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ATTENDING EVENTS AND CONFERENCES are one way to keep up to date on the current issues in your functional area. There is no limit to the types of conferences you can choose—smaller one-day workshops to large, multi-track conferences with exhibit floors, to even more targeted user group events for companies that use that technology vendor’s products. From January to June, the conference season is in high gear and for Pharmaceutical Executive, that season means getting out and learning alongside attendees to uncover new trends, revisit the tried and true for fresh takes, and network for new ideas to present to our readers.

This year has seen the team in San Francisco for the J.P. Morgan Healthcare Conference; Vienna for the DIA European meeting; Barcelona and Philadelphia for double-doses of eyeforpharma; Philadelphia for CBI’s Annual Life Sciences Accounting & Reporting Congress; and DC for CBI’s 16th Annual PCC/2019/Pharmaceutical Compliance Congress. Next up is BIO in Philadelphia followed by a first-half season close with DIA in San Diego.

That’s not to say you still can’t find some conference gems hidden in the summer calendar, much like the seashells you save from your vacation. But vacations and summer schedules do make the conference schedule a little harder to pack and fold for the busy professional.

Our visits to the conference early season produced some great content. First up, a series of videos from both eyeforpharma events, which should soon start popping up on our YouTube channel: https://www.youtube.com/channel/UClf-PvmvAWUr5vBHeo-a6A. European Editor Julian Upton interviewed executives from Propeller Health, ALK Pharmaceuticals, LEO Pharma, S3 Connected Health, and Caribou Bio in Barcelona. In Philadelphia, Associate Editor Christen Harm and I split interviewing duties, with Christen tackling marketing and sales trends with executives from GSK, while I interviewed leaders from Alkermes, Shire/Takeda, and AbbVie on marketing to integrated delivery networks (IDNs); patient advocacy; and analytics.

Also, a shout-out to the advertisers that helped support these editorial interviews by sponsoring their own interviews on-site at eyeforpharma. They include: Aptus Health, Cognizant, Philips Medisize, VMS Biomarketing, and BioPharm Communications.

In addition, both CBI events yielded front page coverage for the Executive Roundtables we present. The first, in this issue, covers the financial executives view of the financial and accounting professional in pharma for the future (see page 12). And in July, we will feature the Chief Compliance Officer, as they forge ahead with the recently introduced principles-based approach to policies. All executives share their insights from their companies, both large and small, which provide well-needed insight for our broad readership.

Along with the flagship conferences for our industry—BIO and DIA—Pharmaceutical Executive will gather, on a smaller scale, our very own Editorial Advisory Board experts to discuss trends, gain more cross-functional insight, and leverage their views of our brand—again on the road to bringing readers the best that our multimedia content provides.

And more interviews

Don’t like watching videos or maybe streaming in the office is not allowed? No problem. The Pharm Exec Podcast features interviews with fresh voices from biotech, pharma, and digital health companies. Found on SoundCloud, https://soundcloud.com/pharmexecmagazine, our 30th episode is with Anna Sundgren, renal disease strategy leader, global medicines development at AstraZeneca, who discusses her personal experience with her mother’s death from renal disease, and the state of renal disease drug development. In another recent episode, Otsuka executives discuss their approach to digital medicine, and you can also listen to interviews with our own editors on stories they have recently reported on.

Last month, I wrote about the many interviews we conduct that have appeared in print. I’m only promoting our offerings a bit. We speak to so many interesting and influential people, I hate to think that even one of their insights gets lost in everyone’s day-to-day hustle and bustle, as well as the many places they go for information. We keep you up-to-date on all of it via e-newsletters and social media. Check out and join our Twitter (https://twitter.com/PharmExec) and Instagram (https://www.instagram.com/pharmexecutive), as well as LinkedIn (https://www.linkedin.com/groups/1823137/) to make sure you aren’t missing anything from Pharmaceutical Executive. Thanks for reading, watching, and listening.
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The CFO Evolution
Julian Upton, European and Online Editor

In separate interviews, Pharm Exec speaks with a pair of C-suite business managers—one representing the perspective of big, established pharma and the other small, aggressive biotech—about the changing dynamics for today’s life sciences CFO.

R&D Investment ‘Impact’
By Joseph Constance

Private equity investment and venture capital have long spurred R&D efforts for hard-to-treat and rare conditions. Joining the mix of late has been impact investing and the opportunities for the socially-conscious to influence drug development—and reap potential benefits in health outcomes and financial return.

The Future of Pharma’s Finance Function
Executive Roundtable: Dollars and Digital
Lisa Henderson, Editor-in-Chief

Pharm Exec convenes a panel of biopharma finance leaders to discuss the pace of digital technology adoption in accounting and reporting—and the growing role and responsibility of finance teams in harnessing data and analytics to deliver deeper and more strategic insights across the organization.

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Washington Report
FDA After Gottlieb: Thorny Issues, Political Challenges
Jill Wechsler, Washington Correspondent

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Europe Battles Over Reference Drug Pricing
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Country Report: Korea
Thinking Big
Focus Reports, Sponsored Supplement

Following its economic rise in recent decades, driven by innovation across a variety of powerhouse industries, South Korea is setting its sights on the next generation of technological growth—including new strategies to globalize and industrialize the nation’s pharmaceutical and healthcare sector.
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**Top Stories Online**

- **The Future of Cell and Gene Therapy**
  Blog post
  Lital Aravot
  bit.ly/2VA4kaT

- **2018 Emerging Pharma Leaders**
  October issue online
  Pharm Exec staff
  bit.ly/2PB6mba

- **Reinventing Pharma’s Talent Search**
  April issue online
  Lisa Walkush, Jacinta Calverley
  bit.ly/2OW8abU

