FDA requires that a generic drug contain the same active ingredient and be manufactured to the identical strength and dosage form as the counterpart brand-name drug. Generic drugs have the same indications of use, dosing, and labeling as the brands. These medicines provide the same quality, potency, efficacy, and safety profile to patients as their brand counterparts. Generic drugs do not need to contain the same inactive ingredients as the brand.

Generic drugs must be bioequivalent to the brand counterpart, also known as its reference product. This means that the active ingredient in a generic medicine is absorbed into the body at the same rate and amount, ensuring that the generic delivers the same therapeutic effect as the brand and can be safely substituted for the brand product.

The rigorous chemistry, manufacturing, and controls phase is applicable to both new brand drugs and generic drugs. All generic manufacturing, packaging, and testing sites must pass the same quality standards as the brand. The same FDA field inspectors evaluate the manufacturing facilities for generics and for brand products, using the same standards, to ensure compliance with all good manufacturing practices.

Looking ahead, can you talk about how the association will continue its work in advancing and progressing the generics industry?

The generic drug industry puts more affordable medicines in reach for millions of Americans. In fact, $239 billion was saved in 2013 alone, according to the Generic Drug Savings in the U.S. report, conducted by IMS Health on behalf of GPhA.

We look forward to continuing our work with members of the supply chain, stakeholders, patients, and others to expedite access to safe, effective, and more affordable generic drugs and biosimilars. •

Alok Sonig

Executive Vice President,
North America Generics
DR. REDDY'S LABORATORIES INC.

Can you provide an overview of the key areas that Dr. Reddy's functions in within the United States, including any recent milestones for the company?

Dr. Reddy's in the United States mirrors the same set of businesses as in India: Pharmaceutical Services and Active Ingredients (PSAI); Generics, Biologics, and our Proprietary Business. Our core competency is our deep technical strengths in the development of complex APIs such as steroids, peptides, complex long chain synthesis and oncology. Our expertise in intellectual property and regulatory issues helps us consistently deliver the highest quality APIs that meet regulatory standards. At the same time, our agility enables our customers be the first-to-market by providing offerings ranging from intermediates to end formulations. Over the last 31 years, Dr. Reddy's has developed from a pure API manufacturer into a multinational pharmaceutical brand, with a global workforce of 20,000 employees and commercial presence in over 25 countries. These sectors are in different stages of operations: the American generics business is seventh in the United States, with our most recent milestone being that we crossed $1 billion. The API business has a turnover of around $120 million in the United States, with the proprietary business at around $50 million dollars. However, this is on the rise as we gain critical mass and our product offerings increase. Last year, we filed three new Investigational New Drug (IND) Applications in the United States within our proprietary business. We are hoping to receive approval for all three applications in the coming year, hence allowing our proprietary business to increase its critical size.

Can you elaborate on your facilities in the United States and how they complement the Indian operations?

We have three facilities in the United States, in Louisiana, Tennessee and New York. We also have two buildings in Princeton within our R&D unit. Our R&D center in Princeton also works in collaboration with our main R&D centers in Hyderabad, India. We are aiming to expand our R&D capacities to ideally serve the US and Indian markets. All our facilities globally follow the same governing principles of operations.

What are your views on the recent increase in M&A activity and why is the environment ripe for this now?

This increase has been driven by the demand for growth caused by the volume of pending drug applications with the FDA. We are currently seeing about 4,000 drug applications sitting with the FDA and this has caused concern for the future of the market as the likelihood of coming up with a blockbuster drug decreases. Bigger businesses in particular are finding it difficult to grow and, from around eight or nine key customers, these have consolidated to around five to leverage cost synergy targets. The balance of power has shifted significantly in favor of the customers and, in order to restore this power, the establishment of some big generics companies is required in the market. If the large quantity of pending files were to be approved by the FDA, this would put at substantial risk the high valuations at which companies have been, and are being, purchased. I believe that M&A activity occurs in cycles, and we are currently experiencing a high.

How are you choosing indications on the proprietary side of the business?

We are very specific on the proprietary side; we are going after the indications of dermatology and neurology. Both these segments lend themselves to incremental innovation, so we do not need to start from scratch and redevelop a molecule. Rather, we can build upon existing molecules and create innovative variations. In dermatology, we have previous experience that is helping us with research. We are relatively new to neurology, so we are taking time to build our expertise.

As a brand in America, we have made a few promises and commitments to our customers. The first is to bring expensive medicine within reach. The second is to ensure that we ensure better availability of medicines, which we do through our generics business. The third and fourth promises are covered by the proprietary business, which are to repurpose drugs for unmet medical needs and to help patients manage their diseases better respectively. Through our API business, our fifth promise is to work with partners and help them succeed. We strive to live up to these five promises in our daily operations in the United States.

Looking ahead, where will Dr. Reddy's be in the next three to five years?

At our current size, there is a fair amount of annual growth. We are trying to differentiate ourselves from our competitors by diversifying our product portfolio. We believe that there is ample opportunity in the United States as this is the largest pharmaceuticals market in the world. We generate 47% of our overall revenues from the United States business, and we hope to increase this figure by growing our generics, PSAI and proprietary businesses. We are excited about bridging our product offerings in North America with that in emerging markets and we look forward to further organic growth in the future. •

Chintu Patel & Chirag Patel

CHINTU: RPh, Co-CEO and Co-Chairman, Co-Founder
CHIRAG: Co-CEO and Co-Chairman, Co-Founder
AMNEAL PHARMACEUTICALS LLC

CHINTU

CHIRAG

Can you explain why you and your family founded Amneal in 2002 and talk about the company's evolution over the last decade?

Our family has a history of entrepreneurship in the pharmaceutical industry. My father trained as a pharmacist and began his career as an inspector with the Indian FDA, but he left after eight years to start his own business selling medical products and wholesaling pharmaceuticals. When I was 20 years old, our family emigrated to the United States and my father took a position with Sidmak Labs, which is now part of Teva. I worked initially for some Fortune 500 companies in various roles, but went out on my own in 1997 with a technology start-up. My brother Chintu worked initially as a retail pharmacist, but we partnered in 2002 to lease a small plant in Patterson, New Jersey and, with our father's support, we co-founded Amneal. We began modestly, funding the business with our own money, but after three years we brought in outside backers to accelerate our growth. We wanted to grow organically, but the outside investment allowed us to make three acquisitions in two years and grow our business substantially. Those initial acquisitions are still the foundation of our U.S. manufacturing infrastructure. After those acquisitions, we renewed our focus on organic growth and invested heavily in both R&D and capital investment in our facilities. We increased our manufacturing capacity as well as our dosage form capabilities, and we are proud to have the largest pharmaceutical manufacturing site in the NY/NJ area. We look at "Made in the USA" as Amneal's competitive advantage, not a cost disadvantage.

Can you elaborate on your product portfolio and the reasons behind your choices?

Our current portfolio consists of nearly 90 products, and we have a pipeline of 125 products pending with the U.S. FDA. We are filing roughly 40 new ANDA applications each year and have over 100 products in development at any given time. Our product selection has evolved as our business has grown, and we have migrated away from commodity generics and now focus most of our R&D efforts on very complex generics and high barrier-to-entry dosage forms. We still develop commodity products to meet the needs of our pharmacy customers, but to really provide value to patients we need to commercialize complex products where there are few, if any, generics.

In a highly competitive industry, how are you targeting your domestic and international reach?

Roughly 90% of our revenues are generated in the United States. The remaining 10% come from Europe and Australia. Our goal is to increase our global distribution to Canada, Japan, Turkey and South America over the next few years. Additionally, 90% of our production occurs in the United States, specifically in New York and New Jersey. We have five facilities in the region with more than 1 million sq ft of manufacturing area covering orals, transdermals, liquids, nasal sprays and topicals. In India, we have six manufacturing facilities, comprising two for injectables and two for oral solids, as well as two API plants.

How does the current high volume of M&A activity play into Amneal's corporate strategy?

Our biggest challenge is customer-side consolidation; five customers buy more than 90% of the generic drugs—they have a huge amount of purchasing power. Therefore, it is natural that consolidation will occur on the manufacturing side. We benefit from M&A activity and believe the industry needs consolidation to continually rejuvenate and recalibrate.

As a company with a strong product pipeline, how has the introduction of the GDUFA fees affected drug approval rates?

Amneal is a supporter of both GDUFA I and GDUFA II. We continually work with the FDA to ensure the agreed-upon performance targets are being met; however, there have been road bumps along the way. We are hopeful that the recent increase in personnel, combined with the fees, will ensure that the next three years run more smoothly. We have a diverse portfolio of products both in development as well as pending FDA approval, therefore we expect to be a net beneficiary of GDUFA's improved cycle times for ANDA review. From a compliance standpoint, manufacturers have a moral obligation to hold the industry to a higher mark of quality, and GDUFA has helped raise the bar and oversight for those that were historically deficient.

Where can we expect to see Amneal Pharmaceuticals in the future?

Our goal is to be one of the top five generics companies in the United States in terms of both volume and revenue within the next five years. We are currently at number seven in terms of prescriptions dispensed annually and are moving up the ranks quickly in terms of revenue growth. Our projected pipeline is diverse, and we intend to continue building upon our product portfolio. Amneal was built on the core fundamentals of quality, customer service and investment in organic growth—we will never waiver from those commitments as we strive to reach the top five. •

Vimal Kavuru

CEO
CITRON PHARMA LLC

Can you give us an introduction to Citron Pharma?

Citron Pharma was founded more than two years ago in early 2013 and launched its first commercial products in the fourth quarter of the year. Today, the company is one of the fastest growing generics companies in the U.S. market. The company was initially formed out of an acquisition of 72 licensed ANDAs from the former Pfizer generics unit and 10 NDA products, but we continue to grow today through continuous product acquisitions, joint ventures and product licensing. The underpinnings of our success come from a highly skilled executive team with decades of experience in the pharmaceutical and healthcare services market, a diverse and growing portfolio, continuous investment in expanding operational capabilities, and aggressive pursuit of business development.

Can you tell us more about how your business model has developed over the past two years?

We are currently what some refer to as a virtual company. We have neither manufacturing nor distribution capabilities under the Citron umbrella, but we are evolving rapidly. Our model has us networked with a large number of API and dosage form partners to extend our operational capabilities. Presently, we manufacture primarily in India, but we also have sites in the United States and Canada. Establishing strong relationships with our outsourcing partners is a challenge as we are continuously expanding our partnership network. However for a company of our size there are limitations to the number of development and manufacturing partners we can effectively work with. In response, we are in the process of rapidly building our own research and development site staffed with some of the best analytical, formulations and regulatory people in the business. This is rapidly expanding our pipeline portfolio in the generic and specialty pharma fields.

You recently received an award from the HDMA for most notable achievement in the industry. What were the major contributing factors that led to you winning this award?

We were awarded HDMA's DIANA for best new generic launch, Duloxetine Capsules, generic Cymbalta®, which, at the time, was the largest product that was going off patent. Through strong relationships with our customers, our sales team was able to launch the generic seamlessly, competing favorably with some of the biggest competitors in the business. We were able to work closely with our supplier partner to expand our capabilities and not only gain a significant market share but also fill shortages of this product left by other competitors. As a result of our early marketing successes, there is not one customer in the U.S. market that we are not contracted. For a company that is only two years old, this is a substantial achievement.

The GDUFA fees that were enforced in 2012 have been received with mixed reviews. How have you found coping with them as a start up?

Before GDUFA, new ANDAs applications on average were taking longer than 24 months to process and what you started to see was a substantial backlog appearing at the FDA. Generic drug user fees were brought in to alleviate this problem. Although the first few years of GDUFA did not seem to address the problem, what we have today is a far speedier and more efficient approval process. Certainly, it is a burden for companies like Citron with smaller operations who are being taxed at the same rate as larger companies, but overall it has been a beneficial scheme. GDUFA is also expanding quality oversight of the industry and this benefits all of us with a commitment to high quality standards.

What are the main challenges today that small to medium sized companies are presented with?

The generic industry is constantly changing, which makes it a very exciting industry segment to work in, but many companies find it difficult to adapt to this ever-changing market environment. The barriers to entry are still low for new companies entering the market and many companies who enter with only a few products in their

portfolio find it very difficult to compete with five or six other players on any given product. To be successful in this market, small to medium sized companies—the middle tier—need to have a constant flow of product introductions to stay relevant and gain customer share. The industry is also consolidating and there is a lot of mergers and acquisitions activity, particularly among the larger names. The fallout of this is that when these companies merge there is often disruption in the market place, which, while providing opportunities for smaller competitors, it can create a very challenging and complex backdrop on which to succeed.

How successful has the Generic Pharmaceutical Association (GPhA) been as an advocate for the generics industry?

During the late eighties and early nineties there were a number of different organizations representing the concerns of the generics industry. This steadily consolidated and eventually the GPhA took the helm as the industry voice for generics. The association has very much evolved from what it once was and today it is seen as a very successful representative for generics companies nationwide. They have done a very good job at spearheading issues such as follow-on biologics (biosimilars) and ensuring that the interests of generics companies are considered alongside those of the branded companies when discussing healthcare reform.

What do the next three years hold in store for Citron Pharma?

We are highly focused on business development in the short term and are constantly looking for new partnerships in development and manufacturing, where our commercial expertise and success in the market is valued. Our goal to consistently expand our portfolio not only extends to generics, but also to branded and specialty products. In three years we will be viewed as a unique specialty pharmaceutical company with a deep product basket, a record for building strong business partnerships and a track record of commercial success. •

Robert Cunard

CEO
AUROBINDO PHARMA USA INC.

Could you start by giving us a brief overview of Aurobindo and detail the company's operations in the United States?

Aurobindo is an India-headquartered generic pharmaceutical company. Incorporated in 1986, the company began as a manufacturer and distributor of active pharmaceutical ingredients (APIs). In 2000, the company entered into the finished formulations business, leveraging its vertical integration and providing a complementary growth driver to third-party API sales. Aurobindo has continued to grow both business segments, with more than 2,100 formulations and 2,500 API filings, and a presence in more than 125 countries. In 2004, Aurobindo had its first product approved by the U.S. FDA and, since then, Aurobindo's operations in the country have grown rapidly through ANDA filings and approvals thereof. Our value comes from the vertical integration of our API business, which remains our core competency. More than 90% of our products marketed in the United States are manufactured with our own APIs. We currently have 120 product families and our portfolio continues to grow.

Could tell us about Aurobindo USA's component business segments?

Aurobindo USA is comprised of four commercial entities: Aurobindo USA, which is our traditional oral solid generics company; Auromedics, which deals with our institutional injectable products; Aurohealth, which is our private label OTC business; and Natrol, which is a recent acquisition specializing in branded nutraceuticals. In addition to these four, we have a wholly owned subsidiary, Aurolife, which is our U.S. research and development and manufacturing entity. It focuses on controlled substances and sales through government contracts.

Where does Aurobindo stand today in the U.S. generics market?

We have grown substantially. One of the measures that we employ is total prescriptions dispensed. This is a key measure because we focus mainly on the high-volume commodity-type generics. In 2010, we were ranked 27th in the United States for both branded and generics companies. Today, we are number 10th. This clearly demonstrates our considerable growth over the past five years. What is key for us is affecting our customers and their patients by meeting their expectations in terms of price, quality, and supply. With rapid customer consolidation, managing growth becomes more challenging, but Aurobindo is well positioned to meet the challenge.

You have a rapid rate of ANDA approvals. Is this a result of the generic drug user fee amendment (GDUFA)?

These approvals are a result of our strategy of being a broad-line provider, which is critical to driving value to our customers and our shareholders. With regards to GDUFA, as an industry we accepted these fees with the understanding that there would be a performance improvement, but today we are still yet to see this fully take place. The backlog of filings has increased considerably since the passage of GDUFA. It has been disheartening to see a lake of transparency and decrease in dialogue with the FDA following GDUFA. However, more recently, the FDA has identified a targeted action date initiative and today we have received likely approval dates for 10 or more filings. This is promising, and we hope it continues.

Do you the think the Generic Pharmaceuticals Association (GPhA) is a successful advocate for the generics industry?

Despite GDUFA not being a huge success story, the GPhA has done well in uniting the industry and is a sound advocate for it members' needs. Following the Hatch-Waxman Act of 1984, the generics industry was very fragmented and immature. Through the efforts of the GPhA, the industry has come a long way and matured not only in its advocacy efforts, but also in the levels of professionalism within individual companies. Looking ahead, one major challenge will be biosimilars and establishing whether this will be a key driver for the industry.

There is a high volume of mergers and acquisitions activity within the generics industry. What opportunity does this present for Aurobindo?

It certainly presents an opportunity for us. As far as expanding our footprint, we purchased Actavis' generics arm in seven Western European markets a little more than a year ago. That enabled us to strengthen our presence in these markets and create better economies of scale. The acquisition of our nutraceuticals business is another example of our activity in this space. In terms of the megamergers among the larger generic players, this is not a threat to Aurobindo. What these big companies need to drive their businesses, be it collectively or individually, is different to what we need to be successful. Our advantage comes from the core strength of being vertically integrated.

Do you have a final message for GBR's readers?

Aurobindo still has very aggressive growth goals. As the business continues to evolve, we are confident in our ability to deliver a growing list of products and dosage forms to all aspects of the market, including traditional retail generics, hospital-based injectables, private label over-the-counter drugs, and branded nutraceuticals, all leveraging our core strengths of vertical integration and large-scale production and ultimately delivering value to our customers. •

Himanshu Brahmbhatt

Vice President,
Business Development and Sales
SUNRISE PHARMACEUTICAL INC.

Can you provide an overview of how Sunrise Pharmaceuticals has made its mark within the pharmaceutical landscape in the United States?

Sunrise was established in 2004 and began its manufacturing operation in early 2005. The company started by launching several of its over-the-counter (OTC) drugs in various therapeutic categories. This included private label and our own Sunrise Label. In a few short years, Sunrise was successful in penetrating all channels of pharmaceutical distribution. In 2010, Sunrise went through a strategic shift and changed the company's vision towards specializing in generic drug development and manufacturing. Currently, Sunrise offers a wide range of products and services, which include contract manufacturing, contract packaging, pharmaceutical development, and analytical testing. Our state-of-the-art facility is designed to manufacture controlled and non-controlled drugs (Class II-V) in NDA, ANDA, and 505(b) (2) categories. Currently, we are a fully cGMP compliant and FDA-registered facility.

What forces led to the company's evolution from being an OTC manufacturer to a generics producer?

The United States is a mature market for OTC drugs. There has been tremendous commoditization coupled with extensive reforms from the regulatory bodies towards OTCs, which has placed enormous pressures on pricing. Moreover, there are now dozens of new entrants in each product category (e.g. analgesics, laxatives, pain relievers, etc.) within OTCs. Thus, market conditions are forcing lot of small and medium-sized manufacturers to re-valuate their strategy. Conversely, in the brand prescription drug segment, there has been a surge of IPs going off patent where generic manufacturers see a substantial opportunity. Hence, we are carefully reviewing all options and optimizing our generic product portfolio to boost growth and profitability.

Has the regulatory framework in the United States supported or challenged you in this shift to generics?

The regulatory framework has definitely challenged us in this transition. In last few years, there has been a major increase in regulatory and quality compliance within the pharmaceuticals industry in general. The FDA has refined its approach towards enforcements and has outlined more stringent compliance requirements across the board. Though we welcome this directive and have implemented it with great care, it nevertheless has added a tremendous financial burden in this weak economy. Secondly, the recently instituted Generic Drug User Fee Amendments have also put strain on manufacturers and packagers. The fees are the same for mature, established organizations with revenues in billions and small companies with revenues below one million. This is a heavy burden to carry for small businesses, and we even know a few companies that have exited the market solely for this reason. So, yes, the current regulatory landscape has definitely impeded our growth, but we remain optimistic about the future.

Could you highlight how Sunrise Pharmaceuticals has grown in the contract manufacturing business?

On the contract manufacturing side, we ideally seek brand and private label organizations that are looking to outsource the manufacturing to maximize their efficiencies towards sales and marketing. There are also many generic companies that seek outsourcing as they run into capacity issues. To better serve these growing market needs, we offer end-to-end service from development to commercialization. We gain our customers by offering the most cost-effective, custom-tailored solutions yet managing strict timelines to bring the product to market in record time while maintaining highest quality standards. We have a cohesive group of research and development (R&D), regulatory, and quality personnel that has over 75 years of collective experience and ensures that every project exceeds our clients' expectations. Our clients realize great value in working with Sunrise, as we offer faster turnaround towards commercialization while maintaining cost and quality.

Where will Sunrise Pharmaceuticals be in five years?

We believe in organic and inorganic growth. To that end, we plan to invest heavily towards innovation and infrastructure as well as increasing our talent pool. We will also continue our focus towards R&D and create a robust and diverse product portfolio. We also plan to invest in advanced technology to enhance our production, laboratory, and warehousing capabilities. Our other goal is to penetrate new markets and explore investment opportunities through acquisitions, investments, strategic alliances, and/or joint ventures with suitable strategic partners. All things considered, in the next five years, Sunrise is poised to be among the market leaders in the generic pharmaceuticals industry.

What is your final message for readers?

The global pharmaceutical market revenue is now over $1 trillion, and we do not anticipate this number decreasing in the future. There will be stagnation; however, there will always be novel opportunities. As an organization that operates in one of the best markets in the world, we will be seeking opportunities to grow in several directions. We are passionate about serving this market and aim to be an industry leader by bringing together science, technology, and human talent to provide products and services of superior quality and value for our clients and consumers at large. •

Regional Focus
The Northeast as Pharma Hub

"Pennsylvania is home to 2,300 life sciences establishments, from global pharma to start up biotech companies, and 85,000 people in the state are directly employed within this industry. Pennsylvania also has two of the top ten institutions in terms of NIH funding, the University of Pennsylvania and the University of Pittsburgh."

- Christopher P. Molineaux,
President and CEO,
Pennsylvania Bio

Image: Shutterstock

The Northeast Corridor: The U.S.' Pharmaceutical Belt

By James Hogan

The West Coast of the United States boasts a number of rising biotech clusters, but the Northeast remains the bastion of traditional pharmaceuticals. This region of the country has always been home to a great many world-renowned academic institutions that provide a constant stream of young minds to support the industry.

States from within the Northeast corridor are able to enjoy proximity to both the financial markets of the world in New York and to the seat of the federal government in Washington DC. A strong logistics framework with major ports and international airports, as well as a time zone that allows companies to do business with Europe and the West Coast in the same day, make this part of the world an ideal location for any enterprise.

New Jersey has garnered the reputation as the "medicine chest of the world," being the oldest and most established pharmaceutical hub in the country. Other states, however, have been successful in capitalizing on the high number of jobs and significant revenues that this industry brings. New York, Pennsylvania and Delaware have all seen the evolution of their own pharmaceutical and biotech clusters. North Carolina as well, with its research triangle, is now the destination for the majority of the pharmaceutical industry's contract research and drug development services needs.

Johnson & Johnson was founded in 1886 in New Brunswick, New Jersey. Over 125 years later, this giant corporation still tops most leader boards globally as the largest and most profitable pharmaceutical company. New Jersey now houses 14 of the world's 20 largest pharmaceutical firms. The biopharmaceutical and medical technology industries are major contributors to the state's economy. "Life sciences is the largest industry sector in New Jersey", said Dean Paranicas, president of the Health Care Institute of New Jersey (HINJ). "The pharmaceutical industry accounts for nearly 71,000 direct jobs in the state. In our last economic impact survey, HINJ member companies' New Jersey facilities spent nearly $8.7 billion for research and development in 2012 and gave $583 million in charitable donations to this state."

This industry is vital to both the state and the country. The state has a total of 66 colleges, universities and technical schools and every year 22,000 students graduate with degrees in the life science industry and prepare themselves for a career in one of New Jersey's many biopharmaceutical companies. This state's talent pool is considered by many to be one of its biggest advantages and the reason for its successful life science industry. "Ultimately, [the life science industry] began with Johnson & Johnson, that has been here since the beginning, but [our reputation as medicine chest of the world] would not have been possible to retain had it not been for New Jersey's incredibly educated workforce," said Kim Guadagno, lieutenant governor for the State of New Jersey. "The state has more scientists per square mile than anywhere else on the planet. Our schools and higher education system have attracted the greatest minds from all over the world."

Just south, and home to well-known generics companies Teva and Mylan, Pennsylvania is pushing the pharmaceutical and biotech industries to be key sectors for its economy. Here, the life science industry employs more than 79,000 people and accounts for $7.2 billion in wages. With around 112 establishments directly involved in drugs and pharmaceuticals, Pennsylvania is also home to a plethora of companies in medical devices and diagnostics, as well as a great many research testing and medical laboratories. Innovation is a word synonymous with Pennsylvania's operations in the life sciences, being ranked fourth in the country in research and development (R&D) expenditures and also fourth in total research awards from the National Institutes of Health (NIH). "Pennsylvania has two of the top ten institutions in terms of funding", said Christopher Molineaux, president and CEO of Pennsylvania BIO. "These are the University of Pennsylvania and the University of Pittsburgh."

As with most other states, the financial crisis of 2008-2009 took its toll on this sector, but the ever-changing landscape is providing plenty of opportunity for growth today. The work that is being undertaken in Pennsylvania's many research institutions is driving major positive changes in healthcare across the state and nationwide.

"The state of Delaware has a broad educated, experienced workforce conducting R&D and manufacturing work, representing pharmaceutical, diagnostic, and medical device companies of varying size," said Bob Drayton, president of Delaware Bio. "In addition, the talented employees at academic and medical research institutions throughout the state contribute to vital and innovative research".

The State of Delaware is the third state in the tri-state region and, together with New Jersey and Pennsylvania, this part of the country represents 80% of the U.S. pharmaceutical industry. Known as the 'first state', more than 50% of publicly traded companies and over 60% of Fortune 500 companies are incorporated in Delaware. Its east coast location makes it accessible to 80% of the U.S. pharmaceutical industry, the investment community, the Food and Drug Admin-

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>
> - Dean J. Paranicas, President and CEO, HealthCare Institute of New Jersey (HINJ)

> [New Jersey] has more scientists per square mile than anywhere else on the planet. Our schools and higher education system have attracted the greatest minds from all over the world.
>
> - Kim Guadagno, Lieutenant Governor, State of New Jersey

istration, and the National Institutes of Health. In 2008, around 12,000 people were employed in life sciences in Delaware and, though this number has declined somewhat due to the high level of mergers and acquisitions (M&A) activity attributed to this industry, the biopharmaceutical sector's share of Delaware's jobs and wages is sixth largest in the United States. Despite being a small state, Delaware is certainly a major player in the pharmaceutical industry.

Beyond the aforementioned three states, North Carolina houses close to 500 life sciences companies and is the country's third largest biotech cluster. It is the world's leading center for contract research organizations and as such, a vital pillar in the country's pharmaceutical industry as a whole. Boston must also be mentioned, as it is set to overtake San Francisco and become the country's top cluster for biotechnology firms. Biopharmaceutical employment in Massachusetts grew by 4.9% in 2014 and continues to outpace the nation in biopharma manufacturing employment growth.

The Northeast will continue to be the primary destination for the world's many pharmaceutical and medical devices companies for years to come. The governments of the different states in this region long ago identified the great opportunities and benefits this sector can offer their economies. Civil associations and private organizations help hold together the various clusters and guide their growth. No doubt the volatile nature of the biopharmaceutical industry and the high level of M&A will keep this landscape in a state of flux, but ultimately the Northeast's pharmaceutical industry will remain a key part of this region's wealth. The outlook is positive. •

Kim Guadagno, Christopher J. Molloy, Michele Brown & Lauren H. Moore, Jr.

KG: Lieutenant Governor
STATE OF NEW JERSEY
CM: Senior Vice President, Office of Research and Economic Development, Rutgers,
THE STATE UNIVERSITY OF NEW JERSEY
MB: President and CEO,
CHOOSE NEW JERSEY
LM: Executive Director
NEW JERSEY BUSINESS ACTION CENTER

KG

Could you start by giving us an introduction to the Partnership for Action?

KG: In 2009, when Governor Christie announced that he was going to run for office, he tasked his Lieutenant Governor with creating the Partnership For Action (PFA). Following our election in early 2010, a transition committee was held to decide what exactly this partnership would comprise. Today the PFA is made up of four principal pillars. The first is Choose New Jersey, an independently funded 501(c)(3) business-attraction and lead-generation organization that markets the state as an ideal location. The New Jersey Business Action Center, which reports directly to me, and provides a 'one-stop-shop' for the business community and the Office of the Secretary of Higher Education form the second and third pillars. The fourth and final pillar is the New Jersey Economic Development Authority, which serves as the state's bank. Collectively we strive to attract business to and retain business in New Jersey and ensure that quality jobs are brought into—and remain in—the state.

With regards to the life sciences, why has New Jersey built and maintained a reputation as the medicine chest of the world?

KG: Ultimately, it began with Johnson and Johnson, who have been in New Jersey since the 1800s, but it is a reputation that is also due to the state's incredibly educated workforce. New Jersey has more scientists per square mile than anywhere on the planet. Our schools and higher education system have attracted the greatest minds from all over the world.

Michele Brown (MB): Another factor is the state's location. A business located in New Jersey has immediate access to the financial markets of the world in Manhattan and is close to the governmental center of the country in Washington, D.C. Equally, a company on the east coast can do business with Europe and California in the same working day.

The life sciences industry requires a large and highly talented workforce. What initiatives are in place to ensure that people are pursuing a career in this field?

KG: Following his election, one of the very first things the governor did was to create three centers of excellence where each of our large institutions could focus on whichever their specialty was.

CM: Through this initiative, Rutgers University, one of the oldest universities in the country, has gone from being 48th to being among the top 30 nationally in terms of research expenditure. Having recently merged with a large medical university and now in its second year of revitalization, Rutgers is now able to bring bench-to-bedside research in one single location. Other examples of higher education reorganization have kept our best and brightest in the state and acted as a funnel to New Jersey's life sciences industry.

Are you seeing more collaboration between pharmaceutical companies?

MB: We are seeing much more cooperation between corporations and higher education institutes. Companies like Johnson and Johnson, who conducted more than 100 collaborations last year, are doing more collaborative work than ever before. Not only is this more cost effective and mitigates risk, but it also brings together minds that may think in different ways.

CM: Many large pharmaceutical companies are outsourcing their innovation and working pre-competitively with universities. Several of these companies are working with Rutgers in the field of continuous manufacturing, a process by which a pharmaceutical product is made just in time rather than in large batches. We recently received a grant of $6 million from one company to support our work in this area. These examples of pre-competitive interactions are extremely positive for New Jersey.

Could you talk about the Partnership's international approach and initiatives to encourage foreign companies to establish a presence here?

KG: Six years ago, New Jersey had no international presence. It did not have the financial means to support overseas offices nor any way of evaluating any return on the investment. Since then, Choose New Jersey has funded a large number of foreign trade missions to countries such as India, South Korea, Taiwan, and, most recently, Israel. From these missions, we can establish leads, bring them back to the partnership and work them.

LM: Any company potentially wanting to establish a presence here or carry out a project will have the Lt. Governor as a first point of contact. This is important as it shows them that they are dealing directly with leadership. Together we can then identify the specific resources, services and business practices that we can bring to bear for their project scope. We are flexible and can tailor our service specifically to any project.

How do you hope to keep New Jersey as a hub for Life Sciences?

KG: The simple answer is by example. In the last six months, New Jersey has garnered investment in the life sciences from companies such as Valeant, Ferring International, Novo Nordisk, and Sandoz. These examples speak louder than anything we could say. •

Dean J. Paranicas

President and CEO
HEALTHCARE INSTITUTE OF NEW JERSEY (HINJ)

Can you provide an overview of the Healthcare Institute of New Jersey, the members you work with, and your role within the pharmaceutical landscape in New Jersey?

The HealthCare Institute of New Jersey (HINJ) was founded in 1997. HINJ represents researched-based biopharmaceutical and medical technology companies that have a significant presence in New Jersey. HINJ seeks to expand patient access to the most innovative biopharmaceuticals and medical devices and to elevate the presence of the industry in New Jersey, emphasizing its impact on the state, the economy and its citizens. Today, we represent 25 medical device and pharmaceutical companies. This is an exciting place for us, as 13 of the world's top 20 research-based biopharmaceutical companies claim New Jersey as their global, North American or U.S. headquarters or have a significant presence here, which creates a unique concentration in terms of presence and impact. As any trade association provides an industry dimension, HINJ's focus is based on three core concepts: patient access, innovation and jobs. Patient access means working everyday to ensure that patients around the globe have the access that they need to necessary drugs, treatments and technologies. Innovation refers to the fact that it is at the heart of the research-based side of the industry that we represent. Jobs represent the economic impact of this industry.

What is the regulatory framework in New Jersey?

Our member companies have anticipated regulatory changes in the health care system and have responded accordingly. Twenty-five years ago, a big shift occurred with the introduction of industry-paid user fees for the FDA. The FDA was resource-constrained and could not cope with the demand to approve drugs and devices. The industry agreed to pay user fees to increase the FDA's resources for review and approval of new medicines and medical devices. The Affordable Care Act also has had a major effect on our industry. There has been a migration towards outcomes-based reimbursement. As a result, among other things, life sciences companies have had to create products that can measure outcomes more effectively.

What is your vision for the pharmaceutical industry in New Jersey in the next five years?

The pharmaceutical industry will continue to evolve globally as well as in New Jersey. We expect that medical innovation will accelerate, including in personalized medicine, or precision medicine in President Obama's words, and there will be a greater focus on rare diseases, which already is occurring. Technology, which is the driver of our innovation-focused life sciences industry, will advance, opening new doors of discovery. Of course, global economic and government activities will impact how we conduct business. Also, moving forward, we anticipate that even greater industry collaboration will occur between and among academic institutions, companies and the government, including the National Institutes of Health.

What are your views on research and development (R&D) in the coming years?

Our ability to advance innovation is crucial to this industry. Having the resources to invest in innovation is the first step towards attaining this goal. Research investment carries high risk with a high failure rate. With the drug development cycle being 10 to 15 years, and intellectual property and patents expiring 20 years after being approved, this leaves little time for innovators to recoup their significant investment, which reduces the incentive to invest.

What are some of the key milestones of the industry in terms of improving job creation?

The United States is the largest market for the pharmaceutical industry in the world. Life sciences is the largest industry sector in New Jersey. The pharmaceutical industry accounts for nearly 71,000 direct jobs in New Jersey. In our last economic impact survey, HINJ member companies' New Jersey facilities spent nearly $8.7 billion for R&D in 2012, and $583 million in charitable donations in New Jersey. The direct and indirect economic effect proves that this industry is vital to the state and the country. The ripple effect includes a reduced burden on the health care system because people are healthier.

What are some challenges that manufacturers of drugs are facing in the United States?

Changes are occurring in the global economic landscape, and health care systems are constantly seeking cost-effective outcomes. HINJ member companies need to respond to these demands. As companies continue their search for new drugs and devices, they need resources. Our job is to ensure that our policy makers understand what our companies need to continue doing what they do best, which includes the regulatory framework, the patent system, the tax system and a viable economic climate for investment in R&D.

What is your final message for readers?

There are two key messages. First, we are proud of the fact that New Jersey is the medicine chest of the world and intend to maintain that reputation. Second, we want to emphasize the industry's effect on the state, the country and the world. The life sciences industry is at the heart of human vitality, as the benefits are many in terms of health and economy, at both an individual and societal level. •

Christopher P. Molineaux

President and CEO
PENNSYLVANIA BIO

Can you introduce Pennsylvania Bio and talk about the evolution of the association?

The organization was formed 25 years ago, at a time when biotechnology was relatively new and was drawing great interest, but its presence in Pennsylvania was relatively unknown. Pennsylvania Bio was founded by two executives from the Pennsylvania State University with the aim of making the state more aware of the biotech business that was being developed here. The other goal was to ensure the growth of this community by facilitating connections between the players in this field. We are a completely privately funded organization and over the past quarter century, the organization has grown and today has a portfolio of 660 member companies, making us the second largest state association for life sciences in the United States. This portfolio is one that has diversified over the years and, different from our roots, which were solely in biotech, we now also offer representation to traditional pharmaceutical companies, medical device and diagnostic companies, academic research institutions, investment organizations, and service providers.

Can you outline the principal roles of the association today?

The mission today is very similar to what it was when the association was founded, though we have a much heavier focus now on public policy advocacy. We dedicate a great deal of time to lobbying for legislation that will help shape the business environment for the state and make Pennsylvania attractive for outside companies. We also operate at a Federal level and work with the congressional delegation on Federal policy that will encourage innovation and enhance the growth of the industry across the Country and around the world, but maintaining a focus on Pennsylvania companies. The other accountability of Pennsylvania Bio is facilitating strategic connections. We run between 25 and 30 programs of differing sizes each year with an aim at creating opportunities for the players in the industry to interact with one another and shape the future.

What are the major strengths of Pennsylvania that have helped nurture this vibrant and active biopharmaceutical hub?

Pennsylvania is home to 2,300 life sciences establishments, from global pharma to start up biotech companies, and 85,000 people in the state are directly employed within this industry. Pennsylvania also has two of the top 10 institutions in terms of NIH funding, the University of Pennsylvania and the University of Pittsburgh. In terms of softer metrics, the state has the geographical advantage of sitting between the financial markets of New York and the regulatory bodies of Washington DC and Maryland.

Does the association have any initiatives in place to encourage interest in Pennsylvania from foreign companies?

We work very closely with the Department of Community and Economic Development, which is part of the Pennsylvania State Government. This department has employees in 14 countries around the world and serves as a funnel of companies and organizations looking to conduct business in the United States. When one of these companies is in the life sciences industry, they are brought to us at which point we orient them towards the resources available in Pennsylvania. More directly, Pennsylvania Bio has signed memoranda of understanding with four countries—Italy, India, Taiwan and the UK—that are in place to foster a dialogue between the United States and each of these countries.

To what extent is the association encouraging collaboration and integration between its member-companies that historically may have been direct competitors?

One of the challenges of a trade association is to remain impartial amongst its member companies and to their individual business interests. All of our activities are guided by the common interests of our members. We have a series of committees within our membership who help shape our public policy agenda for the year and design our programs. On the policy front we play to the most common denominator and focus on issues that affect the majority of our members and will not involve ourselves in any specific product issues. However, it is important for any trade association to really understand what individual companies may need as well as the broad macro-dynamics of what is happening in the industry. In doing this, we can then bring value to our members by connecting them with the right resources or partners, either through events, or in our role as a facilitator and convener.

How do you expect the association to evolve and expand over the next five years?

We will certainly continue to expand our membership portfolio. Currently within our core members we have almost an even split between biotech, traditional pharmaceutical, and medical device companies. We will expect to increase our CRO membership base as this industry grows and we will also see more digital health companies within our portfolio. We also want to further pursue the distribution channel. With regards to our mission, we ultimately want the United States and indeed the world to better understand the resources and opportunities that are available here in Pennsylvania and to promote this state's reputation as a global hub for the life sciences. •

Ben Sparks

Director, Client Services & Development
REAL LIFE SCIENCES

Could you give us an overview of Real Life Sciences and the areas in which it operates?

Real Life Sciences was founded by Steven Quinn (now our Group CEO for the Americas) in 1998. We have 19 offices globally and over 300 recruiters. We specifically focus on permanent (FTE) and project/ contract staffing needs for companies in the Life Sciences market. We have five US offices with 100+ recruiters working in the life sciences space, primarily focusing on the pharmaceutical, biotechnology, and medical devices markets. With global offices and regional hubs we can offer a global reach without losing the local nuances needed to attract and retain the best talent for our customers.

Some pharmaceutical companies complain about the lack of potential employees, while others point to an abundance of candidates. As a recruitment firm, how is the job market faring in reality?

As a rule of thumb, more niche, highly specialized, or executive positions will have fewer candidates. Interestingly, "fewer candidates" is a phrase I hear frequently, however this is a perception rather than a reality. There are candidates out there in all markets and in reality the "number" of prospects is usually high. The challenge that companies face when looking to attract candidates is knowing where to look for the best talent. We position our recruiters to build networks within tight niche verticals, this allows them to gain a strong depth to their network and understanding the best "passive/dormant" talent in their marketplace. This strategy allows us to add maximum value to our candidates & clients. We can introduce opportunities to candidates that are very specific to their needs, and acquaint our clients with candidates whom they would not be able to attract or have access to via direct recruitment methods. We see this in both our permanent and contract businesses.

There are also markets with a vast number of active candidates. On the surface this might seem positive, however, a large pool is not always a good thing. In these situations, a client will initially receive many resumes and spend a significant amount of time interviewing those applicants. However, the number of candidates they hire from this pool is minimal. Individuals that appear to be a good fit on paper are often weeded out during the interview process- a process that often consumes a substantial amount of time and resources.

Our value to clients looking to fill these roles has been to impact their ratios - Our recruiters have already cut though and dismissed this challenging segment of the market. We can supply fewer candidates and have more hires in a shorter time span. Regardless of whether the number of candidates is high or low, one thing is consistent: there is, in effect, a 'war on talent' and competition. The best candidates will always have options. We coach our clients on how to best position their opportunity to be compelling to quality talent from the interview through to the offer stage.

Could you talk about the dynamics of your relationship with your clients and how it develops over time?

We offer many tailored solutions. Our aim is to add value to the client and be a true partner. We have the ability to provide high level and highly-skilled candidates in a short space of time which benefits clients, from start-ups to large corporations.

For our largest accounts, who have a more varied mixture of openings, we have a specialized team of recruiters that are dedicated to those clients. This team focuses purely on delivering candidates to these wider range of roles. This has allowed us to service the needs of clients in the Big Pharma/ Med Device and small Biotech/Med Device clients. Overall, we like to listen to what our clients need from us and the challenges they have; we will then design solutions around that framework. We aim to tailor a solution to add value for our clients, rather than trying to have a "one size fits all" model.

Aside from candidate sourcing, how else is Real Life Sciences able to provide added value to its clients?

We do lots of work with clients around the value of human capital, employer branding, and also look to help create visibility around topics like diversity. We also recently ran a round table event focused purely on retention of talent. We educate candidates on their marketability, overall view of the current jobs market, and support outplacement activities with clients who may be making redundancies.