- **Q&A: Managing Talent from the Ground Up**
  April issue online
  Julian Upton
  bit.ly/2XNvbkC

- **Profile: HBA’s 2019 Woman of the Year**
  April issue online
  Christen Harm
  bit.ly/2IkrisZ

**Pharm Exec Podcasts**

- **Episode 30: Renal Disease R&D**
  Pharm Exec editors interview Anna Sundgren, renal disease strategy leader, global medicines development at AstraZeneca, about the current cardiovascular, renal, and metabolic (CVRM) disease landscape, challenges in renal drug development, and new therapeutics for chronic kidney disease.
  bit.ly/2UUAkKf

- **Episode 29: Prevention and Interception**
  Julian Upton, Pharm Exec’s European Editor, caught up with Ben Wiegand, head of J&J’s World Without Disease Accelerator unit, at eyeforpharma Barcelona, where they discussed the role of patients, providers, and payers in boosting preventative care, as well as J&J’s disease prevention and interception activities.
  bit.ly/2UQG1xG

- **Episode 28: Digital Medicine**
  Pharm Exec editors speak with Otsuka’s Bill Carson and Kabir Nath about digital medicine, mental health therapies, and creating a smooth and collaborative relationship between R&D and commercial.
  bit.ly/2YuimU

- **Episode 27: Tough Targets**
  Pharm Exec talks with Seth Lederman, co-founder, CEO, and chairman of Tonix Pharmaceuticals, about how to navigate creating and developing drugs for conditions such as PTSD and AIDS.
  bit.ly/2UEU6f

- **Episode 26: Patient Advocacy**
  We sit down with Bob Ward, chairman and CEO of rare disease-focused company Eloxx Pharmaceuticals, who shares insights on working with patient advocacy groups, how to attract talent, and how to put together a quality team.
  bit.ly/2C8PfKR

- **Episode 25: China’s Pharma Growth**
  Pharm Exec editors speak with David Shao, CEO of Yisheng Biopharma, about the factors driving China’s exploding pharma and biotech industries.
  bit.ly/2E9O2IG

**Pharm Exec Webcasts**

- **On-Demand**
  **Patient Adherence: A Hard Pill to Swallow?**
  bit.ly/2uK6uck

- **Using Real-World Evidence for US Regulatory Decision-Making**
  bit.ly/2WspzeB

- **Navigating the Clinical Development Regulatory Environment in Japan**
  bit.ly/2HJoCOQ

- **Patient Assistance Centers of Excellence: The Next Generation of Brand Support**
  bit.ly/2RmUQqO

**Twitter Talk**

- **AI-Pharma companies are 100x as complex as FinTech companies. Methodologies used to assess them should be 100x as rigorous.**
  Margaretta Colangelo, @RealMargaretta
  “Specialized Metrics to Properly Assess AI-Pharma Startups”
  bit.ly/2hYoUTS

- **A patient-first mentality can create a beneficial environment for the patient and the #biopharma company, but what does #patientcentricity look like?**
  Six Degrees Medical, @SDMCana
  “What Does Patient Centricity Look Like?”
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FDA After Gottlieb: Thorny Issues, Political Challenges

New leadership faces a host of complex initiatives to promote innovation and protect public health

During the nearly two years that Scott Gottlieb headed FDA, the agency achieved record approval rates for new drugs and generics and advanced important innovations in clinical research and benefit/risk assessment to enhance R&D and competition in the biopharmaceutical industry. The agency issued multiple new rules and guidance documents and utilized important new authorities to expand staff expertise and agency capabilities. And Gottlieb successfully navigated the political pitfalls of Washington to gain increased funding for the agency and support for more aggressive action to promote public health.

Two critical public health issues drew visible FDA attention. The agency championed steps to curb excessive opioid prescribing while also encouraging the development of safer and more effective painkillers. This includes recent support for a comparative standard to limit approval of new opioid therapies to only those offering clear additional benefits.

At the same time, data showing sharp increases in teen use of nicotine products prompted a high-profile campaign to curb “vaping” and flavored cigarette use by the young, while maintaining access for adults looking to stop smoking. Proposed curbs on tobacco use, however, has drawn strong opposition from industry and threatens to block tighter FDA limits on e-cigarette sales.

In fact, it will be a challenge for any newcomer, even an experienced scientist and administrator as former National Cancer Institute director Ned Sharpless, to maintain the broad support needed to devise and implement the vast range of important FDA initiatives, as seen in the diverse portfolio of activities described in the agency’s 2020 budget request to Congress. FDA is involved in advancing medical countermeasures, ensuring a safe national blood supply, overseeing drug compounding, and preventing and detecting contamination of the nation’s food supply, in addition to promoting medical product safety and innovation.

Anna Abram, FDA deputy commissioner for policy, legislation, and international affairs, further described the range of programs demanding continued agency expertise and resources at an April meeting sponsored by the Alliance for a Stronger FDA. (Similarly, Sharpless outlined his priorities and goals in an introductory speech to FDA staff, see facing page). In addition to reducing opioid addiction and tobacco use, FDA is responsible for ensuring cosmetic safety and improving nutrition, including limiting exposure to untested and potentially dangerous dietary supplements. A personal interest of Abram is to devise appropriate policies for overseeing cutting-edge innovations in plant and animal biotechnology, raising delicate issues such as genome editing in animals and tissue-based veterinary products. Abram also is involved in FDA efforts to protect Americans from global disease threats and biochemical attacks, which require close collaboration with the Department of Defense and other US and international partners to build and sustain needed medical countermeasures.

Competition and costs

As the Trump administration and Congressional leaders press for action to reduce drug prices, a difficult task for the FDA commissioner is to explain how expanded drug importing could open the door to unsafe products from abroad, as illustrated by the surge in lethal forms of fentanyl from overseas. Gottlieb was particularly adept at articulating how FDA can help lower prescription drug costs through more efficient approval of generics and biosimilars that enhance competition. This involved repeated criticism of innovator actions designed to block access to supplies needed to test new generics for equivalence.