What is ahead for Real Life Sciences in terms of corporate strategy?

From a headcount perspective, we are poised to double our presence in the United States in the next two years. Our strategy is to grow our regional headquarters in San Francisco and New York. We are also looking to diversify our markets in certain areas to cover the whole Life Sciences market, completing the great work we are doing in Biotech, Pharmaceutical and Medical Devices. Additionally, we are cementing some of our global partnerships by working with clients both nationally and around the world. •

Digging Deep
Research and Development

"More than 90% of the prescriptions written in the United States are for generic products. By and large, pharmaceutical companies realize gains in specialty areas; the vast majority of R&D spending is on Hepatitis C, oncology and multiple sclerosis. Two thirds of the current drug pipeline is in specialty areas including molecules with orphan drug designation, as these are the most profitable products on the sell-side."

- Angeliki Cooney,
Director, Strategic Planning,
IMS Health

Image: Intertek Pharmaceutical Services

Where it all Begins: New Drug Discovery

The shifting focus of pharmaceutical research and addressing unmet medical needs

By James Hogan

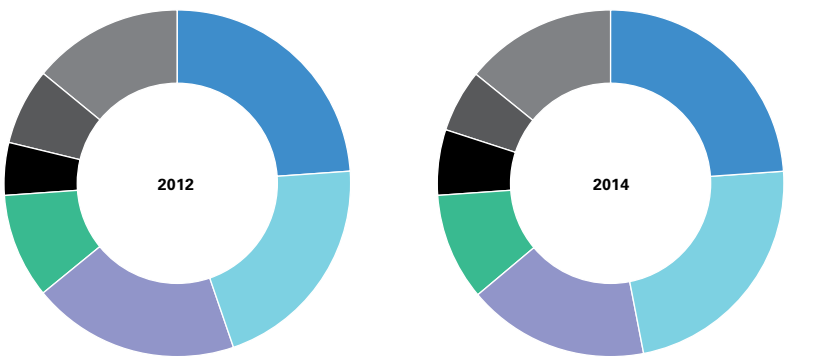
Despite the vast amounts of money that is pumped every year into research and development (R&D) in the pharmaceutical industry, for some diseases there is still no cure. Oncology remains the main focus for new drug discovery, but sadly only 4.7% of cancer drugs put forward for approval are eventually successful and the figure is ever decreasing. There is a shift in focus occurring as companies, keen to concentrate on therapies that may stand more chance of being approved and thus garnering profit, look towards more innovative and niche areas of pharmaceutical development, such as biologics, personalized medicine and orphan drugs. Many consider the age of the small molecule blockbuster drug to be over and that it is being surpassed by a push towards biotechnology.

Healthcare reforms and an aging population are just two of the many factors adding pressure to research-based pharmaceutical companies in their efforts to find marketable pharmaceuticals to address unmet medical needs. In addition to finding cures for as yet incurable illnesses, research teams across the country are focusing on finding more efficient forms of existing therapies, discovering alternative delivery methods and reducing the overall costs of drug development.

No drug can be marketed without first going through the stringent approval processes put in place by the FDA: processes which, over the years, have become more and more challenging for pharmaceutical research companies to navigate. "FDA requirements for R&D have become quite burdensome and to have your own internal R&D is becoming more difficult," said Michael Raya, president and CEO of West-Ward Pharmaceuticals. "Our previous strategy has been to partner with companies specializing in this area. Partnering with research-based companies is also a way to 'buy time'." With R&D becoming increasingly more complex and more highly regulated, large pharmaceutical companies are looking to collaborate on their research endeavors - a move contrary to the historically competitive nature of this industry. "We are certainly seeing much more in the way of cooperation between corporations and higher education institutes," said Christopher Molloy, senior vice president of the Office of Research and Economic Development at Rutgers University. "Companies like Johnson and Johnson, that conducted more than 100 collaborations last year, are doing more collaborative work than they have ever done before. Not only is this more cost effective and mitigates risk, it also brings together minds that may think in different ways," said Molloy.

BIOTECH R&D EXPENSES ($ BILLION), 2012 TO 2014

Source: Statistica



	2012		2014	
	$	%	$	%
San Francisco Bay Area	4.66	24%	6.88	24%
New England	4.17	21%	6.49	23%
Los Angeles/Orange County	3.65	19%	4.97	17%
New Jersey	2.03	10%	2.97	10%
New York State	0.98	5%	1.86	6%
San Diego	1.3	7%	1.68	6%
Others	2.7	14%	3.98	14%
TOTAL	19.49		28.83	

> Almost 10% of our revenues come from biologic commercial manufacturing. […] there has been a very definite focus in enhancing and expanding our biologics offerings.
>
> - Dr. Cornell Stamoran, Vice President, Corporate Strategy, Catalent Pharma Solutions

23,4%

Domestic R&D as % of Domestic Sales

Source: PhRMA

$51,2 billion

R&D Spending by PhRMA Members 2014

Source: PhRMA

17,9%

Total R&D as % of Total Sales

Source: PhRMA

The cost of drug development is however an increasing concern. A reduction in federal government funding is forcing drug discovery centers to become more self-sustaining, with many seeking acquisitions by big pharma to ensure their work can continue.

With the rise of the significantly lower priced generic pharmaceuticals, branded companies are turning to drugs offering longer patent lifespans and therefore larger margins. This has led to a strategy of operating in more niche fields and working with products that are harder to replicate. One of the largest shifts has been towards the realm of large molecules. "The general view is that the industry is flipping its focus from a 60/40 split between small and large molecule activity to a 40/60 distribution in the future," explained Ramesh Subramanian, vice president of strategic marketing at Piramal Healthcare. "This shift is occurring partly due to the higher clinical success in the biologics space and the belief that this space allows for longer patent positions."

In 2013, around 23% of big pharma sales came from biologics, a figure that is expected to rise to 32% over the next eight years. Contract manufacturing organizations are also evolving to accommodate this trend. However, large molecule pharmaceuticals are much harder to make and, as such, manufacturers will often have to invest significant amounts in new equipment in order to accommodate their production. "Almost 10% of our revenues come from biologic commercial manufacturing. […] there has been a very definite focus in enhancing and expanding our biologics offerings," said Cornell Stamoran, vice president of corporate strategy at Catalent. "A report came out recently suggesting that the future of biologic drug development would be in small, focused single-use containers rather than the big 20,000-liter stainless steel tanks. For innovator drugs this is a path we started down around five years ago and the facility we invested in recently is built around a single-use bioreactor model," continued Stamoran.

With so much more that can go wrong in the manufacturing of a biologic, there is much more responsibility on the outsourcing partner to manufacture to the highest quality. Even the slightest change in the manufacturing process can affect the efficient immunogenicity of the product.

> "The general view is that the industry is flipping its focus from a 60/40 split between small and large molecule activity to a 40/60 distribution in the future."
>
> - Ramesh Subramanian, Vice President, Strategic Marketing, Piramal Healthcare

But is this the end of small molecule drug development? Not quite yet, but many believe the future of small molecules will be in conjunction with large molecule development and form part of a complex compound. "While there are always platforms of therapies and technologies where small molecules are still used, companies are also combining or conjugating large molecules and small molecules to enhance their effectiveness, safety and targeting to specific treatment sites," said Ron Connolly, senior vice president of corporate development at Frontage Laboratories. "Small molecule programs will continue to receive significant investment as we expand our understanding of how to reach specific disease receptors; however, large molecule research spending will be greater."

Biologics have been amongst us for decades in the form of vaccines, but now we will begin to see the manipulation of living organisms being applied across the disease spectrum. Following the success of Gilead's Sovaldi, companies will certainly be seeing the opportunities this field offers. The problem of cost though is significant. When Sovaldi entered the market last year, a 12-week course of treatment was priced in the region of $84,000. The drug, a hugely successful treatment for Hepatitis C, caused outrage amongst insurers and patients and has since prompted companies to address the issue of pricing for biologics. Where a small molecule drug costs on average $1 per day, a biologic sits at around $22 per day. However, as we reach the "patent cliff" for a number of biopharmaceuticals currently on the market, the dawn of the biosimilar is set to make these drugs available to patients who before would have been unable to afford such costly treatment.

As it has always been, new drug development will continue to be the main focus of pharmaceutical companies around the world. The twenty-first century has seen more in the way of a united effort to combat the world's medical needs. Rising problems such as a growing aging population and, more worryingly, drug resistance amongst viral infections are constantly being addressed by both giant pharmaceutical companies and the small biotechs through exploring new and innovative forms of medication to pre-competitively strive towards a healthier world. •

A Game-Changer for Industry Collaboration in Life Sciences at Rutgers

By Christopher J. Molloy, Ph.D., R.Ph. & David S. Kimball, Ph.D.

Even casual observers of the U.S. pharmaceutical industry have seen the dramatic shifts, changes in direction, and contractions that have occurred in recent years. Those of us who have worked in Big Pharma and biotech have borne witness to these dislocations, and many in New Jersey have experienced them firsthand.

At the same time, as our state has been losing thousands of jobs in pharma, there has been a quiet blossoming of life sciences startups. According to BioNJ, New Jersey's life sciences trade association, there were 80 biotechs in our state in 1998. Today, there are about 400.

"Biotech startups are becoming increasingly vital contributors to our state's economy," remarks Debbie Hart, President of BioNJ. "While these companies start out small, they often bloom into very significant businesses."

Most biotechs are founded on scientific discoveries or inventions. Often, the intellectual fuel for a startup comes from a university. At least 62 currently active startup companies have been spawned by Rutgers innovation in recent years. One of the university's greatest success stories is TYRX Inc., a biotech in Monmouth Junction, New Jersey, which developed an antibacterial envelope for implantable devices such as pacemakers. Global healthcare giant Medtronic purchased TYRX this year for more than $160 million. TYRX was launched by Joachim Kohn, professor of chemistry and chemical biology at Rutgers, and was sustained by the university during its early years.

Rutgers has a proud history of innovation in the life sciences. Nobel-prize winning microbiologist Selman Waksman discovered new classes of life-saving antibiotics in his Rutgers lab in the early to mid twentieth century, and those drugs are still in use today. In the 1970s, Frank Davis and colleagues at Rutgers developed a novel technique of "pegylating" proteins to be used in the fight against several debilitating diseases. This drug-delivery technique spurred on the revolution in biologics therapies, and has been deployed in dozens of medical products. More recently, molecular beacons invented by Rutgers professors Sanjay Tyagi and Fred Kramer have led to the explosion of molecular diagnostic products for the detection of HIV-AIDS, Methicillin-resistant Staphylococcus aureus or MRSA, and other deadly infectious diseases. In short, Rutgers innovation has been improving the lives of patients around the globe for more than a century, and the scale of discovery continues to grow.

With the goal of helping our scientific and engineering faculty create startups in the life sciences, we launched Rutgers Translational Sciences (RTS) in 2013. Opportunities for collaboration in translational sciences dramatically increased with the integration of most of the University of Medicine and Dentistry of New Jersey (UMDNJ) with Rutgers, a change that transformed the university into one of the nation's largest academic medical centers. Rutgers now ranks in the top 30 U.S. universities with an annual R&D spending total of more than $700 million. We have also seen significant growth in our intellectual property portfolio. In FY2014, Rutgers' licensing revenue was $14.1 million; university inventors earned 144 patents worldwide last year, including 86 U.S. patents. Today, Rutgers has more than 2,600 patents and applications under management.

Rutgers now has two medical schools: a dental school, and other new schools and labs that further strengthen and broaden the university's programs. This added breadth fosters interdisciplinary research collaborations in medicine, chemistry, chemical biology, engineering and pharmacy. And powering research at the university are numerous world-class operations, such as the Rutgers Cancer Institute of New Jersey, the Center for Integrative Proteomics Research, the Public Health Research Institute (PHRI), and RUCDR Infinite Biologics—the world's largest university-based biorepository. Last year, the National Institutes of Health awarded PHRI up to $26 million for work on new forms of antibiotics to combat deadly bacteria that have become resistant to current treatments. The grant supports a public-private partnership that is bringing together scientists from industry and several major universities.

Among the largest mergers in the history of U.S. higher education, the 2013 integration is proving to be a game-changer for Rutgers. Becoming a much larger institution (research grants and contracts increased from $361 million in 2013 to $518 million last year) has forced Rutgers to streamline and enhance its systems university-wide, particularly in its work with industry. As a result, RTS was designed to coordinate research directly with industry and faculties across the university.

The RTS team, which includes scientists with extensive pharmaceutical industry experience and accomplishments, provides the interface between Rutgers and the private sector, building collaborations across the molecular, structural, biomedical, and imaging sciences. Team members include David Augeri, Ph.D., director of the Molecular Design and Synthesis Group (formerly of Bristol-Myers Squibb); Edward Yurkow, Ph.D., executive director of the Molecular Imaging Center (formerly of Johnson & Johnson); and Michael Goedken, Ph.D., director of Rutgers Pathology Services (formerly of Merck). Their efforts combine work with Rutgers faculty directed towards building success in university research, and assistance to local biotech and biomedical companies. For example, over the last two years, they have been working with a local startup company, Mito BioPharm, on candidate compounds that may provide novel, improved methods for treating metabolic diseases such as diabetes and obesity.

Currently RTS has five projects underway with researchers at the Rutgers Cancer Institute of New Jersey; chief among them is research on the potential of the p53-targeted therapeutics. Working with Darren Carpizo, M.D., Ph.D., associate professor of clinical medicine, the team is exploring techniques to reactivate mutant p53 protein, which is commonly disabled in human cancers, to foster a new approach to chemotherapy for a number of important cancers. •

We invite anyone interested to contact us at 848-445-5520 or TranslationalSciences@rutgers.edu

Christopher J. Molloy, Ph.D., R.Ph., is senior vice president for research and economic development at Rutgers. S. David Kimball, Ph.D., is associate vice president for research commercialization. Molloy and Kimball were employed in the pharmaceutical industry as R&D scientists and executives.
For more, visit businessportal.rutgers.edu.

Mark Rogers

Senior Vice President,
Life Science Services
SGS NORTH AMERICA

Could you give us a brief overview of SGS and the importance of the Life Sciences division to the company's overall corporate strategy?

SGS was founded in 1878 and is the world's leading inspection, verification, testing and certification company. SGS went public in 1985 and is listed on the Swiss Stock Exchange. It has 80,000 employees and operates a network of 1,650 laboratories and offices globally. The company is comprised of ten separate business lines, addressing various industrial sectors and, of these, Life Science Services is one of the newer and smaller divisions with 1,600 employees. For SGS, the Life Science division provides solutions to the pharmaceutical industry. We work with companies across the spectrum, from small biologics start-ups to large, multinational pharmaceutical companies providing services to ensure that their products are well defined and safe.

Could you provide us with an overview of your facilities both in the United States and worldwide and how these provide the client with a complete testing facility?

The Life Science business has 27 facilities in 14 different countries. While we have 18 Life Science labs globally, in the United States there are four labs, as well as clinical offices in the Maryland area. Traditionally, the laboratories focused on the quality control testing of pharmaceutical drugs. However, because the industry's pipeline is moving in the direction of large molecule biopharmaceuticals, SGS's strategy was to keep in step with this evolution. In 2010, we acquired the M-Scan Group, which specialized in large molecule characterization and testing. Taken as a whole, the labs operate as a true network by sharing both capacity and capability. While more general tests can be performed within many of the sites, some of the sites offer specific activities in certain areas. This means that SGS can expand quickly when required: if a client has a large project we can utilize capacity at other labs to facilitate the work, and tap into the network for the specialized tests and even replicate locally, if needed.

What quality control measures has SGS put in place and how do these adapt to changing requirements?

Quality assurance is one of the pillars of the pharmaceuticals industry, and SGS takes it very seriously. We have several layers of quality assurance: every laboratory has its own quality assurance control groups. We also have a regional manager for North America and, at a higher level, we have a global group for quality assurance. This allows us to have one quality assurance practice for our operations worldwide. We have global, harmonized standard operating procedures that are inspected by regulators. We also have a multitude of audits in the labs from both our clients and regulatory organizations, such as the FDA and EMA.

As the industry moves towards large molecule activity, what does the biosimilar testing arena look like?

The term biosimilar is apt because the complexity of large biomolecules ensures that no two examples are exactly alike. They are also not "pure" and are likely to be a mixture of very similar structures. These traits often lead to the fundamental question as to when it is possible to classify a drug as significantly similar enough to be a biosimilar.

There is also a significant difference in terms of the amount of testing required for large therapeutics compared with the more traditional pharmaceutical products. Some of those tests have only recently been brought into the mainstream from the world of pure academic research. Additionally, these tests are complex and relatively time-consuming. Biosimilars are expensive and the tests often lack the high levels of sensitivity required to be able to adequately test milligram or even smaller amounts of product.

One of SGS's strengths in the biosimilars-testing arena is that we have labs in Europe that have considerable technical and database experience. Much of this expertise is now available within our North American laboratory network, and we are gearing up to be ready for the coming rush of work.

How is the shift from small to large molecule activity affecting the compliance testing industry?

SGS works with many clients that have backgrounds in the small molecule field. As these companies move into biologics, they often attempt to apply the same small-molecule testing criteria, but this does not always work. Trying to locate and characterize impurities is much more difficult with large molecules, as they are produced in living systems and are not a result of chemical synthesis. Higher order structures are also important to define but are usually not considered in classical pharmaceutical testing. Consequently, educating our clients about new ways of working in this space is a challenge.

Where will SGS Life Science Services be in the next three to five years?

SGS plans on moving forward through both organic growth and acquisition. While growth potential is high for the large molecule testing business, the majority of the market is still based on small molecule drugs. Therefore, we will continue to support small molecule testing and make further investments, as regulatory bodies continually revise these requirements. Our objective is to become the preeminent testing provider for both small and large molecule medicines. •

Glenn Graves

Managing Director
INTERTEK PHARMACEUTICAL SERVICES

Could you give us a brief introduction to Intertek's pharmaceutical division?
Intertek, a company that dates back over 130 years, established its pharmaceutical division 25 years ago through the acquisition of several different laboratories, each of which acts as a centre of excellence for particular project types. Today, this business segment has a global presence and serves companies from the top 20 pharmaceutical giants, down to the smallest of biotech start-ups. Through our integrated network we are able to offer pharmaceutical development services that cater to every of our clients' laboratory needs and partner with them from concept to a finished product.

As a very lucrative industry, how important is this business segment to Intertek's overall business strategy?
The worldwide budget for pharmaceutical outsourcing is estimated to be around $20 billion, most of which is either spent in the U.S. or Europe. Intertek sees this market as a valuable one in which to expand in line with our clients' demands and the changing pharmaceutical and biopharmaceutical markets. We actively search for new acquisitions that complement our existing capabilities and are making new investments into its existing laboratories to facilitate growth whilst maintaining our high regulatory compliance across the network. Ultimately we want to be seen more as a total solution and total resource provider for any client from the pharmaceutical , biopharmaceutical and healthcare arena.

Can you talk more about the specific role of this particular facility?
This facility in New Jersey is one of the GMP laboratories in the Intertek Pharmaceutical Services network. It started out, and continues to be, a laboratory geared towards analysis of small molecules and traditional pharmaceutical products as well as offering full ICH stability storage. We work with our clients during their pre-clinical program to develop testing methods via thermal, spectroscopic, and chromatographic techniques that will determine what their product does and does not contain. From there we can develop an assay to discern what exactly is in the drug. Then we can then validate any of these methods according to GMP procedures. We have capabilities for reference standard certification and raw materials analysis. At this point our client is then able to take their product on to a clinical trial program. We also conduct post-release stability testing such as assay, impurities, and dissolution to help determine the expiration of the product. Our biggest growth area has been with Extractables & Leachables – the complexity of these studies fits well with our knowledge of packaging materials, potential leachables and abilities for trace level analysis. Using state of the art ICP/MS, GC/MS/MS and LC/MS/MS equipment we identify and quantify trace impurities in the pharmaceutical products as well as medical devices and packaging.

To what extent are the various Intertek pharmaceutical arms now working together rather than autonomous entities?
Everyday Intertek's pharmaceutical division is heading towards total interconnectedness. For the most part Intertek has grown this part of their business through acquisition. Each laboratory Intertek have acquired has brought key knowledge and skills that are important to the pharmaceutical industry, and over the last several years this has become a veritable unified pharmaceutical services division. With centralized leadership and a corporate structure, every laboratory, not just in the U.S, but in Europe too, is aware of what the specializations of all other facilities are and is able to utilize that in the process with their client.

What would you say are Intertek's major competitive advantages over other outsourcing partners?
Though growing is just as important to us as any other company, our size is what sets us above other outsourcing partners. Our individual focus on the client is our biggest advantage. We seek to develop a trust-based relationship and ensure that we will deliver on our clients' every need. Over 85 percent of our business is repeat business with the growth coming from new clients who recognize the skills our experts have. Our second advantage which stems from our size is the speed at which we can respond to any request. Our responsiveness is underpinned by our expertise in traditional small molecule and traditional delivery systems. Intertek also have a unique set of capabilities covering more complex pharmaceutical products and high barrier generics including development support for biomolecules and complex delivery systems.