FDA leaders are continuing such initiatives, as seen in efforts to approve more generic drugs more quickly, particularly those in categories that lack competition. While generics makers applaud those efforts, they’re unhappy about a recent FDA proposal to curb extensions to the 180-day exclusivity offered the first-approved generic in a class. Abram noted in her Alliance speech that in March 2020, FDA will be able to inject competition into the insulin market.

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through added authority to approve biosimilar and interchangeable insulin products, which should enhance patient access to more affordable diabetes treatment.

During his tenure at FDA, Gottlieb sought to increase direct contact between the commissioner and center directors so that agency leadership could better understand staff challenges and priorities. That reform was formally implemented as part of an agency reorganization plan finalized just before Gottlieb's departure. In addition, FDA centers adopted a range of internal organizational changes during the past two years, particularly for the approval and oversight of medical devices and for cell and gene therapies regulated by the Center for Biologics Evaluation and Research (CBER). The Center for Drug Evaluation and Research (CDER) continues to revise its Office of New Drugs, establishing additional new drug review offices along with a new Office of Therapeutic Biologics and Biosimilars.

Still to come are broader changes and adjustments in oversight of over-the-counter medicines and updates in FDA regulation of diagnostics.

Gottlieb gained expanded FDA resources and authority by building strong relations with legislators, stakeholders, and industry. He generated enthusiasm for many agency proposals through a barrage of official announcements and Twitter and social media commentary. Many observers expected him to come to FDA as a deregulator, canceling rules and requirements, he acknowledged as he left the agency last month. Instead he pointed to evidence that he expanded FDA authority, particularly in critical public health areas. He left FDA in good hands, but facing further upheavals in federal healthcare policy and partisan infighting likely to stymie regulatory innovation and squeeze future agency resources.

As the Trump administration and Congressional leaders press for action to reduce drug prices, a difficult task for the FDA commissioner is to explain how expanded drug importing could open the door to unsafe products from abroad.

Sharpless outlines priorities

FDA's new commissioner Ned Sharpless, in an introductory address, praised the talent and diversity of the agency's staff, expressed amazement over FDA's "huge portfolio" of programs and responsibilities, and emphasized that he is not planning "any radical changes" from what FDA has been trying to accomplish. This means continued efforts to support the development of new treatments and cures and to increase competition to rein in prescription drug costs by approving more generic drugs and biosimilars. Sharpless will seek further solutions to the opioid crisis and work to reduce cigarette use in adults and kids. And he pledged support for stronger communication around the safety and effectiveness of vaccines, citing his horror as a physician to see outbreaks of measles "making a tragic comeback because of vaccine avoidance."

His work in cancer research and treatment, Sharpless noted, has made him a "champion" of the use of real-world evidence to speed clinical trials and to support regulatory decision-making around novel products. And he cited the importance of FDA's field force in using enforcement actions to protect public health by halting drug counterfeiting, adulteration, untruthful advertising, and marketing dangerous products to children. A main initiative is to modernize and reform FDA oversight of the burgeoning dietary supplement industry, which recently has drawn agency warnings for marketing supplements with unlawful ingredients.

Sharpless began his FDA tenure just as the agency launched a newly updated FDA.gov website that he predicted would provide "more accessible, user-friendly" information important to consumers. Although he serves as FDA's acting commissioner, Sharpless emphasized that he did not see his role as temporary or part-time, and that he planned to "proceed at full speed ahead."
New Flare-Up in External Reference Pricing Debate

European industry fights over every inch on comparative drug pricing initiative

The battles over drug pricing are getting ever more acute, with threats of renewed pressures on the pharmaceutical industry from the World Health Organization’s upcoming annual meeting in late May adding to the anxieties raised by the prospect of a pincer movement by President Trump and the Democratic majority in the House in the United States.

Europe has its own specific concerns. The Italian health minister is pushing a tough amendment to the WHO’s already hostile draft resolution on pricing and transparency, and numerous European civil society groups orchestrated powerful denunciations of industry practice at a WHO meeting on the subject in Johannesburg last month.

The agenda of the April meeting of European health ministers in Bucharest was virtually hijacked by discussions of the cost of innovative medicines, and as the statement after the meeting confirmed, “EU health ministers were invited to exchange views on actions taken at national level, with the possibility that some of these actions could be implemented at EU level.”

Meanwhile, the longstanding controversy over external reference pricing (ERP) was rekindled by an unprecedented meeting in Brussels in mid-April that brought together national pricing authorities with drug companies, patients, payers, physicians, and civil society. A decade ago, national authorities conceived a scheme known as Euripid to boost their negotiating powers with pharmaceutical manufacturers by exchanging pricing information among themselves, so they could make clearer comparisons between what is being paid in each of the countries of Europe.

ERP guidance
The latest stage in this controversial process is the creation of a platform involving all the relevant players, to oversee the implementation of guidelines on how to make ERP work, and to explore how to get even closer to tackle high drug prices. Industry has reluctantly agreed to be involved—mainly on the principle that it is better to be at the table than on the table.

The guidelines (see https://bit.ly/2W6p9Lh), drawn up over the last three years, and published only last July, offer advice to national authorities on how to make the best use of ERP so as to get the best value for money from their drug budgets.

ERP has been widely used in Europe for decades as a way of controlling prices—essentially by fixing a national price only after seeing how much other countries are paying for the product and aiming for something a bit cheaper. It has also been widely criticized by pharmaceutical companies as risking an arbitrary downward spiral of prices. And it has fallen into some disrepute for hindering drug access—since organizations tend to delay launch of products in countries with the lowest prices, to counteract the downward pressure in price-comparison baskets.