Looking ahead for this facility and for the pharmaceutical division of Intertek what does the company have in store for it?
Since the recession, we have witnessed substantial growth and we are looking to increase our staff at the New Jersey facility by about 10 percent and with that, so will our revenue increase. Not just this site, but also the whole division has seen significant investments in new, state of the art equipment. Intertek is not afraid to invest in whatever may be needed to ensure we are consistently meeting every one of our client's requirements. Intertek is seeking to become a full-service pharmaceutical laboratory, serving companies of any size and maintaining a strong relationship with them from discovery, through development, to commercialization. •

Dr. Jim Jingjun Huang

Founder and Chairman
ASCENDIA PHARMACEUTICALS LLC

Can you provide a brief history explaining the evolution of Ascendia in the United States?

My education is in pharmaceuticals and medicinal science. I realized that I wanted to start Ascendia while I was working with a large pharmaceutical company. We began operations in 2012, and specialize in the invention and development of specialty pharmaceuticals and novel drug delivery technologies. Specifically, we develop formulations for poorly water-soluble drugs. In addition, we provide analytical services to pharmaceutical companies while working collaboratively to provide innovative solutions and create advanced medicines. We focus on solubility and bioavailability enhancement of difficult-to-formulate compounds. We develop oral, topical and injectable products that leverage our expertise in nano-emulsion nanoparticles, and amorphous solid dispersion technologies. We are a small-sized company providing a specialty pharmaceutical research and development service.

Can you elaborate on your corporate strategies and your client base?

Our strategy is to use the technology available to improve the insolubility and low bioavailability of numerous compounds. Since we are a small company, we compete in the market by specializing in establishing technologies for this specific issue. Our employees have strong backgrounds in organic chemistry, which helps in dealing with identification and formulation of these compounds. Understanding the technology and chemical properties is essential to our business. Therefore, our corporate strategy entails erudite staff, apt technology and investment in order to run our laboratories. Our facilities are in New Jersey. We operate with a hybrid model with our clients. Using the technology, we identify potential product candidates and have the capability to formulate new drugs. We then file patents for these formulations and drugs. Our model is essentially a specialty pharmaceutical model with a consulting service to our clients.

What are some of the major challenges Ascendia faces today in terms of the regulatory framework?

We have extensive knowledge about our product area and when we are at the formulation stage, we ensure to meet with the FDA. We know that the excipients and the laboratories we are using need to be acceptable to the FDA and need to meet the regulatory standards and requirements. There have not been any major changes in the regulatory environment, and Ascendia complies with the current framework.

Why has the success rate of a compound from the first stage to the development stage not grown from 14%, despite the fact that technology has advanced?

Currently, only 14% of the compounds make it to the development stage. Compounds tend to become increasingly greasy and hydrophobic. Our goal is to utilize this technology to improve the compound in its formulation process, in order to reduce the rate of attrition. Currently, attrition rates are high and our aim is to use formulation technology to reduce the attrition rate for a new chemical entity and to increase efficacy. I believe that another important area of focus is the compound itself. Designing the compound is the primary stage, where more modulations can be made in formulation to increase the success rate of the compound.

Where will Ascendia be in five years?

We are hoping that our company will be a leader in nano-based technology. We are also aiming to use this technology to enhance the solubility and efficacy of several existing drugs. Currently, we are attending many conferences and seminars to enhance our knowledge on this specialty area that Ascendia hopes to excel in.

Do you have a final message for the readers of this publication?

We are hoping that Ascendia can help the pharmaceutical industry to introduce medicines that can enhance patients' lives. Our long-term vision is to be a company that is of some meaning and contribution to humanity. •

We create chemistry that makes our world love change.

The world is changing fast. To make sure that it is for the better, we are co-creating innovative solutions that will help tomorrow's generation enjoy a better life and a more prosperous planet. When we come together to help ideas soar, it's because at BASF, we create chemistry.

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BASF
We create chemistry

Ron Connolly

Senior Vice President,
Corporate Development
FRONTAGE LABORATORIES

Could you give us a brief overview of the evolution of Frontage Laboratories and outline any recent major milestones?

Dr. Song Li founded Frontage in 2001, with our lab operations beginning in 2002. Starting with a small investment, some used analytical equipment and business from friends, Frontage has grown to a global company, with 400 employees across the United States and China. We have two laboratory operations and two clinical sites in each country, along with additional data management and biostatistics staff. In the United States, both our labs are located in Pennsylvania, while our clinics are in New Jersey. We also conduct clinical studies in China, although China is more conservative than the United States in terms of allowances for novel drug clinical research.

Frontage grew to provide all the key services that enable a new company to take a leap from pre-clinical research to phases one and two of clinical studies. We have four key groups, the first being the Chemistry, Manufacturing and Control (CMC) drug development team, comprising analytical development, pharmaceutical formulations, manufacturing of clinical trial materials, and organic synthesis. The second group provides bioanalytical services, involving the testing of pharmacokinetic and biomarker samples from pre-clinical and clinical studies. Drug metabolism is our third group, which includes evaluation of the biotransformation of a drug within animals and humans. Lastly, our clinical research group conducts Phase 1 and 2 studies with healthy volunteers or patients for new molecular entities, novel formulations, and generic equivalent products.

To what extent are the different divisions within a CRO, or the combined efforts of different CROs, integrated or managed?

On the pharmaceutical side, some aspects of development are transactional, short term studies that are picked up by various research team leaders within the pharmaceutical companies themselves. For larger value, long-term studies, or for high volume repetitive study efforts, larger pharmaceutical companies often utilize sourcing/purchasing groups to identify service partners to help them with research requirements or to provide comprehensive oversight from clinical trial materials manufactured through the execution of the clinical studies. Depending on the phase of development, a large company may tend to pick a larger scale CRO that has a global presence with capacity to organize and support their trials around the world. As a clinical development project progresses from Phase I to Phase III, pharmaceutical companies are overseeing the hand-off and integration of research activities from one CRO to another, since later phase studies require specific therapeutic expertise in the recruitment and retention of patient populations. It is common to see several CROs involved in the life cycle of a development project based on the various contributions that are needed at different research stages. The more specialized the patient population is, the higher likelihood that multiple CROs will be involved. Frontage provides support to our clients to organize and manage an IND-enabling program that may require services from different divisions within the organization, from lead compound formulation, drug metabolism and pharmacokinetic evaluations, toxicology, Phase I study design and execution, to regulatory submission of the IND package components.

To what extent have we been seeing a shift from small molecule to large molecule activity and how has this affected Frontage?

Frontage is providing services for both large and small molecules. In the CRO industry, small molecule research has been more predominant, although there has been a recent shift to larger molecule research outsourcing. We are investing in new equipment in order to keep up with the latest trends, as well as looking at unique ways to analyze larger compounds, such as monoclonal antibodies and antibody-drug conjugates. While there are always platforms of therapies and technologies where small molecules are still used, companies are also combining or conjugating large molecules and small molecules to enhance their effectiveness, safety and targeting to specific treatment sites. Small molecule programs will continue to receive significant investments as we expand our understanding of how to reach specific disease receptors; however, large molecule research spending will be greater.

Looking ahead to the next three to five years, where can we expect to see Frontage in terms of growth plans?

Our intention is to continue to grow organically and through acquisitions. We are evaluating acquisition targets to be able to offer more services to our clients. Our hope is to offer more later-stage clinical research services in the United States to complement the investment that Tigermed has made into our company. This year we acquired a stake in BDM, a biometrics company that carries out data management and biostatistics needed in all phases of clinical research. Currently, we are also exploring ways to expand our manufacturing capabilities and facilities, as we would like to continue scaling up the formulations that we develop for clients in the early phases of development and hope to enter into the commercial manufacturing (CMO) space over the coming years. Finally, we are looking to expand our large molecule service offerings to match the level of focus that many companies have on this area of research and development. •

The Spokes in the Wheel
Contract Services

"Drug companies are under a lot of pressure to demonstrate the effectiveness of their medication, and one of the ways to address this is through compliance and adherence packaging. We work with clients on a daily basis to optimize their packaging for drugs both in development and those already commercially on the market. We are also looking at adherence programs more broadly to change patient behaviors and drive better health outcomes."

- Justin Schroeder,
Executive Director, Marketing,
Business Development and Design,
Packaging Coordinators Inc. (PCI)

Image: Piramal

Image: Amneal Pharmaceuticals LLC

Growing and Diversifying: Contract Manufacturing in the United States

By James Hogan

The past two decades have seen a rapid rise in the complexity of new drug development and an expansion in the range of products available on the market. Over the years, pharmaceutical companies that historically had been vertically integrated have found that, in order to maintain efficiency in their operations, they must look externally for assistance. Whether this be for manufacturing, packaging, or even upstream research, it has no longer remained practical to manage these increasingly complex processes in house.

> Our standard operating procedures (SOPs) have been written with the fact in mind that we are a service company and therefore must be flexible to our client's requests. They are built around industry standards, but also around flexibility as we always ensure to keep the client in mind.
>
> - Stephen L. Schweibenz, President, Alliance Contract Pharma (ACP)

Despite the financial crash of 2009, when there were efforts made by many pharmaceutical companies to internalize operations in an attempt to reduce overhead costs, outsourcing today is the preferred and often necessary strategy adopted by many companies, ranging from big pharma down to the start-up biotech; the latter more often looking for a partner rather than simply a service provider. This demand prompted the growth of what is now a well-established outsourcing industry.

A range of different contract manufacturing organization (CMO) models have evolved, either from spun-out divisions of big pharmaceutical companies or through the acquisition of facilities. Today, they serve the industry in their various specialized forms. The CMO industry has matured to the extent that it has its own trade association, the Pharma and Biopharma Outsourcing Association (PBOA), founded in 2014 by Gil Roth. "[The CMO] industry was historically very fractured with a number of varying business models within," said Roth. "I saw though that their common interests were more important than the differences in their business structures or dosage form offerings, and that united they would have a voice that would be listened to by regulators, legislators and other groups."

The U.S. CMO market is the largest for contract manufacturing, having generated approximately $10 billion in revenues in 2011. It will continue to grow in line with the pharmaceutical industry itself, as well as by the outsourcing of non-core businesses and an increasing amount of specialty and biotechnology companies that do not have in-house capabilities.

With this growth, contract companies are becoming more specialized and are approaching niche areas to maintain an advantage in what is becoming an increasingly competitive environment. Catalent, a large New Jersey based CDMO, is one company that has adopted this strategy. "We today are focused in niche and specialized technologies that are hard to replicate," said

Cornell Stamoran, vice president of corporate strategy. "We are able to operate in any areas that tend to be of far greater complexity. Choosing to play in this field differentiates us from most of our competition in the CDMO range."

The rise in the number of businesses that offer outsourcing services, and the increased complexities and intricacies involved in the various processes, has led to greater emphasis on the relationship between the provider and the client. "We try to maintain an intimate culture that is conducive to forming close relationships with our partners and providing the highest service levels possible," said Bob Albanese, vice president of operations at Clinical Supplies Management. Rather than search simply for a means to transfer overcapacity, pharmaceutical companies are looking for strategic partnerships. As such, there are a number of factors that will influence a company's choice in partner; speed and flexibility are key traits for any outsourcing company to display. "Our standard operating procedures (SOPs) have been written with the fact in mind that we are a service company and therefore must be flexible to our client's requests," said Stephen L. Schweibenz, president of Alliance Contract Pharma (ACP), a CMO that was set up in 2009. "[They] are built around industry standards, but also around flexibility as we always ensure to keep the client in mind."

Many of these contract companies will be working with partners of varying sizes and must adapt accordingly. Working with the smaller players, such as start up biotech companies, ACP and other such businesses will be needed in more of an advisory role as opposed to working with big pharma, where they may encounter conflicts of interests with regards to integration of SOPs.

With this greater integration comes more responsibility for the contracted companies. One service that may be particularly scrutinized in this respect is contract analytical or laboratory testing services. Quality assurance is everything in this industry and, while the buck may ultimately stop with the service user, it is for the provider to ensure that all required tests on a product are being carried out appropriately. "What our most recent FDA inspection showed was that the agency is looking for contract laboratories to take a bigger role in the decisions that are being made regarding a project," said Glen Graves, managing director for Intertek Pharmaceutical Services, which offers a range of pharmaceutical development services catering to a company's laboratory needs. "There is now more emphasis on us, as the outsourcing partner, to ensure all necessary tests are carried out for a particular product rather than simply the ones the client dictates."

This means outsourcing companies will be facing a greater degree of accountability under federal regulations than they may have in the past. Contract companies will have to seek to balance the crucial trait of flexibility with this growing regulatory responsibility to succeed in a now established market of its own. Although maintaining a constant competitive advantage over rivals is important, contract companies must work towards collaboration across the board to ensure that this growing and increasingly diverse pool of outsourcing capabilities is effectively utilized and better serves the end user, the patient. •

> "[The CMO] industry was historically very fractured...I saw though that their common interests were more important than the differences in their business structures or dosage form offerings, and that united they would have a voice that would be listened to by regulators, legislators and other groups.
>
> - Gil Roth, President, Pharmaceutical and Biopharmaceutical Outsourcing Association (PBOA)

Gil Roth

President
PHARMACEUTICAL AND BIOPHARMACEUTICAL OUTSOURCING ASSOCIATION (PBOA)

Can you talk about your background and what led up to you form the Pharmaceutical and Biopharmaceutical Outsourcing Association?

My career in pharma began 16 years ago as the founding editor for Contract Pharma Magazine. It was during this time that the CMO/CDMO business model began to take off. During my time at Contract Pharma, I saw how the industry was maturing, but I also identified areas in which it could be pushed to evolve more, and in March of 2014 I left the magazine to found this trade association. One the questions I was asked most when I first started PBOA was, "Why had no one done this before?" The answer was that this industry was historically fractured with a number of varying business models within. I saw, though, that their common interests were more important than the differences in their business structures or dosage form offerings, and that united they would have a voice that would be listened to by regulators, legislators and other groups.

What are the principle benefits that companies will stand to gain through membership in this organization?

Our main goal is to establish regulatory and legislative advocacy for the contract manufacturing industry. In addition to this we are able to collectively advance the general business interests of this industry. One of my personal goals is to offer a platform through which these different companies can communicate with one another.

What are your strategies for the expansion of this association now?

Our first year was really spent recruiting our core members and building the association's infrastructure. In 2015, people are starting to see the work we are doing and the tangible effects it is having. They read about the congressional meetings that we are having and the FDA workshop that we held in March. They see that there is something of merit to join, and coming out of Interphex there was considerably more interest from companies that had initially seemed tentative. In a sense, the PBOA is starting to sell itself. Within a year we hope to have doubled our membership.

How has the contract manufacturing (CMO) industry evolved in the 15 years that you have been a part of it?

We saw a number of different business models take root over the years. Some had a growth strategy of acquiring pharma facilities that were going to be closed or spun out. The idea behind this was that a company buys the facility relatively inexpensively from a pharma company and establishes a trailing supply agreement for several years. New business is brought in, and, when that initial supply agreement elapses, the facility can fund itself essentially. We have also seen a few periods of roll-ups, where there has been consolidation. In some instances, these roll-ups were geared towards achieving scale. In the first half of the last decade, it was about scaling up to get a large geographic and service footprint. Of late, consolidation has been much more focused on technology plays and making sure a company has specific technologies that will add value to different clients' drug development and manufacturing needs. The providers that were building scale now have it, and nobody is buying into a commoditized area of the industry just to get a bigger footprint. They are looking to the higher value aspects of the industry and what clients are looking for.

Will the trend of consolidation continue or will outsourcing be the preferred route?

Certainly for the smaller and emerging companies, outsourcing is the preferred route. The capital requirements for manufacturing are still so extensive, the timelines are long, and the risk is high. Larger companies continue to talk about rationalizing their networks as well as the number of vendors and CMOs that they work with.

With Obamacare launched, what impact has drug pricing had on the market for both generics and branded?

Drug pricing is not my area of expertise, and it is not an area that the PBOA focuses on. In my opinion, the problem with the idea of controlling drug prices in the United States the way that European markets do is that U.S. drug prices and the revenue that companies make from this market largely fund the research and development (R&D) into new drugs that are then sold into other countries. With too much pressure on the price of drugs, there will be a point where R&D suffers. One thing to note is that, while our branded drug prices are higher than in other countries, our generics are much cheaper. All of these payer systems have trade-offs.

What are the next big steps for the association?

Within our operations, we want to make sure we are participating with FDA when the GDUFA is being negotiated for its next five-year period. We want to make sure that this industry is prepared for the serialization and track and trace regulations that are affecting the industry worldwide and will hit the United States in 2017. We want to help strengthen the industry, and in terms of the PBOA's growth, we want to look at other areas of outsourcing and other geographies. •

Robert Maddox

President
PHARMACORE, INC.

How has PharmaCore developed in the last three years, and how has industry growth affected this development?

The bulk of our clients are still small and medium-sized pharmaceutical companies, but outsourcing is becoming more sophisticated. Clients are more certain which strategic relationships they wish to pursue. They are becoming more refined in their approach to outsourcing and have learned how important these relationships can be for the success of their programs. Clients are no longer interested in simply choosing the vendor with the lowest bid but are considering such attributes as customer service, technical ability, and communications.

Can you elaborate on why clients prefer quality over low costs?

PharmaCore has developed a good reputation among its clients. Our relationships have evolved over the years and will continue to do so. Our clients do not make decisions based purely on price because they need companies that are reliable and can deliver. We were recently awarded three CMO Leadership Awards for Quality, Reliability and Innovation, which exemplifies our desire to go beyond for the sake of our clients. This has been gratifying because our clients voted on these awards. The companies that can be innovative and do that routinely and judiciously will be successful.

How has PharmaCore expanded in terms of markets and services?

We are closely examining some services that we will likely be offering in the future. Currently, our capacity is being utilized at a very high level and we expect this to continue as we move into commercial manufacturing. Commercial manufacturing opportunities exist with a number of our clients. We are now able to work on schedule II controlled substances, including both research and manufacturing, and now have the ability to import and export raw materials for these projects. We are also focusing on new research capabilities and services that our clients could benefit from. We are trying to carve out a space that fits us and utilizes our facilities to the fullest degree.

How much of an emphasis is placed on developing client relationships in contract manufacturing?

Contract manufacturing has become much more collaborative. For example, pharmaceutical companies send chemists come to our facility to learn and obtain an overview of production at a certain scale. There is also much more information sharing than would have occurred in the past. The industry is changing and evolving to a point where companies want as much information as possible at increasingly earlier stages.

Could you give us your insights into the future of the pharmaceutical industry?

In the 12.5 years I have been at PharmaCore, I have seen tremendous changes in how outsourcing has been adopted. It has transitioned from simple custom synthesis for a fee to a much more sophisticated model. The increasing trend towards strategic collaborations will continue as clients see the benefits it brings. We have also seen a trend, particularly among small companies, towards business returning to the United States. Companies have found what does and does not work in Asia, and PharmaCore itself has seen a return of business.

Looking ahead, where can we expect to see PharmaCore in the next three to five years?

There are several projects that we are involved with that will hopefully be on the market in the next few years. With our added focus on contract manufacturing we hope to grow as a CMO and be able to take on more projects that fit our scale. It will make PharmaCore stronger, more diversified, and better known within the industry. Furthermore, we will continue to focus on our clients' needs and perform at the highest level possible. •

Vivek Sharma & Ramesh Subramanian

VS: CEO
PIRAMAL PHARMA SOLUTIONS
RS: Vice President, Strategic Marketing
PIRAMAL HEALTHCARE

VS

RS

Could you give us a brief overview of Piramal Healthcare's Pharma Solutions and Critical Care segments and the importance of the United States to your overall corporate strategy?

VS: Piramal's Critical Care segment is focused on inhalation anaesthesia and we are the third largest inhalation anaesthesia company in the world. We are the only inhalation anaesthesia company having the capability to offer all the inhalation anaesthesia products and we sell to more than 100 countries worldwide. In the United States, we entered the inhalation anaesthesia business around five years ago. We are now the second largest provider of product here. We are actively looking at enhancing the product portfolio so that we can become an even more meaningful player. This segment has leading positions in several major countries: we are one of the top two suppliers in the United States, while we are the number one supplier in Japan.

Pharma Solutions is our contract manufacturing business and we entered this space around 12 years ago. We are one of the few providers to have capabilities in Asia, Europe and North America, where the majority of our clients are based. We have five plants and two R&D facilities in India, two large plants and an R&D set-up in Europe and two development and manufacturing sites in North America. Specifically in the United States, we have injectable development and manufacturing at our Coldstream Laboratories facilities in Kentucky, while our API development and manufacturing is located close to Toronto in Canada.

Could you talk about the acquisition of Coldstream Laboratories and the impact this has had on Piramal Pharma Solutions?

VS: We had been looking to add injectable manufacturing capability to complement our R&D capabilities in injectables. Coldstream Laboratories had very strong brand recognition and were seeking a global firm with complementary capabilities to invest and help them grow. Piramal and Coldstream turned out be a good fit. We are now expanding our capabilities and capacity at Coldstream, while also investing and improving the current infrastructure. Our goal is to become a leading player in injectable development and commercialization. Since the purchase, customer feedback has been positive; clients are happy to be part of a set-up in which Coldstream can provide a larger offering and improved services. Our customers also appreciate the fact that we can provide more integrated services. The facility also acts as a fill and finish centre for our Antibody Drug Conjugates (ADC) business based out of Grangemouth.

In a competitive market, what differentiates Piramal Healthcare from other players?

RS: We can talk about four differentiators: our global presence, our quality mindset, the ability to provide end-to-end solutions and our investment in innovation. The first is Piramal's global presence combined with local execution. For example, the majority of steps in the manufacture of a product can be carried out in India in order to obtain cost benefits, but proximity can be achieved by conducting the final stages closer to a client, in say Europe or North America. The second factor is quality. Piramal has shifted from focusing on 'quality for compliance' to 'quality as a culture'. Quality has a separate reporting line directly to the board; our Vice President of Global Quality and Pharmacovigilance was recently included in the list of the top 50 most influential quality personnel in India by the World Quality Congress. This is a reflection not just of our leadership, but a testament to the whole firm's emphasis on quality.

We are also able to provide end-to-end solutions. We start at the discovery stage and move programs through clinical development and commercialisation of a product. Tech transfer, client communication and program management work seamlessly through this process, which is appreciated by our clients. Finally, we invest in innovation. We have a biocatalysis center of excellence based in Europe which enables us to carry out chemistry efficiently. In the production of chiral molecules, for example, our technology could provide solutions that delivers the specific enantiomer of choice with little loss due to separation. We have also invested in flow reactor systems, an area of high interest to our clients, and are looking at programs and processes that lend themselves well to this.

To what extent are we seeing a shift from small to large molecule activity?

VS: The macro environment is indeed changing, but we are still seeing a need for drug discovery and early phase operations. Although there are fewer large pharmaceutical companies, the companies that have formed now have even greater needs.

RS: The general view is that the industry is flipping its focus from a 60/40 split

between small and large molecule activity to a 40/60 distribution in the future. This shift is occurring partly due to the higher clinical success in the biologics space and the belief that this space allows for longer patent positions. Within this shift also lies a therapeutic trend: oncology is becoming a part of most clients' focus due to the view that payers are less likely to push back over pricing for cancer treatment.

What effect is the recent high volume of M&A activity having on the wider pharmaceutical industry?

RS: The one constant in this industry is change. From our perspective, we have to ensure we understand where our clients are going in the future. There are macro reasons behind mergers and acquisitions and the key for us is to identify those, so that we can position ourselves correctly, and continue to assist both our existing and new clients.

VS: As a service provider we always have to be one step ahead and understand market needs. Piramal just has to adapt. Recently, we have seen two of our customers merge and we have seen another customer spin out a segment and sell it to another of our customers! As long as it is happening within our customer base and we have key relationships with the players, we should not be too affected.

With the increase in regulation across the spectrum of the pharmaceutical industry, we are seeing companies embrace outsourcing. Is this a positive shift and how can we expect outsourcing to develop?

RS: The definition of what is core is changing within the industry. Fifteen years ago, outsourcing chemistry to Asia was not the norm. Five years later, continuing to do chemistry operations internally was deemed unusual- that is how quickly things evolved – but even then biology was kept in house. Five years after chemistry was outsourced, biology operations began to be outsourced. As firms such as Piramal become better at doing certain things, pharmaceutical companies will choose to utilise such centers of excellence rather than doing things themselves. We expect that these changes will continue; five years from now, what we are seeing as 'core' today may have come to Piramal as we become ever more innovative.

Looking ahead, where can we expect to see Piramal Healthcare's Pharma Solutions and Critical Care segments in the next three to five years?

VS: Our ambition is to become one of the top two players worldwide in the Critical Care segment and, in the Pharma Solutions segment, become one of the top four or five companies in the world. We have done exceedingly well in the last few years in what is looking like a very exciting space for a service provider. With our global capabilities and quality mindset, we have the opportunity to grow both organically and inorganically. We are aggressively pursuing several opportunities that could enable us to become more meaningful and relevant to our customers. •

Dr. Cornell Stamoran

Vice President of Corporate Strategy
CATALENT PHARMA SOLUTIONS

Could you introduce us to Catalent and talk about how the company has evolved?

Catalent is the leading provider of advanced delivery technologies and development solutions to the global pharmaceutical and biotech and consumer health market. The company was spun out from Cardinal Health and launched as its own brand in 2007. We have spent the last seven and a half years going through a tangible operational performance transformation with a new CEO and a substantial change in our leadership team to really progress the harmonization of our operations. Today, our on-time delivery is up and the underpinnings of our operational network have very much been strengthened. With our more than 1,300 patents and advanced delivery technologies, we aim to provide our customers with a service that they would not be able to find elsewhere.

What would you say are your key competitive advantages over similar service providers?

Our main advantage is our fundamental strength in advanced delivery technologies. Today, we are focused on our patented, niche and complex technologies that are very hard to replicate. This differentiates us from the other players in the CDMO field. Part of the process of Catalent going public last year was to educate the market as to what our focus was. In addition to our patented technologies, Catalent's 80 years of experience in this field sets us above our competitors.

With regards to development solutions we have provided this service for many years, but these were embedded within our different business units. Over the past six years we have concentrated our focus in this area, by bringing together these services under one stand-alone delivery service.

Working with both large pharma and small- to medium-sized companies, what sort of relationship do you try to foster with your clients?

We work with a substantial majority of the top 100 pharmaceutical companies, but we also work with more than a thousand other businesses. Unlike other outsourcing partners, rather than simply forming a relationship with the company we work with, Catalent also forms its relationship with a molecule. The stage at which we engage is generally between pre-clinical testing and phase II, though with smaller companies we tend to come in at an earlier stage. We are not there to help a company decide what is the right molecule, but to help them decide what is the right molecule formulation and dose form. We offer the expertise to help them optimize the form of the molecule and then aid them in finding the right formulation to use based on the characteristics of the molecule and the clinical characteristics they are trying to achieve. The smaller companies tend to rely more on our drug development expertise and knowledge, whereas our larger clients will enlist us to bring out out the more complex, specialized expertise, capabilities and capacity.

Can you talk about how Catalent is evolving in accordance with the shift towards biologic drug development?

Almost 10% of our revenues come from biologic commercial manufacturing. Starting with Cardinal and continuing with Catalent, there has been a very definite focus in enhancing and expanding our biologics offerings. However, we do this in a way that makes sense based on today's approach to biologics. A recent report suggested that the future of biologic drug development would be in small, focused, single-use containers rather than the big 20,000-liter stainless steel tanks. For innovator drugs, we started down this path five years ago, and the facility we invested in recently is built around a single-use bioreactor model.

Can you talk about the Catalent Applied Drug Delivery Institute?

The Catalent Applied Drug Delivery Institute aims to solve real world issues and advocate for more effective use of delivery technologies. Around two-thirds of drugs that have been approved in the United States over the past five years have characteristics that could be avoided or otherwise improved to the benefit of the patient. The message we want to send out is that you do not have to settle for a product that is good enough when you are able to make it optimal. The institute also brings academics and the industry together through forums and consortia to try to solve problems that the industry and patients are facing.

Can you talk about some of the horizon projects for Catalent?

One thing that we are most excited about is a new generation of two of our platforms. We have a new type of soft-gel that is made with plant-based materials and have expanded a broader range of compounds, including important potential capabilities to deliver biologics orally. We also have an application of our Zydis technology that we believe can effectively deliver vaccines and other biologic molecules. Oral delivery of macro-molecular products has been a major goal for Catalent for the past two decades. We also continue to expand internationally, having expanded into China and doubling our presence in Brazil. Looking ahead, we will strive to remain the world's leading provider of solutions to any company's complex drug delivery issues. •

Stephen L. Schweibenz & Benjamin W. Reed

SS: President
BR: Vice President, Manufacturing
ALLIANCE CONTRACT PHARMA


SS


BR

Could you give us an introduction to Alliance Contract Pharma and tell us about the company's role today?

BR: We formed our privately owned contract development and manufacturing organization in 2009. The niche that we decided to approach was liquid filling in a hard-shell capsule due to the market demand and our combined experience in this field, and we opened up our cGMP suites according.

SS: The main advantage to liquid-filled capsules is minimal formulation development, which expedites clinical trials (First in Man). The majority of our business is now with early development Rx products from small to mid tier companies. Our major competitive advantage here is our accessibility. Our clients who have worked with larger CDMOs say that they much prefer working with a more intimate and friendly organization, which is very much what we pride ourselves on.

What other services are you able to offer at Alliance Contract Pharma?

BR: We want to be able to meet all of our clients needs and be as flexible as possible; therefore, we built our facility with this in mind. From this we have a range of services that can provide raw material testing to method development and validation.

SS: We also operate an analytical laboratory that was set up to primarily support clinical and commercial manufacturing scale. From this we have a range of services that we can provide from raw material testing to method development and validation. Additionally we are able to conduct long term stability testing.

BR: Another niche that we are breaking into is the high potency area, which is a growing trend in the industry. In addition to our current cGMP manufacturing, we are adding segregated cGMP cleanroom suites (ISO 7 and ISO 8) with dedicated air handling for potent compounds.

To what extent does a client influence your standard operating procedures (SOPs)?

SS: Our SOPs have been written with the fact in mind that we are a service company and therefore must be flexible to our client's requests. Clearly we have some minimum requirements that we are going to maintain at all times. Our SOPs are built around industry standards, but we are also flexible to the client's needs. Our smaller clients, for instance, rely on us heavily to guide them through their processes and take their products to market.

With more restrictions surrounding chemical imports, has the amount of APIs sourced locally grown?

BR: Oftentimes, the client will dictate the sourcing of APIs, but we are responsible for sourcing the raw materials. We have seen approximately a 50/50 split between foreign and domestic-sourced APIs. A number of our clients have an initiative in place to source domestically.

SS: In the past, there was a large initiative to take everything out of the U.S. because of rising costs, but this is reversing because of the issues with quality. The industry is now more sensitive to foreign imports. •

Bob Albanese

Vice President, Operations
CLINICAL SUPPLIES MANAGEMENT INC.

Can you give us an introduction to Clinical Supplies Management Inc. (CSM) and talk about the company's role within the drug development environment?

CSM was founded in North Dakota almost 20 years ago, starting as a returns and reconciliation provider for clinical sites. The founder and current CEO, Gerald Finken, quickly realized that reconciliation could be done more efficiently if he had some control over how the clinical kits were initially distributed. He therefore expanded the business to cover clinical packaging, labeling, distribution, and storage with the goal of streamlining the clinical supply chain.

Can you explain the concept of clinical supplies and how it has evolved as an industry over the years?

Clinical supplies started becoming a separate entity within the industry around 25 years ago. It was initially based on a commercial packaging model, which operated in substantially large batches. However, because of the lower volume required and unpredictable nature of clinical trials, the commercial model became unfeasible. Gerald recognized the need for flexibility in clinical supplies and invented the revolutionary On-Demand Packaging and Labeling service for CSM. The process has matured to a platform on which the entire company works today, allowing CSM to build a customizable kit based on a client's requirements in either very small or very large supply, within a very short timeframe. Unlike the industry standard, CSM aims to fulfill orders and deliver clinical supplies in days rather than weeks.

What are CSM's differentiators in a highly competitive industry segment?

Certainly our accessibility is key. We have strategic locations both in Pennsylvania and North Dakota to best serve our client base as quickly as possible. Additionally our size enables us to face complex supply challenges head-on and find new ways to succeed where others struggle. We also try to maintain an intimate culture that is conducive to forming close relationships with our customers and providing the highest service levels possible.

As an outsourcing partner, do you ever encounter any friction with clients trying to impose their own standard operating procedures (SOPs)?

I recently met with a company that wanted to impose their own SOPs over CSM's. We combatted this by displaying our outstanding quality and service records, which has been established through the successful execution of thousands of projects. It is a polite discussion,

but is one that is needed. If we change the way that we do business we jeopardize not only the patients' health, but our name and reputation as well. We are firm on our SOPs and often a new client will simply attach an addendum of what would have been their SOPs to ours.

What new trends are you noticing within the industry and how is CSM adapting?

One of CSM's goals is to always stay at the forefront of new trends. What we are witnessing today is the move towards personalized medicine. Investigators in clinical trials are able to use genome sequencing and biomarkers to determine each individual patient's reaction and tolerance to a drug and thus determine the exact dosage needed to be most effective. CSM is able to then respond to these specific requirements of each dosage level needed and provide the kits in the quickest time possible. Though this field still has a way to go, CSM is very much prepared to offer the solutions for when this becomes common practice.

Do you have a final message for our GBR readers about CSM's work and its on-demand service?

On demand, from its inception to the current platform we use, is ultimately pharmacy dispensing in a cGMP environment. We offer the highest level of patient dose flexibility, becoming the innovator in creating and implementing a direct-to-patient distribution model. Our success is based on the ability to serve our clients in the most effective and time efficient way possible. To achieve this and to better serve patients, we are continually expanding our global footprint both domestically and internationally. With the addition of our Malvern facility, we are gaining momentum in bringing on-demand and direct-to-patient to the global market. •

Mark McLoughlin

Senior Vice President and President,
Americas Lab & Distribution Services
VWR INTERNATIONAL, LLC

Could you provide us with a brief history of the company since its founding and an overview of VWR's operations in North America?

We have been around for more than 160 years and are positioned in a number of industries, including pharmaceuticals, biotechnology, industrial, education, government and healthcare. With our history and experience, we are able to consistently provide a range of product choices and differentiated services and we deliver on our promises through operational excellence. VWR has a strong leadership position in the biotechnology and pharmaceutical industries, as we have a wide range of products (over a million SKUs) available on a global scale. In terms of a breakdown of our product mix – about 18% of revenues is equipment, 45% consumables, 27% chemicals, 3% services and 7% other. While services account for only 3% of revenues, the customers who purchase these services also purchase about 25% of our total product sales. Customers value VWR's suite of value added services and are thus more likely to partner with VWR to access a vast range of products, improve their supply chains and increase their efficiency. We have more than a million products in our system and we work with approximately 4,500 suppliers worldwide. We fill approximately 17,000 orders per day and serve more than 120,000 customers annually. VWR held its IPO in October of last year and is benefiting from the increased exposure and interest in the Company now that we are publicly traded.

VWR has two business segments; one is the Americas, and the other covers the Europe and Asia-Pacific regions. The Americas is a little larger than its counterpart, but our expertise and solid, consistent growth in Western Europe provides a global footprint that differentiates VWR from the competition. Roughly 38% of our total business comes from the biopharmaceutical industry.

What are some of the recent key milestones undergone by VWR?

We have been rather active on the acquisitions front, focusing on our core laboratory business. We acquired Integra Companies and STI Components in the United States in late 2014, National Biochemicals in early 2015 and UK-based Hichrom Limited in May 2015. In October 2014, the Company successfully completed its IPO. We also opened up VWR's largest distribution center, at 500,000 square feet, in California in 2012. This supports our customers in the Western part of the United States.

What are some of the challenges you face in product handling and manufacturing?

A key challenge in manufacturing is supply chain security, particularly for our biopharmaceutical customers who are manufacturing large pharma products. When these companies are dealing with as many raw material suppliers as we are, it is important to give them assurance and security. We work with both the largest biopharma companies and smaller biotech companies. And while their product needs might be different, we offer a broad range of products and services that can meet their unique challenges. We are well positioned to support them in this regard.

How can sustainability be viewed as more of an opportunity than a threat to distribution companies such as VWR?

Our efforts in sustainability have grown over the years. It first started as a way to report what we were doing as a company. Then, based on customer feedback, we started to develop programs to help support our customers' efforts. One of our programs, 'From the Lab Bench to the Park Bench' involves taking back pipet tip boxes from our customer and creating park benches and other eco-friendly products from this plastic waste. This program, launched in 2012, was developed following feedback from our customers. They saw huge amounts of waste leaving their facilities and going into landfills, so we identified a solution to help them and the environment. We have started flagging sustainable products on our website as an option to customers who want to make more eco-friendly choices.

What is the impact of the increased focus on personalized medicines on the pharmaceutical industry?

Two of our recent acquisitions, STI and Integra, are focused on single-use proprietary solutions. The rise of personalized medicine means that production runs are going to be much smaller and a significantly larger number of drugs will need to be manufactured. Pharma customers are opting for smaller equipment that can be rapidly adapted to move production from one drug to another. STI and Integra provide single-use, disposable products enabling our customers to reduce their production set-up times and improve their speed to market, all at a reduced cost.

Looking ahead, where can we expect to see VWR in the next three to five years?

We will continue to grow our offering and deliver our value proposition (product choice, operational excellence and differentiated services). We want to help our customers by being the most efficient choice in the industry and by finding solutions to support our clients' goals. We have tried to be a step ahead of where our customers are heading, while maintaining the flexibility to move in different directions as the industry continues to evolve. •

Lukas Utiger

President Drug Substance
PATHEON INC.

Could you provide us with a brief introduction to Patheon, including any recent major milestones?

Patheon is a leading global provider of outsourced pharmaceutical development and manufacturing services. With more than 8,850 employees worldwide, Patheon provides a comprehensive, integrated and highly customizable set of solutions to help customers of all sizes satisfy complex development and manufacturing needs at any stage of the pharmaceutical development cycle.

The company offers end-to-end services and the ability to take products all the way from API, small molecule and large molecule through formulation development to commercialization, delivering a combination of unrivaled quality, reliability and compliance. Patheon has a reputation for providing scientific and technical excellence through solutions that meet the increased demand for manufacturers to bring new, effective and safe medications to market more quickly. As a recognized leader in the contract development and manufacturing organization (CDMO) industry, Patheon has transformed into a $2 billion business in the last few years.

In terms of recent milestones, Patheon's pursuit of both organic and inorganic growth, has led to the successful completion of multiple mergers and acquisitions, bringing five separate companies into the global Patheon network within three years. This includes Patheon's acquisition of Banner Pharmacaps in 2012, which aligned with the company's intent to lead oral dosage development and manufacturing services; the $2.65 billion merger with DSM Pharmaceutical Products (DPP) in 2014, which expanded the company's footprint to more than 20 locations worldwide; and the acquisition of Gallus Biopharmaceuticals. Most recently, Patheon acquired both Agere and IRIX Pharmaceuticals in 2015.

How important is integrating with clients and what are the advantages of having a global footprint?

Pharmaceutical companies rely on experts within a CDMO to work in tandem with them to take a molecule from development, to clinical and commercial-scale manufacturing, and finally to the packaging phase. In recent years, the client-CDMO relationship has undergone a transformation, moving from a transaction-based relationship to a strategic, collaborative partnership, bringing true value to clients. Additionally, increasing customer demands for innovative, integrated solutions from the CDMO industry have resulted in increased productivity across the board.

Responding to the need for deeper and longer-term relationships with customers, Patheon developed Patheon OneSource™, an end-to-end development offering which streamlines supply chain activities and focuses on driving value through simplicity, speed and quality. Patheon's industry-leading experts around the world collaborate to bring a depth of expertise to the development and manufacturing process.

Could you tell us more about the differing dynamics of working with big pharmaceutical companies versus small biotechs?

Big pharma relies mostly on in-house resources in research, process development and regulatory services. In addition, the big pharma quality departments have experience in validation and regulatory filing. Therefore, they are mainly looking for flexibility and niche technologies to support a launch. After launch, these companies mainly address the cost of goods with a balance of in-house and external manufacturing. Quality, speed and flexibility, mainly relying on specific technologies, are what they look for.

Small biotech companies on the other hand expect a much broader service level. Besides relying on the CDMO's regulatory and quality expertise, small biotech companies also look for process innovation & process development/scale-up expertise. Optimal process design in drug substance and drug product is mostly delegated to the CDMO, which allows for close partnership to create the best overall solution.

Do you have any predictions for the future of the pharmaceutical industry?

The CDMO industry is following the same trajectory as the CRO industry. We can expect to see a few large, major players versus several small ones. Outsourcing to these large CDMOs will continue in order for pharmaceutical companies to get a physical form delivered in a fast, cost-effective and reliable manner.

Currently, the CDMO industry remains fragmented, with more than 600 players, but customers increasingly have a need to simplify supply chains due to pressures from regulatory agencies and investors. This is where Patheon's strategy to lead consolidation comes in, offering end-to-end services and the ability to take product all the way from the initial molecule stage, through formulation development to commercialization.

What will we see from Patheon?

Patheon is a globally preferred provider, which will continue to lead industry transformation through delivering better supply chain solutions, as it has the broadest offering of any CDMO and the most experience at getting drugs to market. We will continue to engage in partnerships and acquisitions that support our strategy and commitment to continuous improvement, and will always be looking for growth opportunities for our company. Therefore, we expect to continue leading consolidation within the CDMO industry as we seize opportunities to enter into logical adjacencies. •

Terry Herring & Pete Valko

TH: President, Commercial Operations
PV: Chief Operating Officer, BioComp Pharma and ProSolus Pharmaceuticals, Inc.

MISSION PHARMACAL COMPANY, INC.

TH

PV

Could you give us a brief overview of the company since 1946 and its evolution since then?