It has also been seen as obsolescent, since the official list prices of therapeutics in its database are no longer the reliable reference they were years ago before pricing practice became complicated by discounts and managed entry agreements—in which the real price remains confidential.

Industry input
The industry has not been successful in preventing the creation of the Euripid guidelines to ERP, but it has been moderately successful in nuancing them, by energetic input during the drafting phase. Just how successful can be seen from comparing some of that input with the final version now published.

Industry underlined the need for greater realism in the Euripid text—and for a recognition that ERP has shortcomings. It urged acceptance that ERP should be used only as a supportive policy for price setting and not as the sole or main pricing criterion, warning that ERP has “unintended consequences…that the guidance document prefers to simply ignore.”

Similarly, it criticized Euripid for offering “no recognition in
the role of price differentiation across countries in supporting patient access,” invoking concepts of “Europe-wide solidarity” for differentiated pricing to help solve health inequalities, through wealthier nations agreeing to pay “a price reflecting the value of innovative medicines and resist the short-term static gains to be had from arbitrage or referencing low price markets.”

And the guidance defended the confidentiality agreements on discounted prices as providing medicines for patient groups who would not otherwise be able to afford them, but at the same time ensuring that “medicines specifically provided at lower prices for these markets are not be diverted to more affluent populations for which they were not intended.”

Industry also urged formal limitations to ERP so that it “should not apply to in-patient or hospital medicines,” nor to off-patent medicines, and insisted that “the core principle of ERP should only be applied to official listed public prices.”

**The value argument**

At the heart of the industry argument was a resumé of the industry’s case for its value-based pricing policy—a policy invariably depicted by critics as merely “charging whatever the market will bear.” The industry position is more complicated, and emphasizes that the price of a medicine is based on the value it brings to patients, healthcare systems, and society, while providing appropriate incentives for companies to invest in new therapy development.

It states: “Pharmaceutical companies take a look at a number of factors when pricing drugs including the level of innovation, the availability of other medicines to treat the same condition, the level of added benefit over existing treatments, and induced changes to the care pathway like reductions in hospitalization or the need for surgery or other procedures. All these factors are taken into account by companies in setting a price, that is then subject to rigorous value-assessments and negotiations with healthcare systems.”

**Transparency ‘net’**

These industry efforts have attenuated the likely impact of the guidelines by winning some modifications to the final text. Now the industry faces an even more challenging task: pushing back against Euripid’s ambitions to shift its focus from list prices to net prices. Industry—and many national authorities who benefit from confidential discounts—are resistant to the untrammeled transparency that more radical players are seeking.

If they are forced to disclose net prices, drug manufacturers say they will stop granting discounts and provide their products only at list prices. And pricing authorities who currently obtain discounts in return for confidentiality agreements say they will not be able to afford the acquisition of expensive treatments if they are available only at list prices.

This will be the principal battleground of the next year in Europe. Transparency advocates will be reinforced by the emergent regional cooperations on drug pricing—such as the Benelux Initiative or the Valletta Group—as they mature into functioning alliances determined to weaken the negotiating power of drug companies. And the slogans of transparency are likely to win new converts in the more radical European Parliament expected to emerge from the elections this month.

**Clamor just building**

Some health activists are already claiming it’s “game over” for industry secrecy on pricing. But international strains on pricing in the US and at WHO are likely to make Europe’s drug industry determined more than ever to preserve Europe’s relatively benign pricing system.

Some health activists are already claiming it’s “game over” for the European pharma industry’s secrecy on pricing. But international strains on pricing in the US and at WHO are likely to make Europe’s drug industry determined more than ever to preserve Europe’s relatively benign pricing system.

That case for the value-based approach to pricing is going to be heard a lot more in the coming months.
At the most recent CBI Annual Life Sciences Accounting & Reporting Congress, held in March in Philadelphia, a select group of senior-level biotechnology and pharmaceutical financial executives gathered to discuss “The Evolution of Finance in the Digital Revolution.” From the technology adoption in their own organizations, to how technology impacts the future financial department employee, to examining the ROI of an increasingly digital world, the following is an edited transcript of the discussion.

PE: Where would you place your company on the digital technology adoption curve?

CHRIS PRENTISS, Adamas Pharmaceuticals: Adamas Pharmaceuticals is a relatively small biotech. We launched our first drug a little over a year ago, which we distribute through a specialty pharmacy. Therefore, we have access to a lot of data—and it’s very rich information. But what do we do with it and how do we transform that data into insights? From a company perspective, it is a huge focus for us. A finance department is used to dealing with a lot of data—and it’s very rich information. But what do we do with it and how do we transform that data into insights? From a company perspective, it is a huge focus for us. A finance department is used to dealing with a lot of data—but now we are really being brought into the discussion of how we translate it into insights. I think this is a great opportunity for the finance department to be more involved in the business. And the need is there to learn the business at
a much deeper level because we are the team the CEO and the executive team are asking, “So what does this data really mean?”

Even though we are a small biotech and may not have the tools and resources that other organizations have, our CEO/founder has a computer science PhD, so he recognizes the value of data and analytics. But if you compare us to other pharmaceutical companies, I imagine we are pretty low on the maturity curve.

**STEPHEN RIVERA, Johnson & Johnson:** Looking at accounting and reporting technology adoption, I would say we may be at the beginning. J&J’s history is all based on a very decentralized portfolio of companies, but since I’ve been here, the consolidation of accounting and reporting and bringing it all together under one system has been a behemoth undertaking.

We have three huge businesses—pharmaceutical, device, and consumer—which all have different needs, but they all have to talk to each other and work together. How do you come up with the highest and best digital solution to support them as well as give the insights you need to run your company, the broad brush of a healthcare company like Johnson & Johnson? I think we’re still in the beginning parts of coming up with a solution that would give us what we’re looking for down the road.

**JEFF MILLER, most recently Recro Pharma:** I got into pharma 12 years ago at a relatively small company. And what I’ve experienced is, it seems like our digital needs and journey kind of paralleled the growth of the company. Our journey started about eight years ago with an upgrade to a big-time ERP (enterprise resource planning) system. I feel like that’s usually the springboard for a company’s digital growth. After that, we addressed our top priorities, which were trying to manage the financial close process better, managing big data, and managing gross-to-net for a growing drug portfolio. Like Stephen and Chris, we’re dealing with a lot of transactional data from multiple source systems. And you have users in the Finance and Sales departments who don’t realize that they’re using variations of the same data in their different presentations to management. This can often create confusion.

Our gross-to-net and price-change management processes were automated with a third-party solution provider because, at the time, we were an all-generics company dealing with customer pricing and discounting terms that were changing daily with high volume.

The company implemented Cognos as its central data repository for all internal and external data sources in order to create “one-version-of-the-truth” reporting across all functional areas of the company.

All that digital growth expired over a period of about five years, which left us in a good spot in terms of accomplishing our goals. But I have to say, you can never completely remove yourself from Excel. Even though we’ve automated the complex gross-to-net calculations, we still need Excel. In many cases, data is extracted from an automated solution so it can be further manipulated in Excel.

**DOMINIC PISCITELLI, AnaptysBio:** I’m very supportive of the adoption and implementation of digital technology to the appropriate level and at the appropriate time. AnaptysBio is a clinical stage development company focused on inflammation; we have approximately 80 to 90 employees, and we have been a public company for a little over two years. We don’t have any complex collaborations and we don’t have any commercial products. For the year ended 2018, we were required to be SOX 404(b) compliant, which adds a new level of complexity and disclosure. We currently operate with a basic ERP system and we still do certain activities manually.

When you’re an R&D company, you’re burning cash and you need to be thoughtful and spend where there’s a higher ROI, where investors want to spend their money, which is R&D.

But now as our pipeline has advanced to Phase II and we are...
well-capitalized, it is something we’re starting to spend more time assessing and evaluating and developing a three-year IT plan. I believe now is the time to start evaluating and making initial investments in more advanced technology. In my opinion, this is the typical life cycle for investing in the technology for earlier stage biotechs. You’re just not many years away from where we are today.

**PE:** in regard to employees and current practices and technologies, where are the current skill sets and where is the future of your workforce?

**PRENTISS:** From a small pharma perspective, the skill set of the finance department cer-

“‘The CPA exam is changing the way they’re thinking about training CPAs in the future. Candidates today are coming in with a hybrid of both technical accounting skills and digital knowledge.’” — STEPHEN RIVERA, JOHNSON & JOHNSON
go in to implement a system, an Oracle or an SAP, with those significant implementation and maintenance costs. It just doesn’t make sense at an earlier stage.

**RIVERA:** I agree.

**PISCITELLI:** Some of the advances I’ve heard here at the conference with larger organizations, such as using robotics or bots to help them with their balance sheet analytics and income statement analytics, are great. But it’s not practical for a company like us today.

I think it’s just a natural progression. I’ve been in situations in the past, such as having a commercial product or a partnership with a large pharma, and a collaboration and cost-sharing relationship where you need real-time accurate information transmitted back and forth between the company and your partners on sales and expenses. In those cases, I can see where some sort of blockchain technology can makes sense. But that’s certainly has to evolve and change. It’s a lot more than, “do you know how to use Excel, or do you have any ERP experience?” The data is so much more immense that you need to have some experience with additional analytic tools. For example, using Alteryx to be able to crunch data in a way that the finance department hasn’t had to worry about in the past.

But, again, how do you get value out of that data? You can’t just run to IT or commercial ops every day to do that. That skill set is becoming more and more a requirement of what you’re doing. Our auditors are even learning how to use these tools. You’re looking for a different type of person than maybe somebody who’s just turning the crank and handing a report to the business; business is looking for a lot more from finance departments these days.

**MILLER:** I’ve seen a shift in the last five years as the Finance department grew. We were always looking for people with the basic accounting skills, accounting degrees, and hopefully CPA licenses. But we now have to put a lot more weight in the profile for candidates on their data manipulation skills and data integrity.

I feel if they walk in the door without strong data skills, you are at a disadvantage. Once we started hiring employees with these data skills, it allowed us to be more strategic and create business analyst roles that service several areas within the finance organization. An analyst could be the designated super-user, say in Cognos, and can then fulfill the data reporting needs of the whole team.

**RIVERA:** The CPA exam is actually changing the way they’re thinking about training CPAs in the future. Candidates today are coming in with SAP (system applications and products) knowledge, with basic data understanding and technical accounting as well—a kind of a hybrid of both technical skills and digital knowledge.

I also think a younger generation is coming in and they want to work for an employer that’s up to speed on what’s new in digital. They get very frustrated when they come into a company and all they have is Excel. We have a lot of recruiting here at Johnson & Johnson and we want to keep everything fresh and current. But we hear that the younger generation is used to having the latest technology and that’s what they’re expecting employers to have.

**MILLER:** With the younger generation, they don’t want to be put in a box. They want to keep moving, and they want to continually
expand their skill sets. If they see an interest from Finance leadership that we care about their professional goals, that’s huge for job retention.

For instance, if you have someone who is getting their master’s degree in data integrity and you put them in charge of your central data repository and empower them to fulfill the needs of the whole Finance department, all of a sudden you should have an invested employee for the next few years.