TH: Mission Pharmacal was founded by H.N. Walsdorf as a family company in 1946, originating from a pharmacy background. As we began manufacturing compounds in the 1970s, Mission transformed into a supplement-oriented organization. During that time, when we were a small organization with a turnover of around $15 million, the founder's son Neill Walsdorf, Sr. began to work with the University of Texas and developed products associated with women's health and urology, such as Citracal® (calcium citrate), Urocit-K® (potassium citrate), and Lithostat® (acetohydroxamic acid). By the 1990s, approximately 75% of our gross revenue came from consumer products, while the bulk of our net earnings came from prescription products, focusing on the two areas of women's health and urology.

In 2008, I met with Neill Walsdorf, Jr. and discussed strategies for diversification and growth; the organization as a whole needed to be revamped. In 2010, we put our diversification strategy into effect and, since then, we have added the BioComp Pharma generics division and gained Alamo Pharma Services, our outsourcing partner for sales representation and operational services. In addition, we recently acquired ProSolus, which is our transdermal manufacturing organization. We also have a contract manufacturing group in Boerne, Texas.

In the last 12 months, we have launched our shipping and distribution arm BexR Logistix, and we have extended from women's health and urology to primary care, specialty pediatrics, and long-term care. BioComp Pharma is now approaching the $100 million mark as a company which, together with our other recent acquisitions, has left us stronger and more diversified. We also have an international arm and, as of a few months ago, we own minority stakes in two companies in the United Kingdom. Each of our business units supports the overall missions and goals of our company. This allows us to not be dependent on any one area.

Could you tell us more about the benefits of setting up BioComp Pharma, Alamo Pharma Services, and BexR Logistix?

TH: All three companies were established initially to benefit Mission solely but, as they have developed expertise in these categories, they have been able to take these skill sets externally. Mission is the anchor client and they also focus in particular on helping small start-ups grow and diversify. BioComp for example has the opportunities from Mission, as well as external generics opportunities. Alamo services 230 sales representatives from Mission, and the same again in partner sales representatives. We decided that our subsidiaries don't have to be big, but they do have to be good, and each one is run by an expert in the field.

What has been the impact of the acquisition of ProSolus Pharmaceuticals on Mission's operations?

PV: ProSolus is a small company, as it was founded only a few years ago. It has certainly helped us expand our capabilities. There are high barriers to entry in transdermal patch manufacturing, and this dovetails well with Mission's goal of building and growing both our own manufacturing capability and commercialization opportunities, as well as being able to contract out this expertise. For example, 30% of the products ProSolus currently manufactures are for Mission, with the remaining 70% for external companies. Our expectation is for ProSolus to help expand both the Mission and BioComp portfolios and also to present opportu-

nities for other companies in this space to approach us and have development or manufacturing work done.

What has been the impact of patent expirations on branded products and how is the generics segment leveraging this opportunity?

PV: There is anticipation for patent expirations. It has come about because of the lack of origination and innovation today compared with that in previous decades. There are many products that have a tremendous amount of value but are underutilized, under-marketed and undersold. Companies are resurrecting these products and putting them to beneficial use. The industry's focus has also shifted to biosimilars, for which there are high barriers to entry. They are for example expensive to develop, meaning there are very few players in this market. At BioComp, we focus both on defending Mission's brands as well as on novel delivery platforms, such as transdermals. We are also seeking niche opportunities as part of the corporation's diversification strategy.

TH: We believe there are some generic products that can be treated as branded products, and we implement this within BioComp, thus providing low costs for consumers. We try to look at the opportunity rather than seeing whether products are OTC or prescription, branded or generic. We evaluate each opportunity and decide whether or not it is viable for us. There are two products that we are currently taking from prescription to OTC because we believe there is the opportunity and scope to do so.

Looking ahead, where can we expect to see Mission Pharmacal in the next three to five years?

TH: We are launching products from our latest acquisition in the cough/cold arena later this year and we recently acquired a Derm Team. We have in excess of 20 products in development; 50% of these are branded products, around 30% are generics, and the remainder are in the consumer sector. We also believe we have a great opportunity internationally, following our acquisitions in Europe, so we will be including some of our current products in this expansion. •

Graham Reynolds

Vice President of Marketing and Communications,
Pharmaceutical Delivery Systems
WEST PHARMACEUTICAL SERVICES, INC.

Could you introduce West Pharmaceutical Services, Inc. and where its main focus within the company lies?

West Pharmaceutical Services, Inc. is a leading manufacturer of packaging components and delivery systems for injectable drugs and healthcare products. Working by the side of its customers from concept to patient, West creates products that promote the efficiency, reliability and safety of the world's pharmaceutical drug supply. Approximately 110 million West components are used every day around the world.

The company was founded in 1923 in Philadelphia, Pa., U.S., with a focus on insulin and antibiotics. During World War II, West was instrumental in providing the container closure system for penicillin, making it possible to deliver large quantities quickly to the troops. Today, the combination of a glass container with a rubber stopper and an aluminium seal remains the preferred option for many injectable pharmaceutical products. West drug delivery systems also include prefilled syringes, self-injection technologies and administration systems.

From its beginnings in the US, West is a global company with headquarters in Pennsylvania. Can you tell us more about your facilities around the world?

In addition to our Exton, Pa., headquarters, we have major centres in Europe, North and South America and Asia, as well as partners in Japan and Mexico. West opened its first plant in India in 2014, and this region is an important area of growth. Around the globe, we have more than 30 facilities manufacturing quality products for our customers.

Would you describe West as more of a partner rather than simply a vendor and what types of drug delivery methods can you provide?

Partnership is our focus. We work closely with pharmaceutical and biotechnology companies to create packaging solutions and container systems for their injectable medicines. Nearly all of the world's top 50 pharmaceutical companies rely on West systems to help ensure the safety and efficacy of their drug products. Furthermore, the world's top 35 injectable biologics are packaged and delivered with components manufactured by West and its partner, Daikyo Seiko. Within our drug delivery business, West offers self-injection systems, including wearable technology, which enables patients to administer injectable medicines at home.

West works with some of the largest companies in the world. Is there also scope to work with smaller players?

We also work with early-stage companies. Even if their products will take a decade to bring to market, we partner with our customers from the earliest stages of development to determine the best container and delivery system to help ensure safe and effective administration to the patient.

In working with biopharmaceutical companies, it is important to consider potential drug to container interactions, such as delamination, that can occur between complex molecules and glass containers. We believe that the container and the delivery system are as important as the drug molecule because, if the two are not entirely compatible, that could affect the patient. We believe that smaller, start-up companies can especially benefit from West's many years of experience testing and developing our products to deliver the best quality components.

Regardless of the size of our customer, we are constantly innovating to meet the needs of their business and the ever-changing healthcare environment. As increasing numbers of drugs are self-administered—in particular for diabetes and auto-immune diseases—drug companies are relying on patients, partners and caregivers with limited self-injection experience to take responsibility for their own drug delivery. This means delivery devices need to be easy to use and created with patient behaviours in mind.

How have you developed your customer relationships with both large pharmaceuticals and smaller players?

We have experience working with both ends of the spectrum. Small companies are primarily interested in getting a breakthrough therapy to the market and often require an array of services, from concept to delivery. Larger pharmaceuticals have the infrastructure to deliver the drug and may even have their own manufacturing capabilities. In those cases, the partner looks to West's specialized expertise in primary packaging and devices and often focuses on ways to differentiate their product within a particular category. We can provide proprietary solutions and offer our development, engineering and manufacturing capabilities to support customer-specific devices.

What are the next steps for West in research and development?

Historically, our core products have been packaging and container closure systems, but in the last 10 years, we have increased our focus on delivery systems to anticipate the future needs of patients and deliver drug packaging, safety and administration systems that not only meet the demands of our customers, but also those of a connected world. Patients are more aware than ever before and are taking an active role in managing their health.

Technology also will play an increasingly important role in helping patients manage chronic conditions. West is exploring tools, such as smartphone apps, that work with our devices to help patients manage their treatment regimen and potentially improve medication adherence. •

Contract Packaging and the Future of Serialization

By Harriet Bailey

The return of Packaging Coordinators Inc. (PCI)—one of the largest pharmaceutical packagers in the United States—to the market in 2012 coincided with the re-birth of the North American contract packaging industry as a whole, following its decline in the early 2000s. PCI had been a leader in the field in the latter half of the twentieth century, before being swallowed up by health care distributor Cardinal Health at the turn of the millennium, when companies increasingly sought their own in-house packaging solutions. However, with the impact of new legislation a decade later, including GDUFA fees, the Affordable Care Act and the move to serialization, pharmaceutical companies have come to realize that compliance issues are more easily solved by a specialist in the field.

This has been good news for the contract packagers. New Jersey-based Reed-Lane has seen its revenues double since 2010, while Aphena Pharma Solutions attributes its considerable growth over the last five years to its focus on serving the generics industry. As Eric Allen, vice president sales and marketing at Aphena, said: "Due to the new laws surrounding drug serialization and the costs associated with this, it became too expensive and time consuming for many smaller companies to establish their own packaging arm. Today, in an effort to save on overhead costs, far more companies are choosing to outsource many aspects of their operations."

This has also enabled pharmaceutical manufacturers and contract packagers to develop much closer relationships than previously. "The large companies view us as an extension of their operations and the virtual companies rely on us for our expertise in packaging," said Joe Luke, Reed-Lane's vice president of sales and marketing.

One area seeing increasing demand is compliance packaging. As the FDA takes an increasingly diligent approach to reviewing drugs for commercialization, manufacturers and packagers are working ever more closely to improve patient adherence. As Justin Schroeder, executive director of marketing, business devel-

Image: Sharp Packing Solutions

Focus on Serialization

In order to prevent counterfeit products entering the drug supply chain in the United States, the Drug Supply Chain Security Act (DSCSA) was passed in 2013. This requires track-and-trace solutions to be implemented and drug packages to carry unique serial numbers—hence serialization.

Fours years after the law is implemented, each link in the supply chain is supposed to have worked out a way to track and trace their products at the lot level; two years after that, this is supposed to have been refined to each individual package. The FDA would then be able to regulate all drugs being produced for consumption in the United States, which would be particularly useful for identifying the point at which a counterfeit product has entered the supply chain.

At present, it is uncertain as to when exactly the Act will come into effect, but 2017 is the generally accepted date to which many packagers are working; ReedLane's Luke confirmed the company will be ready for serialization in January 2017. "Though not yet mandatory, pharmaceutical companies in the United States are coming under increasing pressure to implement track-and-trace solutions," said Sharp Packaging Solutions' client development and relationship manager, Bob Macadangdang.

Not all companies will have the capacity or the financial wherewithal to install serialization-compliant packaging suites. "While these laws are necessary," argued Aphena's Allen, "many small companies have been forced out of business." However, while some players will lose out, those who press ahead with reforms will ultimately benefit.

In this instance, the United States is not a trendsetter, with both China and South Korea among the countries having already implemented their own serialization requirements. Initially affecting only products on China's National Essential Drugs list, the requirements will be extended to all pharmaceuticals on December 31, 2015. South Korea follows suit a day later, on January 1, 2016. The effects of this should be closely monitored by the FDA in order to provide U.S. manufacturers with clear guidance about what is expected of them, and when. •

opment and design at PCI, explained: "Drug companies are under a lot of pressure to demonstrate the effectiveness of their medication, and one of the ways to address this is through compliance packaging. We work with clients on a daily basis to optimize their packaging for drugs both in development and on the market."

Retailer Wal-Mart has led the way in packaging reform with its $4 Generic Prescription Program. Hundreds of generic prescription drugs have been made available at all of its U.S. outlets at $4 for a 30-day supply. The smaller prescription is packaged in blister packs; not only is this a significant departure from the bottles of tablets and capsules typically found on the shelves of US pharmacies and a nod to the more usual blister packs found in European markets, but it also prevents adverse external conditions, such as moisture and temperature, from affecting the medication inside. As recently as 2014, blister-packaging uptake in the United States was estimated to be at a paltry 20%, compared to around 85% in Europe; this figure, however, is on the rise. With around half of the 1.8 billion prescriptions being followed incor-

> Though not yet mandatory, pharmaceutical companies in the United States are coming under increasing pressure to implement track-and-trace solutions.
>
> - Bob Macadangdang, Client Development & Relationship Manager, Sharp Packaging Solutions

rectly each year, PCI is an advocate for calendarized compliance packaging. "Several studies have demonstrated the effectiveness of calendarized packaging on patient adherence," said Schroeder.

Indeed, according to a recent study, 13% more patients were found to take their medication correctly and to continue their treatment over the long term with this type of packaging.

Yet this reliance on contract packagers to be at the forefront of industry trends has not all been plain sailing. The GDUFA fees, introduced by the FDA in order to accelerate approvals of generic drugs—and thereby significantly decreasing healthcare spending for the consumer—encompass companies across the spectrum of the industry. As well as hitting API manufacturers, the FDA also requires "organizations that support the manufacture or approval of these products" to pay the same, non-means-tested fees. "We don't own the ANDA or produce any of the active ingredients and therefore the question about why small packagers should pay this fee arises," argued Reed-Lane's Luke.

Although Aphena claims to be one of the top three contract packagers in the United States, it recognises the difficulties faced by some of its competitors: "Small to mid-tier companies are simply not able to pay these fees out of the small margins they earn from the generics market," said Allen.

With GDUFA II—an update to the initial legislation—in the pipeline, discussions surrounding fee reductions and waivers are rife within the packaging industry. "At the very least," suggested Luke, "the fee should be proportionate to the size of the firm, rather than simply a flat fee for all."

Considering the United States is the largest market in the world for pharmaceuticals, with a particular set of nuances in terms of dug delivery, it comes as no surprise that both domestic and international manufacturers require help in getting their drugs from the labs to the patient. As the dynamic between the FDA and the drug companies themselves shifts, companies able to take on some of the extra burden of regulation, while also coming up with innovative drug delivery methods, will continue to drive the outsourcing trend. •

Patricia Elvin & Joe Luke

PE: President
JL: Vice President of Sales and Marketing
REED-LANE, INC.

PE

JL

How has Reed-Lane evolved since its inception in 1959 and what are some recent key milestones?

PE: Reed-Lane was founded by a few shareholders building strip-packaging machines in a garage in the late 1950s; today, these machines are known as pouching machines. The name Reed-Lane itself came from the time of the Panama Canal. Dr. Walter Reed was a U.S. army physician who confirmed the theory that mosquitos transmitted yellow fever and worked alongside Dr. Lane. The two names were put together to form the contract packaging company Reed-Lane. In 1999, the company moved to Wayne, NJ; since 2010, investments of $11 million were put into new plant infrastructure and packaging equipment. In this short period of time, the company has increased sales and profitability and installed new high-speed equipment, concentrating on solid-dose packaging of pharmaceutical products.

JL: Since 2010, we have seen our revenue double and our business is 100% focused on health care and pharmaceuticals. We package a mixture of generic and branded products for both OTC and prescription drugs.

In terms of client relationships, in what ways do large pharmaceutical companies and small start-ups have differing needs from Reed-Lane?

JL: Our key customers comprise large international pharmaceutical companies, as well as virtual companies. The large companies view us as an extension of their operations and the virtual companies rely on us for our expertise in packaging. Our transparent operating model and lack of bureaucracy means decisions are made quickly, which appeals to our customers.

PE: Every customer is treated equally by Reed-Lane, in terms of the time we allocate and the capital we invest, regardless of their size.

How important is it to have strong advocacy within the pharmaceutical packaging industry?

PE: The Healthcare Compliance Packaging Council (HCPC) is focused on encouraging compliance packaging in the US. We are competing with bigger companies in the space but are bound to adhere to the same regulatory standards.

What effect is the Generic Drug User Fee Amendments (GDUFA) fee having on smaller packagers?

JL: We are paying the same GDUFA fee as multi-billion dollar companies in the industry, which doesn't seem to make sense. We don't own the ANDA or produce any of the active ingredients and therefore the question about why small packagers should pay this fee arises. At the very least, we believe that the fee should be proportionate to the size of the firm, rather than simply a flat fee for all.

What effect is serialization having on Reed-Lane and the industry as a whole?

JL: Reed-Lane will be ready for serialization for January 2017. Our first serialization suite, which consists of a flexible line concept, is installed and validated. It is capable of full aggregation even though it will not be required in the United States until 2023. Two of our bottling lines will be capable of serialization in 2016- ahead of the mandate. Because serializing product is not required until January 2017, it is difficult to predict the impact on our company right now. As the industry approaches the deadline, lead times for equipment and services will become tighter.

PE: Serialization technology is going to benefit us in the long-term with regards to our business relationships because there will certainly be companies who are not completely serialized. We are planning our serialization capabilities such that we will not only be able to serialize for our current customers, but we will also be able to offer this service to other potential customers who do not have the capacity in their own organizations. Serialization brings new aspects to the contract packaging environment, with enhanced equipment and employees who are more technically advanced. Companies will need to train their current staff along with new staff to handle this new aspect of the business. There will be a new human resource turnover with the industry-wide focus on serialization.

What milestones will Reed-Lane undergo in the future and do you have a final message for our readers?

PE: We hope to continue expansion in this facility with the introduction of a new bottling line by 2017 and, eventually, we plan on opening another facility.

JL: Reed-Lane is a solid, mid-sized contract packager with an array of capabilities and flexibility. We offer our customers a positive working experience as we are conscious of quality and are quick to react to changes. •

Eric Allen

Vice President Sales and Marketing
APHENA PHARMA SOLUTIONS, INC.

Can you give us a brief introduction to Aphena Pharma Solutions and tell us how the company has evolved from a small outfit into the large establishment that it is today?

Aphena Pharma started as a family operation in 2002 and focused primarily on packaging solid-dose items for mail-order pharmacies. Through government contracts, the company steadily scaled up its operations to encompass commercial customers and, after a number of acquisitions, Aphena branched out from solid dose packaging into the fields of liquid and topical medications, thus being able to offer a more turnkey solution to the pharmaceutical industry. Today, unlike similar companies, Aphena is able to offer a vast array of packaging services for both solids and liquid-based products but also full manufacturing capabilities for liquid-based products to our clients, being worthy of our full name, Aphena Pharma Solutions.

What has been the main contributing factor to Aphena Pharma Solutions' substantial growth and success?

Certainly the major contributing factor to Aphena's considerable growth is the generics industry. Five years ago the company made the strategic decision to focus on this industry. Many of our competitors were focused solely on branded products, as there are typically larger margins associated with branded companies. There were far more ANDA (generics) filings in the application system, however, than there were NDA (branded) filings and, at the time, Aphena saw an underserved market that we were able to exploit. The reason Aphena Pharma Solutions is considered as one of the top three powerhouses in this industry is because of our focus on generic products.

Do you think that the success of the generics industry could have an adverse effect on the research and development work of branded companies?

There has been a recent decline in the number of new blockbuster drugs coming onto the market, particularly antibiotic drugs, which has been associated with the ever-increasing costs involved with new drug discovery. However, this is unrelated to the generics industry. There is a constant stream of new legislation that is preventing generic companies from contesting the length of a patent on a drug and producing their own version. What a number of branded companies have done to further offset this risk is to establish their own generics arm and now produce the authorized generic of their own branded product, thus eliminating some of the competition and increase the speed to market for the generic products.

What do you consider to be the main challenges that companies within both the branded and generics industry are facing today?

By far the biggest challenge that both we, and many of our clients, face is new legislation. There has been a move to cut down on counterfeit drugs by imposing a track and trace, or drug serialization, law. While these laws are necessary, many small companies have been forced out of business, as they do not have the financial means to comply. In the generics market, the same can be said for the Generic Drug User Fee Amendments (GDUFA). Small to mid-tier companies cannot pay these fees from the small margins that they earn from the generics market. This is eliminating the competition for larger companies that have the means to pay these fees, thus leaving big pharma able to raise their prices and defeat the low-cost mindset of a generic drug for the consumer or insurance provider.

Are you witnessing a tendency for companies to establish their own packaging arm in an effort to consolidate or is outsourcing still the preferred route?

A few years ago, we witnessed a big push by manufacturers to bring the other facets of their business back in-house, but the new laws surrounding drug serialization and the costs associated with this have made it too expensive and laborious for many smaller companies to establish their own packaging arm. Today, in an effort to lower overhead costs, more companies are outsourcing many aspects of their operations. Recently, we have seen a large influx of generics companies that have previously never outsourced but are now looking to do so because adhering to the new legislation has become to expensive and laborious.

In which direction is Aphena Pharma Solutions now expanding?

Our strategic direction is predominantly domestic-orientated. We have a number of customers that ship internationally, but at this time we do not see the company expanding overseas. The United States is still the strongest pharmaceutical market in the world and many foreign companies, particularly from China and India, are looking for ways to enter it. Aphena Pharma Solutions, through its ever-strengthening domestic presence is able to offer them that opportunity and, through partnership, can package and distribute their products throughout the country. •

Justin Schroeder

Executive Director, Marketing, Business Development and Design
PACKAGING COORDINATORS, INC. (PCI)

Could you introduce us to PCI Services and the company's recent history?

This is the second time around for PCI. It was the market leader in contract packaging for many decades in the second half of the twentieth century, before it was acquired by Cardinal Health in 2000. In 2012, Catalent—a Cardinal spinout—sold its commercial packaging arm to private equity firm Frazier Healthcare. PCI was then recreated under the leadership of CEO Bill Mitchell.