PISCITELLI: I agree with all of the points discussed. The other side of the coin is investing in your current staff. I think you have the dynamics of attracting the right people, but you also have the dynamics of motivating your current staff to start thinking outside the box and encouraging them to evaluate and adopt new technology and look for opportunities to streamline processes and for automation. It’s human nature to be hesitant or resistant to change and encouraging employees to adopt new technologies or processes can sometimes be challenging.

PE: Does the decision to implement technology come from the top down?

MILLER: In certain situations, I think the executive team has to have an appetite for investing to mitigate financial risk. For example, at the time we invested in gross-to-net automation, we knew that we were going to be beta. There was no generic company in industry that had a full-suite gross-to-net automation solution. The benefit was it probably kept our costs down because it was just as much of an investment for the vendor that we used. And we knew there would be pain. But when you are dealing with a large amount of dollars in accounting true-ups, that’s what kick-started the process of investing in technology.

But sometimes it comes down to the individual. I pitched something to our Finance leadership eight years ago, and there was no appetite for it at that time. Two years later, my audience was a new CFO and VP of Finance, who basically said: “I don’t see why you haven’t done this already.” So it’s all about appetite and willingness to be at the forefront of technological growth.

PRENTISS: And comfort. Are you set in your ways? Are you ready to move with the times? That’s a big part of it. And you also want to think about technology from a retention perspective. How do you continue to transition your employees work to value-level work and get through the close as quickly as possible and get on to the projects and the fun stuff?

RIVERA: I was in a presentation with one of the accounting firms. By having one system, they can go in and have the robot do all the auditing, and they can test journal entries. They could say, “Who did all the testing of the journal entries?” And they can find the one journal entry that one person does once a month. I was an auditor once. I said, wow. Even if I sampled a hundred, how would you find the one person that does it once a month? It is just an example of how a robot could find things that we as humans could never pore through that big data to come up with.

PISCITELLI: I think bots can be implemented to replace the basic routine transactions. They can be used for certain transactions like testing of issues such as separation of duties (e.g., posting and approving journal entries), and I would expect auditing firms will adopt some of these processes. In the future, mid-sized biotechs may consider implementing as well.

“I don’t think [use of bots] ever replaces the human element of analyzing things and providing that value-add.”

— DOMINIC PISCITELLI, ANAPTYSBIO
Focused on Challenges

Anders Götzsche on the winding road to his ultimate path: steering the finance arm during Lundbeck’s transformation to a multi-product company

**GÖTZSCHE:** After working at PwC as a chartered accountant, I went into sales in the software business (SAS), which was not a very traditional move, but I had been involved in some marketing activities in my previous role. At that time, a lot of people asked me, “Why don’t you stay at PwC and become a partner?”—but I wanted to develop my capabilities and skills. I was responsible at SAS for a division selling financial systems to large customers; I made cold calls and produced marketing plans. It was very valuable to learn how to manage those large customers. I then moved to Falck as director of investor relations and finance, and I was part of the activity that led to the merger of Falck with Group 4/Securicor. I went onto become a CFO of a media group (Det Berlingske Officin, now Berlingske Media) with 4,000 employees and 60 different publications, including dailies and broadsheets. What I liked about that business was the daily rush of making decisions, mixing strategy with tactical operations. But I missed the international perspective. So when, after three years, I was offered the chance to join Lundbeck, one of the biggest companies in Denmark, and address some of the complexities and global challenges that pharma brings, it was too good an opportunity to say no to, and I have never regretted making that move.

**PE:** What were your priorities upon joining Lundbeck as CFO? Did you envision staying as long as you have?

**GÖTZSCHE:** I had spent eight years at PwC, but I was always looking for new challenges and experiences. What I found out at Lundbeck was not just that the pharma business is so interesting, but that there was always a stream of new and exciting challenges. When I arrived, we had to make a transition, as Lundbeck then was more or less a one-product company. So we made decisions to forge new partnerships, to stop the share buy-back, and to acquire a new platform in the US. We needed to streamline the business and enhance the value offering. It was a multifaceted program of restructuring and preparing the organization for change management. Since then, we have raised the profits to record-high levels, and have more than doubled our earnings and our share price. We have a very strong foundation now to

**PE:** Can you tell us about your background and your journey to Lundbeck?
pursue a new strategy of expansion and investment and further grow our revenue and earnings.

The CFO role here has been much more than a traditional finance role. If it had been simply that, then I think it may have become boring for me after 12 years. But, today, I have responsibility for all corporate support functions—legal, tax, investor relations, HR, communications, sourcing, business service—a very broad-based area of responsibility.

The pharma CFO role is a special one. You need to enjoy the scientific aspect and have an interest in the mechanism of action of the medications. You need to be close to the R&D organization. You need to be able to explain why your drug is different from others on the market and why it will make a huge difference to patients. And you get the chance to meet or communicate with those patients, whose lives your drugs may have changed and improved in significant and meaningful ways.

A strong CFO needs to protect the business from all the risks, but also understand that there is risk in this business and if we don’t take risks we don’t deliver new drugs for the patients. If we don’t do that, we’re not in business for the long run. From my perspective, the CFO role is about enabling the business to deliver fantastic results, deliver new medicines, and keep innovation alive in the organization. It’s also about going out of your comfort zone. Do you enjoy having conversations with R&D or do you want to stay on the finance track? In some cases, a purely finance-oriented CFO may be exactly right for the organization. That is not what I wanted to be, but I have full respect that different profiles fit into different organizations.

I can look back after more than 10 years and say we have a stronger, leaner organization. We have a broader product portfolio, we have more than doubled our profit, and increased our revenue by more than 70%. That is a great achievement. I have not done it alone of course; it has been about teamwork. An organization does not rely on one person; it needs leaders, but it also needs good people. That was something I continually emphasized during my run as interim CEO.

**PE:** How did you find making that transition to interim CEO?

**GÖTZSCHE:** It was quite tough at the beginning, having two jobs and stepping up to the plate to take that CEO responsibility, but you start the role on a high note because you are given so much confidence from the board. What I found I was good at was keeping the management team and the organization united and focused. When you look at the results of my tenure as CEO, I think they speak for themselves. It was great fun doing it and seeing the organization running really well. But I also really like my position as CFO, and so when we found our new CEO (Deborah Dunsire, who joined in September 2018), it was great to start forging a good relationship with her and get back to my main role. (Götzsche agreed with the board at the outset that his tenure as CEO would be temporary. “It is challenges, not necessarily my position, that excite me,” he told the Danish pharma news outlet, MedWatch.)
“It’s about going out of your comfort zone. Do you enjoy having conversations with R&D or do you want to stay on the finance track?”

**PE:** We hear a lot of gloomy stories about the nature of big pharma going forward, about traditional models being broken. Do you remain optimistic about the next few years?

**GÖTZSCHE:** I believe there are a lot of opportunities. All companies, all industries, need to align to the new realities. It’s the same with pharma. There is still a need to improve patients’ quality of life. We know there are lots of areas where people are still suffering.

We need to look into those areas, for example, where we can develop medicines that use biomarkers, or where there are new solutions presented by digitalization, big data, and AI. I believe there is plenty of room for the biopharma industry to keep improving the lives of patients.

At Lundbeck, together with the rest of the management team, I want to continue to execute the new strategy, to build a strong pipeline, and to make new deals. The mid- to long-term ambition is to grow the organization, both from a revenue and an earnings point of view, and build an even stronger Lundbeck.

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**Banking on Success**

Shane Kovacs on melding biotech operations and investment banking skills at stem cell startup BlueRock Therapeutics

**PE:** What is your background in finance and life sciences?

**KOVACS:** Growing up I was a math and science guy; my undergraduate degrees are in chemical engineering, life sciences, and economics. I worked in biotech in a lab position throughout my engineering summers. Then I migrated into finance and went to business school to formalize my business education beyond economics. Coming out of business school, I went into investment banking, where I focused on biotech and life sciences companies within healthcare. It was really a marriage of my two passions, finance and science.

I spent just shy of 10 years with Credit Suisse First Boston (now Credit Suisse), working on mergers and acquisitions and debt and equity raises for companies in the life sciences sector. I was raising a $65 million private financing for a private biotech in the fall of 2012 called PTC Therapeutics, which we were taking public in early 2013 when this whole wave of biotech IPOs really began. They were looking for a CFO and I was so excited about the prospects for the business that I decided I’d join them, so I flipped over from banker to CFO in May 2013. I spent about four years helping to run and grow PTC. It was an incredible experience and I learned about all facets of operating a biotech beyond just finance, including R&D, regulatory, and commercialization.

In early 2017 I was drawn back to Wall Street, but about
six months in I realized that I wanted something more fulfilling for my career. I started talking to different VCs and was introduced to BlueRock, which was then less than two years old. I saw it was an exciting platform with disruptive potential for new medicines, using a cell as a therapeutic instead of a small molecule or an antibody. The company was well funded and there was a strong mandate from the board supporting an aggressive growth strategy. I felt that this was an opportunity where I could have a significant impact as a part of that management team.

**PE:** What have been your finance priorities since joining Blue Rock Therapeutics?

**KOVACS:** The company was founded in late 2016 with just two shareholders, Bayer AG and Versant Ventures, and while we are very well capitalized, our strong growth trajectory means that we’re very much a consumer of capital. So, we ultimately have a need to “feed the beast” and think longer term about how we bring in more investors and more capital. It’s also been necessary to put a whole organizational structure into place at the company based on our longer-term goals. That has really leveraged my operating experience at PTC and understanding the nuts and bolts of a biotech company and what you need to do to successfully grow the operations. So we set up that structure, all of the different R&D departments supported by all of the different general and administrative teams, some of which had no employees at that time.

A major part of my job over the last nine months has involved the formation of the financial and capital strategy, positioning the company, building a website, getting in front of investors and getting their feedback. Also, I’ve had to build out the finance operation, because everything had been outsourced to third-party consultants from a finance perspective. I needed to hire the team and begin to implement all of the systems, processes, and procedures that will enable us ultimately to operate as a public company.

**PE:** How do you balance the CFO and CBO roles?

**KOVACS:** I think it very much depends on the background of your CEO, the rest of the executive team, and what backgrounds and skillsets they bring to the table. As a banker, I met many different executive teams of successful private and public companies. Sometimes you might have a CEO who’s well known in the community with a proven track record and has experience with capital formation and investor relations (IR). Perhaps that CEO doesn’t need a CFO who brings those skills to the table. Maybe that company is more suited to a traditional accounting/controller type, who can step into a CFO role and learn all the other external IR, strategy, and business development skills. I think you need an executive team that satisfies many different attributes or skillsets. And depending on the makeup of your entire team, you may or may not need a CFO that satisfies those needs.

When you move from banking to operating, you learn so much from your colleagues. It could be from your board members or your peers on the executive team from various other disciplines, such as your chief medical officer or head of manufacturing. I built a team of CPAs, for example, but I’m not a CPA by training. I understand accounting and am a
chartered financial analyst, but I never did audit work. You learn along the way. It’s about understanding how to build teams and how to work with teams. That sort of personal dynamic is very different from banking. But I’ve been able to apply approaches from banking. If you look at the Bulge Bracket investment banks, for example, they build teams by growing their own. They go out and find best-of-breed, if you will, from the top schools and they hire the top students—aggressive, smart individuals—and bring them in. I learned that from my banking days, and I brought that approach to building the teams at PTC and BlueRock.