A year later, PCI had the opportunity to acquire AndersonBrecon from AmerisourceBergen. That acquisition substantially increased the size and scope of the company. It brought with it new facilities in the United States and Europe and added clinical services to the commercial packaging business. AndersonBrecon itself was a combination of the legacy businesses Anderson Packaging and Brecon Pharmaceuticals.

Most recently, PCI acquired two Welsh companies in late 2014: Biotec Services International, focusing on the packaging, labeling and distribution of clinical investigational medicines with a specialization in cold-chain, and Penn Pharma's drug development and manufacturing, clinical trial services and commercial packaging aspects, as well as laboratory services. The main addition however was the ability to manufacture drug products; Penn is the industry leader in oral solids, tablets, powders and topicals, with a specialization in potent compounds.

Why has PCI, a well-known pharmaceutical packaging company, moved into manufacturing?

It is really at the behest of our customers. We have built our business through long-standing relationships and our customers now want to expand the scope of our collaborations. Penn Pharma itself has a world-class, purpose-built facility for the continued manufacture of potent compounds—there is nothing like it in the world. In terms of our client base, we serve the majority of the major pharmaceutical companies; we are a preferred supplier for 19 of the top 20 firms worldwide. We also work with many mid-sized and virtual companies.

Could you talk about your facilities in the United States?

Our headquarters is in Pennsylvania. It is a commercial packaging site of 500,000 square feet, conducting primary and secondary packaging in addition to supporting parenterals and injectables, including vial labeling, syringe assembly and device assembly areas as well as simple and complex kitting. Our two former AndersonBrecon sites are in Illinois. One facility, of around 125,000 square feet, carries out commercial packaging in the areas of blistering, bottling, pouching and secondary packaging. The other site is comprised of nine different facilities around the city of Rockford, totaling more than one million square feet. It carries out a multitude of packaging activity, including commercial packaging of ethical and over-the-counter medicines, as well as clinical services such as the storage and distribution of global investigational (clinical) medicines and clinical packaging and labeling. That site also has an on-site laboratory services and an area that supports potent compounds.

How important is patient adherence for pharmaceutical companies?

Drug companies are under a lot of pressure to demonstrate the effectiveness of their medication, and one way to address this is through compliance and adherence packaging. We work with clients on a daily basis to optimize their packaging for drugs both in development and those already commercially on the market. We are also looking at adherence programs more broadly to change patient behaviors and drive better health outcomes.

Calendarized compliance packaging is a core part of our business. Walmart's $4 generic packaging program is a great example of the sheer scale at which calendarized packaging can be applied. It has been a leading influence in waking people up to what can be achieved. Several studies have demonstrated the effectiveness of calendarized packaging on patient adherence. Walmart was bold in taking that action because it is a distinct departure from the rest of the American market, which tends to default to bottles.

What impact will serialization have on the industry as a whole and how is PCI reacting to these changes?

We have been doing active serialization for a number of years now, despite the fact it is not yet a requirement. We have a good working knowledge regarding serialization and its application, which has been invaluable as we look to scale that up for all of our customers. We have also seen that specific markets, such as South Korea, have already adopted serialization requirements ahead of the United States.

What is the future for PCI Services?

The growth and acquisition of PCI has been about serving the customer, who is our primary focus. We maintain relationships with our clients throughout a drugs' lifecycle, from clinical development to the commercial product launch, through the loss of patent exclusivity and ultimately the long-term lifetime of the drug. PCI should continue to grow and expand in logical adjacencies to our core business in supporting our clients' needs. We also want to make sure that PCI will be integral in the geographies in which there is the opportunity to support our clients' needs in new growth markets, including Russia, China and India, Asia Pacific and Latin America. •

Bob Macadangdang

Client Development & Relationship Manager
SHARP PACKAGING SOLUTIONS

Could you introduce us to Sharp Packaging and its facilities in the United States?
Operating as one of four business segments under UDG Healthcare PLC, Sharp Packaging Services is an international contract packager and supply chain service provider. Following UDG's restructuring in 2012, Sharp now operates in two key areas of pharmaceutical packaging, commercial packaging and clinical services. In the U.S. we have three sites all in Pennsylvania, in Allentown, Conshohocken and Phoenixville. Sharp also has facilities in Belgium, the Netherlands and the United Kingdom.

Can you provide more details as to the range of services Sharp can offer?
Sharp is a leader in all forms of standard commercial packaging solutions from bottle and blister packaging to oral thin film and pouches, sachets and stick packs. We also are able to meet any biotechnology packaging requirements whether that is in vial form, pre-filled syringe or in auto-injector. With regards to our clinical services, Sharp has decades of experience in managing local and global clinical supply chains. In addition to clinical packaging we offer analytical and research services and clinical manufacturing services, to name just a few. We are also able to meet any cold chain requirements a clinical project may have.

What sort of relationship do you aim to form with a client when working with them on a clinical project?
Given the unpredictable nature of clinical programs, we recognize that flexibility is fundamental and as such strive to adapt to all our customers needs even at the eleventh hour. With this in mind, constant communication is also essential. Ultimately our relationships are formed on trust as the fortunes of our client may rest on a particular project. Our over-arching goal is to have customers know that partnering with Sharp is a safe and secure way to deliver their global project.

Can you talk about your working relationships with companies across the spectrum in terms of size?
Smaller companies will always require more from us, as they will not have their own established internal expertise. We have the resources to be able to help them with their distribution and logistics needs and also guide them through the challenging regulatory framework. With larger companies, though they may not need much in the way of supplementary assistance, we still try to form a more intimate relationship.

With biotech becoming more common amongst pharmaceutical companies, how easy a transition has this been for Sharp?
Sharp has been invested in this field for over eight years. We are able to offer the same high level of services to customers with a biotech product as we do with our small molecule customers. We are noticing a shift in drug development towards the macro-molecular and to keep up with this rising demand for biotech solutions we recently started the construction of a facility that will be dedicated solely to dealing with biologics. This plant will be operational by Q2 2016.

Can you explain serialization and talk about how Sharp is at the forefront of this?
In simplest terms, serialization was conceived as a means of preventing counterfeit drugs and diversion incidences. This is done by giving each individual product a unique identification code. Though not yet mandatory, pharmaceutical companies in the U.S. are coming under increasing pressure to implement track-and-trace solutions. The FDA's ultimate concern is the safety of the public and as such ensuring complete supply chain integrity is a major priority. Already obligatory in China and Korea, we believe that serialization will soon become and a legal requirement in the U.S. When this time comes Sharp will be able to be the leading solution provider in any company's serialization needs.

Do you have a final message for our GBR readers?
Having been in this business for 60 years, Sharp has a deep seeded expertise in all pharmaceutical packaging requirements. We maintain that quality, flexibility and trust are the key factors in forming a successful partnership. Our mission is to continue to enable healthcare companies to operate more effectively through international professional outsourced solutions. We cannot do this without putting a strong emphasis on quality. •

Safe on Arrival
The U.S. Logistics and Distribution Network

"Companies are creating biological drugs that are more unique to individuals, as opposed to developing blockbuster drugs for the masses to boost sales. To maintain the integrity of these products, manufacturers are looking to 3PLs like us to provide cold chain solutions that can simultaneously help them remain compliant and keep their costs down."

- Scott Cubbler,
President,
Life Sciences & Healthcare, Americas,
Exel

Image: Allergan Inc.

Reaching the Patient: Logistics and Distribution

By Harriet Bailey

Just as the earliest arrivals to the American continent settled up and down the East Coast before moving westwards, the hub of the pharmaceutical industry is also to be found there, and in particular the Northeast Corridor. Not just the domain of homegrown companies, large multinationals have also chosen to establish themselves in the region. A coherent distribution network is therefore crucial in order to reach patients across the entire country, from Alaska and Arizona to Washington and Wyoming.

Drugs commonly pass from a manufacturer to the pharmacies via a wholesaler and the United States has three players that dominate the market: on the East Coast, Pennsylvania-based AmerisourceBergen; on the West Coast, McKesson in California; and Ohio-headquartered Cardinal Health in the Mid-West region. McKesson is by far the oldest, having been founded in 1833, as well as the largest, generating revenues of almost $180 billion in the financial year 2014-15. The "Big 3" control more than 85% of

> Whenever there is a merger, companies such as Exel are given the job of incorporating the smaller company's products into the supply chain of the acquiring company. We get involved with developing the new supply chain and finding solutions for these companies.
>
> - Scott Cubbler, President, Life Sciences & Healthcare, Americas, Exel

the wholesale drug distribution market, with a combined turnover of almost $290 billion in 2013, but margins are slim. Large pharmacy chains in particular squeeze wholesalers on price. To combat this each of the Big 3 has signed exclusive purchasing agreements with a pharmacy giant. The entire method of stocking the large chains was, accordingly, entirely re-calibrated. The first to pair off were AmerisourceBergen and Walgreens/Alliance Boots in March 2013, prompting Cardinal and CVS Caremark to team up in December 2013, to form the largest generic drug sourcing operation in the United States. This was quickly followed by McKesson and Rite-Aid expanding their drug sourcing agreement in February 2014 to cover generics as well as branded products.

Alongside the big names, however, are thousands of independent pharmacies that have significantly less purchasing power and are more directly affected by each drug price fluctuation. Although Rochester Drug Cooperative (RDC) is the sixth largest wholesaler in the United States, its revenue, at around $2 billion in financial year 2014-15, is around ninety times less than McKesson. "The independent drug wholesalers face strong competition and we probably only account for around $13 billion of a $400 billion industry," said Larry Doud, RDC's CEO.

RDC are typical of the cooperative model, which is in operation across the country and is often the only way for an independent pharmacy to be able to take advantage of competitive pricing. The cooperative buys in bulk on behalf of its members and pays them an annual dividend. "This year, we made a profit of $31 million and we paid $30.75 million back to our members," explained Doud.

The cooperative model assists independent pharmacies in other ways too: "We have a $20-million fund that our pharmacies can use to buy each other out, which allows them to remain independent. Previously, a buyout by a chain was the only available exit strategy," continued Doud.

This does not help, however, the independent wholesaler itself. Kinray, previously the largest independent wholesaler in the United States, was bought out by Cardinal Health in 2010. Many of its clients turned to RDC in the aftermath, no doubt justifying in its new members' minds the RDC logo of a knight in shining armor.

Distribution Revolution

Although some manufacturers and wholesalers will have their own fleet of vehicles to transport product, they are increasingly turning to outsourcing partners to physically distribute drugs. Once again, the market is dominated by third party logistics companies operating across a number of industries, such as Exel—DHL's U.S. brand name—and Kuehne + Nagel (KN). These global partners often have the scope to be able to allocate an entire facility to one customer or to create a dedicated pharmaceutical offering, as in the case of KN's PharmaChain. It incorporates full GxP compliance worldwide, track-and-trace capabilities, as well as KN CoolZones for temperature-sensitive products.

Nevertheless, smaller, U.S.-focused logistics providers are also in demand, particularly for the new wave of small and mid-sized players whose requirements do not yet fit into the standardised global offerings of the larger 3PLs. LifeScience Logistics is one such company, founded in 2006 and operating specifically within the mid-market biopharmaceutical space in the United States: "While there are several big competitors in the space, we observed that there was a gap in terms of service," explained Richard Beeny, LifeScience Logistics' co-founder and CEO. "We are an attractive option for foreign companies trying to enter the American market space because we are a one-stop shop for many of the services they need."

Navigating the increasing amount of regulation for drug distribution in the United States is a complex task and is one explanation for the recent rise in popularity of the outsourcing model. Pharmaceutical companies are able to focus on their core competencies, relying on the specialists to deal with distribution challenges.

With the recent high volume of mergers and acquisitions activity, outsourcing areas such as drug distribution makes it easier to both find combined solutions for the resulting new entities as well as to achieve synergies quickly and easily. Exel's focus on the big players in the pharmaceutical industry means it often deals with supply chain enhancement: "Whenever there is a merger, companies such as Exel are given the job of incorporating the smaller company's products into the supply chain of the acquiring company," said president life sciences and healthcare for the Americas, Scott Cubbler. "We get involved with developing the new supply chain and finding solutions for these companies."

As the impact of the Affordable Care Act, upcoming legislation on serialization and the shift towards biologics works its way through the entire supply chain, wholesalers and distributors will have to clearly define the extent of their responsibilities. In the distribution arena at least, it appears that outsourcing is the model of choice. •

"The independent drug wholesalers face strong competition and we probably only account for around $13 billion of a $400 billion industry."

- Larry Doud, CEO, Rochester Drug Cooperative (RDC)

Cardinal Health

"Supplier diversity is a key to success in this rapidly changing healthcare environment. Maintaining an inclusive business environment and a diverse supplier base spurs competition, generates new thinking and fosters collaboration that leads to innovation. We are committed to supplier diversity for Cardinal Health, our customers and for our economy."

- George Barrett, Chairman and CEO

FOUNDER

Robert D. Walter

LEADERSHIP

George S. Barrett – Chairman and CEO

REVENUE AND GROWTH

Headquartered in Dublin, Ohio, Cardinal Health, Inc. (NYSE: CAH) is a $103 billion health care services company that improves the cost-effectiveness of health care. As the business behind health care, Cardinal Health helps pharmacies, hospitals, ambulatory surgery centers, clinical laboratories and physician offices focus on patient care while reducing costs, enhancing efficiency and improving quality.

Revenue for fiscal 2015 was $102.5 billion, a 13 percent increase from the prior-year period due primarily to sales growth from existing and new pharmaceutical distribution customers. Revenue growth was negatively impacted in fiscal 2015 due to the previously disclosed expiration of our pharmaceutical distribution contract with Walgreen Co. ("Walgreens") on August 31, 2013.

PARTNERING WITH THE PHARMACEUTICAL INDUSTRY

Fuse by Cardinal Health:

Fuse by Cardinal Health is an innovation lab focused on improving the future of health and wellness.

We know that by partnering with our customers, together we can create a more enjoyable and effective healthcare experience.

- See more at: http://www.cardinalhealth.com/en/about-us/our-business/fuse-by-cardinal-health.html#sthash.yt6lsObz.dpuf

COMPANY QUOTE

"Ultimately, we want what any consumer of healthcare desires. Get home. Get well. Be well."

CORPORATE SOCIAL RESPONSIBILITY

Studies show it takes an average of 17 years for proven practices to be implemented across all of healthcare.

Since 2008, the Cardinal Health Foundation has invested more than $16 million to improve care, reduce costs and increase efficiency - from small grants to the support of large-scale networks and professional development; we focus on achieving measureable improvement and excellent patient outcomes. •

McKesson

"We lead by having the courage to make difficult decisions and by caring enough to do whatever it takes to help our customers succeed."

- John Hammergren, Chairman, President and CEO

FOUNDER

John McKesson and Charles Olcott founded the company in 1833 in New York City.

LEADERSHIP

John Hammergren – Chairman, President and CEO.

REVENUE AND GROWTH

Today, McKesson is ranked 11th on the FORTUNE 500 with more than $179 billion in annual revenue. The company delivers vital medicines, medical supplies and health care information technology solutions that touch the lives of patients in every health care setting. McKesson is committed to creating a health care system that leads to lower costs, fewer mistakes, higher quality and better health for all.

Over the past decade, we have launched initiatives and solutions aimed at reshaping health care. Among some of these important initiatives:

• Our Health Mart® pharmacy franchise has changed the face of independent pharmacy, enabling independents to thrive in business while providing exemplary care and service to their communities.

• The US Oncology Network, part of McKesson Specialty Health, is advancing cancer care by expanding patient access to high-quality, integrated care among community-based oncology physicians. The network leverages technology, shared best practices, evidence-based guidelines and quality measurements.

• We recently entered into the CommonWell Health Alliance, a collaborative effort among health IT suppliers to reach common standards, seamless interoperability and data liquidity between electronic medical record (EMR) systems — an essential part of connecting health care providers for better clinical outcomes.

KEY FIGURES

Leading positions in health care distribution and technology

• No. 1 in pharmaceutical distribution in U.S. and Canada

• No. 1 in medical-surgical distribution to alternate care sites

• No. 1 in generics pharmaceutical distribution

• No. 1 in hospital automation

• No. 1 in medical-management software and services to payers

• No. 2 in specialty pharmaceutical distribution and services

• 52% of U.S. hospitals use our technology and services

• 20% of physicians use our technology and services

• 1/3 of all pharmaceuticals used each day in North America delivered by McKesson

• 4th largest pharmacy network: 2,900 Health Mart® retail pharmacy franchisees

CORPORATE SOCIAL RESPONSIBILITY

Regional Volunteer Chairs

In McKesson offices around the world, employee volunteers serve as Regional Volunteer Chairs (RVCs). These RVCs have volunteered to serve in a leadership capacity in their area to motivate employee volunteers and organize group volunteer activities. •

Steven Atcheson

Senior Vice President,
Sales & Marketing
KUEHNE + NAGEL INTERNATIONAL AG

Can you provide a brief introduction to Kuehne + Nagel's global operations?

With more than 64,000 employees at more than 1,000 locations in over 100 countries, Kuehne + Nagel is one of the world's leading logistics companies. Our strong market position lies in the sea-freight, airfreight, contract logistics and overland businesses, with a clear focus on providing IT-based logistics solutions. We provide integrated, value-creating solutions to the world's major industries, including aerospace, automotive, consumer, high tech, industrial, oil & gas, and pharmaceutical & health care. This year, we are celebrating our 125th anniversary in business. Kuehne + Nagel is the number one seafreight forwarder in the world and number two in airfreight logistics. We are also the number two global contract logistics provider with a global network of warehousing and distribution facilities. In the European overland transport sector, Kuehne + Nagel is among the three leading forwarders and has a strong transportation presence in North America enhanced from its recent acquisition of ReTrans Inc., a U.S.-based leading provider of multimodal transportation management solutions.

Could you provide an overview of the company's pharmaceutical offering?

We developed a dedicated, end-to-end supply chain solution known as KN PharmaChain to specifically address the needs of the pharmaceutical and health care industry. KN PharmaChain is not a matter of just moving a shipment; it is more about how Kuehne + Nagel can provide a sustainable solution that benefits all the parties involved, from the shippers to the patients. The industry has embraced KN PharmaChain, as we have experienced 15 consecutive quarters of double-digit growth.

From a contract logistics perspective, we operate 107 GxP compliant facilities globally and many offer temperature-controlled environments for cross-docking, consolidation and storage of temperature-controlled shipments. In addition, our Overland KN PharmaChain services offering is industry leading. Throughout Europe, our extensive hub and spoke network offers a full range of trucking services including temperature-controlled Less Than Truckload (LTL) shipping. Temperature-controlled shipments are monitored by the KN PharmaChain CareTeam, operating 24 hours/day and 7 days/week. Our automated system KN Login provides electronic alerts and ensures any disruption in the supply chain will be reported immediately to the CareTeam, allowing them to pro-actively intervene to minimize or resolve any potential supply chain failures.

What challenges do you face in terms of regulation and compliance?

The compliance and regulatory environment is complex and therefore very important to us. All of our KN PharmaChain facilities are audited to the highest standards and are given KN PharmaChain status when they have been audited and documented to exceed GxP standards.

We have a comprehensive risk management system to mitigate risks during the complete door-to-door logistics process. To ensure superior standards and performance, all carrier partners are subject to a strict carrier assessment audit and all KN PharmaChain lanes are risk assessed to identify and mitigate potential supply chain disruptions. Kuehne + Nagel also has lane-specific standard operating procedures to ensure that all shipments receive a consistently high level of care and attention, meet specific trade lane requirements, intervention methodology and escalation procedures.

Is serialization a positive development?

Serialization adds a level of complexity into the supply chain. The impact of serialization from a service provider perspective will be companies working in a closer partnership with their transportation providers. The relationships will be more long-term and strategic.

How can companies such as Kuehne + Nagel innovate?

Kuehne + Nagel has been serving clients' logistics needs and growing in the industry for more than 125 years. We invest extensively in our people and our network, and take it upon ourselves to expand and improve our product offerings, including taking them to the next level by being as innovative as possible. Our launch of KN PharmaChain in September 2012 was an innovation. We are extensively aligned with our customers and work in partnership to develop solutions that address their ever-changing needs. Most recently, recognizing the increasing trend towards the use of e-commerce solutions, Kuehne + Nagel launched a new integrated web application for quotations, booking and tracking services. With our solution, KN FreightNet, customers can obtain quotes for export and import shipments online within seconds, as well as being able to place their orders directly. Quotations are based on a few shipment details. Bookings can be made or the offer, which is valid for 14 days, can be saved.

How will Kuehne + Nagel develop?

We expect to increase our penetration of the pharmaceutical and healthcare market. We have enjoyed incredible growth over the last five years. Our customers are an extension of our organization and by providing them a competitive advantage, we expect our growth to continue. We see ourselves continuing to grow with our large customers through more in-depth partnering and in our smaller customer segment, such as biotechnology and medical devices. •

Richard Beeny

Co-Founder and CEO
LIFESCIENCE LOGISTICS

Can you provide a brief background explaining why you founded LifeScience Logistics in 2006 and how the company has evolved since then?

We founded the company in order to focus on mid-market pharmaceutical, biologics and medical device companies, in particular foreign companies looking for a turnkey solution to enter the U.S. market. We only service the healthcare industry. While there are several big competitors in the space, we observed that there was a gap in terms of service for companies of this size. There are many mid-sized and small companies that require more handholding and flexibility than the large 'big box' 3PLs were providing. We have experienced a tremendous growth rate during the last 10 years and, although we started with a site of around 40,000 square feet, we currently have four sites totaling 1.35 million square feet in the United States. The market is clearly telling us that we are doing the right things.

Could you give us an overview of your four U.S. facilities and the services you offer?

We specialize in full 'order to cash' distribution, which includes everything from taking orders at our call center to invoicing and managing the receivables and charge backs on the back end. We are an attractive option for foreign companies trying to enter the American market because we are a one-stop shop for many of the services they need. We are headquartered in Dallas, Texas. Due to its advantages from a tax and geographic reach perspective, we do the bulk our distribution activity out of Indianapolis, Indiana.

How have you developed relationships with clients both in the domestic sphere and abroad?

Although we are a young company, we have a tremendous amount of infrastructure. We have been able to take advantage of technology and run a lean organization. From a client perspective, we can provide a high level of support, as we make decisions quickly, which enables us to foster close working relationships with our clients. The bulk of our business is in support of U.S. manufacturers shipping products to domestic wholesalers and retail chains and international customers, who want to gain access to the domestic market in North America.

How will serialization affect the industry?

In the short-term, the requirement of the 3PL in terms of pedigree is to communicate information from the manufacturer to the distributor and wholesaler. We are meeting the present requirements and are prepared for the upcoming changes. We monitor the progress of the FDA closely, as well as the various state boards of pharmacy, on issues of pedigree and serialization.

Where can we expect to see LifeScience Logistics in the next three to five years?

We have been doubling the size of our commercial operations for the last few years. We will continue to grow at a high rate and ensure that we are reinvesting dollars ahead of our clients' growth needs. We will stick to our knitting and focus our energies on providing the very best service at the lowest possible cost. •

Larry Doud

CEO
ROCHESTER DRUG COOPERATIVE, INC. (RDC)

Could you give us an overview of RDC and how it has evolved to become the sixth largest wholesaler in the United States?

When RDC began in 1905, there were hundreds of wholesale druggists who distributed products to each other. Even then, they were unable to buy well enough as individual pharmacies, so they banded together to get better prices. In 1948, RDC became a cooperative, conducting business only with those member pharmacies and paying them dividends. In 1983, we decided to sell outside of just member pharmacies in order to bring the company new business following an embezzlement situation, but the company was unable to grow.

I was hired in 1987 and at that point I had 23 years of experience in the industry. I wanted RDC to become a boutique wholesaler, only servicing the independent pharmacy, rather than the chains, hospitals, and government institutions that we had taken on. We had the company evaluated and began to sell stock to newly interested pharmacies and build our customer base outside of the Rochester area, in areas such as Buffalo and Syracuse. We have been able to expand because we offer such great personal service to everybody that, if a company is not a customer, it wants to be. RDC now has around 280 shareholder pharmacies, which own around 520 stores.

How does RDC go the extra mile for independent pharmacies?

We have a $20 million fund that our pharmacies can use to buy each other out, which allows them to remain independent. Previously, a buyout by a chain was the only available exit strategy. We also have around $10 million with our customers to enable them to remodel their stores, add technological capabilities, and stabilize their financials if necessary. Furthermore, we can assist pharmacies with the issue of returns. Many factors affect an independent's profits—collection failure, incorrect items, and out-of-date items are some examples. We accept these products back and issue credits the same day so that the pharmacy is not out of pocket; usually, they would have to pay for the product before being issued credit.

With the wholesale market dominated by three major players, what are some of the challenges for independent pharmacies operating in the space?

Reimbursements are an issue, as they are dictated by insurance companies, most of whom pay back too slowly for our customers to be able to survive. Some insurance companies require pharmacies to belong to preferred networks; there are no preferred networks, however, for independents. McKesson and AmerisourceBergen both own their own preferred networks and require customers to sign prime vendor agreements with them.

We also help independent pharmacies get fair reimbursement by setting up contracts with manufacturers directly and by supplying insurance companies with price increase information on a daily basis. Sometimes it can take six weeks for them to adjust their prices, which is too long for independents operating on tight margins. And every time the retailers are squeezed harder for profits, they come after the wholesalers to lower their acquisition prices. In our case, we pay our member pharmacies a dividend, which is extremely important to the consumer. This year, we made a profit of $31 million and paid $30.75 million back to our members. Our margins are very slim: although we generated more than $2 billion in revenue last year, a profit of $31 million dollars is actually quite low. We operate very inexpensively; we have about 145 employees, and our costs are about 1.1% of sales.

Could you talk about the further expansion of your business and your new facility in New Jersey?

When Kinray, which was previously the largest independent wholesaler in the country, was sold to Cardinal Health, we were able to grow our business significantly. Our business grew from around $650 million in revenue to $2 billion in around five years, and I can see us doubling that in the next three years now that we have the New Jersey facility in place. Expansion out of Rochester was necessary, both to manage the increased business in the area, but also to give us additional warehousing space. We have 55,000 square feet at our facility in Rochester, while our New Jersey warehouse gives us a further 100,000 square feet.

Where can we expect to see RDC in the next three years?

My dream is that by 2018, we will have added another $2.5 billion in revenue to the company. Then I am going to retire in 2019. I have a great succession group, headed by a colleague who has been with us for 24 years. •

Scott Cubbler

President, Life Sciences & Healthcare, Americas
EXEL

Could you provide us with a brief overview of Exel's role within DHL and the Life Sciences and Healthcare segment specifically?

Exel is part of the Supply Chain division of Deutsche Post DHL, the world's leading logistics group. In North America, we are the leading contract logistics provider, with about 30,000 associates in the U.S. and Canada, where we deliver supply chain solutions to market leaders in a wide range of industries including Automotive, Chemical, Consumer, Energy, Industrial, Life Sciences & Healthcare and Retail and Technology. In Life Sciences & Healthcare, we provide supply chain services to pharmaceutical companies, medical device manufacturers, healthcare facilities, generics companies, over-the-counter product developers and other regulated and licensed life sciences product organizations. This comprises the full range of services, such as secondary packaging, warehousing, distribution, inventory management and transportation.

How important is the Life Sciences segment within Exel?

Last year, DHL announced its "Strategy 2020," a corporate-wide initiative designed to drive the future of logistics through focusing on core business, connecting to achieve excellence and growing our markets. This strategy highlighted Life Sciences & Healthcare as one of the most promising verticals as it is the fastest growing. For that reason, we are investing heavily in this industry both on an international scale and in North America. We operate a number of different facilities in the United States. Some are dedicated to a specific customer and can span more than one million square feet. We also provide multi-client sites, in which multiple clients operate out of the same space. Our biggest campuses are in Pennsylvania, Memphis and Indianapolis, but we have 28 sites across the United States, from Boston to California.

In terms of your client base, where do you operate and what end of the spectrum do you typically serve?

We focus mainly on the larger manufacturers in the consumer space, such as Johnson & Johnson and Pfizer, but we also have a variety of smaller, shared-use clients. Most of our shipments are for domestic consumption; however, we do have a number of sites that act as distribution centers for exports.

What is the impact of the recent high volume of M&A activity we have been seeing in the industry?

Any type of merger or acquisition poses a tremendous supply chain challenge for the companies involved, as the acquiring company ends up with redundant supply chains. Acquisitions are helpful in reducing a corporation's costs by providing synergies, with one of the methods being supply chain enhancement. Whenever there is a merger, companies such as Exel are tasked with incorporating the smaller company's products into the supply chain of the acquiring company. We get involved with developing the new supply chain and finding solutions.

What are some of the challenges Exel faces in servicing the health care industry, compared to other verticals?

We have a dedicated team for the Life Sciences & Healthcare field because of the challenges that come with the supply chain for this industry. Those challenges include obtaining licenses by state while simultaneously commencing operations. Some states require eight to nine months of lead-time before providing the license, so it is vital to have a third-party logistics provider (3PL) that understands the complexities of licensing. Another challenge is operating in a manner compliant with rules and regulations through an effective quality management system. Legislation is constantly changing by state, and we need to know how to execute manufacturing flawlessly so as not to jeopardize our clients' shipments. The best way to overcome these hurdles is by establishing a true partnership based on trust.

How is the Affordable Care Act impacting the industry in terms of outcomes-based reimbursement?

There are many dynamics in the pharmaceutical industry that are forcing companies to adapt very quickly. The pressures of the Affordable Care Act on cost reduction are felt in all areas of the business, especially with the medical device manufacturers and hospitals. Hospitals are scrutinizing their supply chains more closely than ever before because they need to aggressively cut costs in order to keep up with declining reimbursements. In addition, the move towards biopharmaceutical products and personalized medicine is changing the landscape of the industry. Companies are creating biological drugs that are more unique to individuals, as opposed to developing blockbuster drugs for the masses to boost sales. To maintain the integrity of these products, manufacturers are looking to 3PLs to provide cold chain solutions that can help them remain compliant and keep their costs down.

Where will Exel be in five years?

We hope to continue to grow significantly alongside our customers as hospitals require additional assistance with their supply chains due to the implementation of the Affordable Care Act and manufacturers strive to be increasingly cost efficient. We will continue to seek solutions that address our customers' compliance needs, reduce costs in the Life Sciences space and add flexibility to the supply chain. •

Robyn Frisch, Charles Dods & Melissa Authelet

RF: CEO
CD: Executive VP
MA: Manager of Regulatory & Compliance
ROCHEM INTERNATIONAL INC.

YC

JL

Can you provide an overview of how Rochem has evolved in the sectors it services in the United States?

RF: Rochem was founded in 1994 and started as a distributor of chemical pharmaceutical ingredients. We are focused on exporting products of Chinese origin to our global customers and service the pharmaceutical, nutritional and food industries. On the pharmaceutical side, we develop and supply active ingredients for human, veterinarian and over the counter drug use. On the nutritional side, we supply vitamin, nutraceutical, and sweetener ingredients for use in the healthcare sector. We are primarily focused on distribution in regulated markets and have built a strong infrastructure through our own warehouse and logistics group. Our in-house regulatory and compliance group ensures that the products we distribute meet the required quality standards whether for pharmaceutical or nutritional use. What makes us unique is our unparalleled knowledge of the Chinese manufacturing base linked with the rigorous regulatory and compliance process we instill in our selected Chinese partners. This allows customers in regulated markets to access the benefits of using these long term low cost manufacturers with confidence.

What led you to provide ingredients for these specific product groups?

RF: I worked in China for six years under the largest state-run chemical pharmaceutical company, which gave me an intensive background to comprehend the needs of this industry. After Rochem entered the pharmaceutical space, we assessed that there was a market need for nutritional and food products, which led us to serve those particular product groups as well.

What are some of the main challenges that Rochem has faced as a bridge between the United States and China?

CD: The key challenge in our business involves finding the right suppliers in China to service specific customer needs. When Rochem was formed in the 1990s, China was developing as a manufacturing base for the pharmaceutical and nutritional industries. It has since evolved to become a crucial source for such ingredients, and this has come with increased challenges in bringing Chinese products to conform to ever more stringent regulatory standards. We offer a value-added service to the products we bring. We not only select the top suppliers from China but also have a compliance procedure that compels us to audit our manufacturers at least once a year. This applies not only to pharmaceuticals but also to food companies. Offering customers confidence in supply chain and most importantly in the compliance and regulatory field whether for newly developed or more mature products, are our prime functions, and our specialty.

What are some challenges that you face in adhering to the FDA regulations?

MA: Part of the added value of the regulatory compliance team is that we audit and inspect facilities before we begin sourcing from them so we are there first hand to see the challenges. With the implementation of GDUFA in the US, we are seeing more frequent re-inspections. It is not only about preparing for an inspection but consistently following cGMPs. There are times when half a manufacturing plant may be for the regulated market and the other half for non-regulated market because cGMP manufacturing is so costly. We have strict standards that we have to adhere to before we begin doing business with any manufacturer because of this. Our customers are aware of these types of situations so our policy entails complete transparency, which means taking our customers to visit the sites where the chemicals are manufactured. We are also present for regulatory inspections such as FDA and EDQM, assisting both the manufacturer and the agency during the inspection. Our function goes far beyond distributing and trading, including product development as well as full regulatory support, to ensure we add value for both the customer and manufacturer in the supply process.

What is Rochem's five-year growth strategy?

CD: We currently work with 40 to 50 different manufacturers, and as we grow we also need to take on more suppliers that can meet the standards of our regulatory compliance team. The reason we are focusing on China is because China has evolved over the last 20 years, and we see a significant improvement and ample opportunity for growth. The Chinese pharmaceutical industry continues to innovate through heavy investment in research and development and we will expand our business over the coming years by bringing some of these innovations in the pharmaceutical, nutritional and food industries to the North American and European markets.

What is your final message?

RF: China is going to be the strongest economy in the world within the next 10 to 20 years, and will eventually become the biggest pharmaceutical market. It is growing as a source of raw materials and pharmaceutical ingredients, and Rochem is well positioned to capitalize on the bridge we have built between China and the rest of the world. We will continue to grow as a reliable provider of pharmaceutical, nutritional and food ingredients from China. •

Into the Future

"We are certainly seeing much more in the way of cooperation between corporations and higher education institutes. Companies like Johnson & Johnson, who conducted more than 100 collaborations last year, are doing more collaborative work than they have ever done before. Not only is this more cost effective and mitigates risk; it also brings together minds that may think in different ways."

- Kim Guadagno,
Lieutenant Governor,
State of New Jersey

Image: Reed-Lane, Inc.

Will the United States Remain the World's Leader for Pharmaceuticals?

By Harriet Bailey

> The United States is looking to Europe, which has been pioneering in adopting biosimilars. It is, however, essential in driving the growth of biosimilars because of its size.
>
> - Angeliki Cooney, Director, Strategic Planning, IMS Health

Despite the increasing importance placed on the pharmaceutical sector by emerging economies that can offer lower production costs, patent protection issues and the overall strength of a country's economy all contribute to the success or failure of an individual industry. Countries such as India and China were once highly favored by a number of sectors for their skilled workforces that could be hired at a fraction of the price of their Western counterparts, not least by the pharmaceutical industry. Some companies, such as Piramal, have been able to capitalize on this cost mindset and implement it into their normal operations. "[Piramal has a] global presence combined with local execution," said Ramesh Subramanian, vice president of strategic marketing for Piramal Healthcare. "For example, the majority of steps in the manufacture of a product can be carried out in India in order to obtain cost benefits, but proximity can be achieved by conducting the final stages closer to a client, in say Europe or North America."

However, with the FDA bringing its inspections of foreign facilities on a par with domestic sites, combined with rising costs, "the labor arbitrage is not as important as it used to be, as China and India are becoming increasingly more expensive," claimed Angeliki Cooney, director of strategic planning at IMS Health.

This is heralding a return of drug manufacturing to North America, in particular to Mexico. The country enjoys both a close proximity to the United States, but also bilateral trade relationships and agreements. Furthermore, the economies of the BRIC countries, headed by China, are experiencing a worrying downturn in growth. Factors such as excess capacity, insufficient levels of demand and over-reliance on debt suggest an economy in decline. With the People's Republic already tainted by insinuations of an impending recession, wary U.S.-based manufacturers are likely to retract their business from the country and look closer to home.

Lead by Example

According to industry association PhRMA, "continued U.S. leadership in biopharmaceutical research and development is foundational to American economic growth and competitiveness," emphasizing just how important robust patent protection is. "Generally speaking, the United States grants a limited monopoly for a claimed invention to a patent owner, which encourages innovation. In the pharmaceutical space specifically, additional regulatory market exclusivity associated with novel small molecules and biologics also promotes innovation," explained Vishal Gupta, partner at international law firm Steptoe & Johnson.

As India struggles to shift its negative image in terms of innovation, it appears that its poor patent protection record could be to blame. Citing issues such as application backlogs and a lack of resources, the United States is portrayed as an example for other countries to follow.

In a study commissioned by PhRMA, it was found that the United States, the UK, Switzerland and Ireland are at the top of the leader board in terms of attractiveness for biopharmaceutical investment. Intellectual property protection is a deciding factor, with neighboring Canada near the bottom of the list due to its policies. "The study reaffirms that the policy environment matters," said John Castellani, president and CEO of PhRMA. "It shows that economies could be much better equipped to attract a portion of the billions of dollars invested globally by the biopharmaceutical industry each year if policy conditions improve and become more supportive."

Size Matters

With the United States having proven its position in the global pharmaceutical landscape compared to the emerging economies, the question remains as to what sets it apart from its European competitors. As regards to the shift towards large molecules, the United States is somewhat late to the party. Biosimilars have been in wide use in Europe since 2006, with biosimilar legislation approved by the European Commission (EC) in 2004. The FDA, on the other hand, did not produce its own policy on the topic until 2012—using the EC's document as a guide—and only approved its first biosimilar for public consumption in 2015, almost a decade later. However, the United States does have an ace up its sleeve: "The United States is looking to Europe, which has been pioneering in adopting biosimilars. It is, however, essential in driving the growth of biosimilars because of its size," remarked IMS's Cooney.

Sheer volume accounts for how the United States stole the crown from Europe, in spite of its head start. And although threatened by India and China, their current woes will not be tempting large amounts of investment away from the United States in the near future.

As with its success in other industries, it would be unrealistic for the United States to lead in all aspects, but it can certainly be expected to catch up quickly, and then leave others trailing in its wake. •

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Costs have risen in China and India, as both economies have boomed and the price of labor has increased. [The United States] is an obvious choice for manufacturing as it is large, robust and resilient. The advantage of the United States is the availability of infrastructure and high productivity levels, which is influencing the decisions of many companies to return to the United States for manufacturing. The overall attractiveness of the country as a manufacturing location is increasing, but it does not yet compare to lower-cost economies based on that factor alone.

- Anil Andrade, Business Head, North America, Capsules Division, ACG North America LLC

We have seen growth chiefly in North America and Latin America. We have streamlined our process of importing directly to the customer while widening our product range to boost our business development in the pharma and cosmetic markets. The market itself has developed on the cosmetic side. We have received an improved response from Latin America and Canada, and expect to see continued growth in these markets. Within the United States, our backbone is the pharmaceutical market.

- Derek Whitaker, Regulatory Compliance Officer, Novacyl

As a rule of thumb, more niche, highly specialized, or executive positions will have fewer candidates. Interestingly, “fewer candidates” is a phrase I hear frequently, however this is a perception rather than a reality. There are candidates out there in all markets and in reality the “number” of prospects is usually high. The challenge companies face when looking to attract candidates is knowing where to look for the best talent.

- Ben Sparks, Director, Client Services & Development, Real Life Sciences

The growth of personalized medicine and digitalized healthcare will influence the emergence of many trends. We are likely to see the development of a greater number of drugs with associated biomarkers, especially in oncology, immunology, CNS, pediatrics/ prenatal, cardiovascular, and infectious diseases. This trend will likely be driven not only by pharmaceutical companies but also by hospitals and healthcare systems. In addition, we are likely to see an increased use of advanced diagnostics for screening, risk assessment, and therapeutic selection.

- Dr. Feng Li, President, Alliance Pharmaceuticals

Due to the growth of biologics, we are introducing new solutions to meet the needs of customers developing these types of large molecule drugs. One of the big challenges is in downstream processing and purification of large molecules. Single-use technologies can provide major productivity and flexibility benefits to these customers. While there has been a great deal of innovation in single-use technologies for upstream, downstream has lagged behind, in particular with chromatography and purification solutions. To address this bottleneck, Grace recently introduced Provance® columns that are designed specifically for single-use purification of monoclonal antibodies.

- Adam Grose, Vice President and General Manager,
W.R. Grace and Company

Clients are increasingly looking externally for manufacturers with a focus on sourcing new active pharmaceutical ingredients primarily within the United States. This push has been fueled in part by the Section 199 tax deduction for domestic manufacturing, which allows for significant tax savings on the profits generated from active ingredients that are manufactured in the United States. While companies continue to source globally, we are seeing that they are procuring APIs in the United States and Europe, and raw materials and intermediates in Asia.

- Garrett Dilley, Senior Director, Business Development, Sales and Marketing,
Johnson Matthey Pharma Services

The biggest factor is differentiation in the OTC market. All of our customers are finding ways to make their products look different and provide a unique value. They are seeking different packaging so that their products stand out on the shelves. We have a strong engineering team for package design that undergoes the entire product lifecycle from concept and design to production.

- Mike Ruggieri, CEO,
Comar LLC

We are already seeing generics companies attempting to get a head start on development so they can be first to file and, at QS Pharma, we have received numerous enquiries for generic compounds. We want to ensure we utilize our expertise in the best possible manner and therefore we review such requests very carefully. Where we see the need is genuine and we can contribute to the success of the product, we will participate. There are many generics companies who do not have manufacturing facilities suitable for highly potent compounds and it appears that, with the increase in enquiries we have seen, they are trying to find facilities like ours.

- Nutan Gangrade, President,
QS Pharma

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Additional copies of this book can be ordered through Elif Ozturk (elif@gbreports.com).

THANK YOU

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