As chief business officer, I’m also building out the business development team. We are very active in both search and evaluation of new innovative technologies to continue to enable our CELL+GENE™ platform that we can either in-license or acquire. Additionally, we have been receiving interest from other parties interested in partnering with us and our platform. Going forward, that will also be an important effort at BlueRock.

For me personally, my ultimate career path is to pursue a CEO role in biotech. There are a number of precedents in our industry and it’s something I aspire to longer term. As a result, getting more involved and understanding other aspects of the operations of our business is a critical skill set I continue to build upon.

**PE:** What’s your vision for your company going forward?

**KOVACS:** The real goal for BlueRock is to bring game-changing therapeutics to patients and realizing the disruptive potential of a cell as a therapeutic. Our lead program is in Parkinson’s disease, and we hope to enter the clinic this year.

The trial is a surgical procedure using our authentic dopaminergic neurons as a therapy; we aim to reinervate the human brain and reverse degenerative disease, potentially restoring motor function to the millions of patients suffering from Parkinson’s and potentially have a dramatically impact in a disease where there’s been very little innovation for the last 50 years.

We’ll know if we can achieve that in Parkinson’s in the next two years. To be a part of a company that could have a huge impact and leave a legacy like that is super exciting.
Impact Investing and R&D

Exploring the rise of environmental, social, and governance investing and venture philanthropy in accelerating drug development

By Joseph Constance

There is no shortage of diseases and conditions for which a cure is desperately needed. Just think of cancer, Alzheimer’s, and autoimmune disease. Despite the strides made in recent years in developing treatments, the road to a cure for many of these conditions can be a meandering path beset with pitfalls, frustration, and failure to hit pay dirt.

Hence, there is a never-ending need for funding drug research and development. Traditional private equity investment and venture capital have been around for years. In many instances, these types of investment have had a positive impact on therapeutic research and commercialization efforts. But now, enter impact investing; environmental, social, and governance (ESG) investing; and venture philanthropy—a version of impact investing. Along with them come opportunities for the socially-conscious to influence drug development, and reap benefits—positive health outcomes as well as a financial return.

Creating social impact
Impact investing and venture philanthropy entail generating beneficial social or environmental outcomes by investing in certain industries or social efforts, in addition to obtaining financial gain for oneself. These investments give socially-conscious investors a results-based approach to investing. They differ from traditional philanthropy in which donors do not expect to receive financial reward. These investors challenge researchers and company executives to contribute to the public good as they create profit.

Impact investing and venture philanthropy tend to be in the realm of high net-worth people. And then for those who do not have millions in assets, there’s ESG investing, in which people determine how to invest based on their individual value system, explains Les Funtleyder, healthcare portfolio manager at E Squared Capital Management, and a Pharm Exec Editorial Advisory Board (EAB) member.

Investing in pharmaceutical R&D would appear to be a good fit for these types of investors, who could be an individual, a group of individuals, or venture-like funds. “By definition, if you create a drug that cures people, you’re having a positive impact on society,” says Funtleyder, who also teaches healthcare investing at Columbia University.

Funtleyder says that while ESG is more common in Europe, it is expected to grow in the US, especially among millennials who want to invest in organizations that align with their values. In healthcare, ESG investors would avoid companies that are involved in mercenary pricing of their drugs, for instance. ESG investors would look for organizations with diverse employment or diversity on the boards of directors. In developing countries, ESG investors might seek out organizations trying to improve access to healthcare through the establishment of local clinics.

Ideally, investing in a company would be based on an investor’s values, such as developing drugs for unmet needs. Targets might include acute, orphan, or pediatric diseases. “Generic companies have a role to play. They could be the guys in the white hat, lowering costs,” notes Funtleyder.

Opportunities in pharma
Surprisingly, the Global Impact Investing Network’s eighth Annual Impact Investor Survey found that only about 5% of impact investment efforts were directed to the healthcare sector in 2018. The survey’s findings represent more than 200 respondents’ perspectives on how the impact investing industry overall continues to evolve.

The lower percentage of healthcare investments may be attributable to the belief that healthcare investing may be more risky, explains Funtleyder. But there have been many missed opportunities in the pharma area, and much of that may be due to a lack of communications on the part of the industry, he asserts. “Many people don’t necessarily understand how difficult it is to make (and receive regulatory approval for) a drug,” says Funtleyder.
He believes the pharmaceutical industry has not articulated its “value proposition” well in a way that would resonate with socially-oriented investors; people generally do not understand the process involved in producing a drug, says Funtleyder. “You don’t often see biologists or medicinal chemists in ads talk about how cool the science is, and what they have to do to get a drug to market,” he notes.

Still hope for dementia

One investment fund focused on a specific disease is the Dementia Discovery Fund (DDF). The fund facilitates the development of effective drugs for the treatment of dementia. It aims to invest in early-stage research and is an example of a venture capital fund amenable to impact investing and venture philanthropy.

The DDF is the first venture capital fund to specialize in dementia. By focusing the 2013 G8 meeting on the global challenges of dementia, David Cameron, former UK prime minister, advocated for the disease as well as for more investment. Then, the newly formed World Dementia Council worked with the UK’s Department of Health and Social Care to address dementia specifically. This led to a partnership with the charity Alzheimer’s Research UK and some major pharma companies. Together, they formed the initial investment in the DDF. SV Health Managers LLP currently manages the fund.

The DDF has four key areas of scientific focus:
- Inflammation, immunology, and microglial function
- Membrane contact site biology
- Mitochondrial dynamics
- Synaptic physiology and structure

Angus Grant, CEO of the DDF, explains that the fund invests in early-stage projects that might not receive company or government support because of the large amount of innovation and investment needed. “We hope to fill an area where there’s a void by funding early research, and de-risking it for biopharma to step in,” says Grant.

“We have to be very disciplined in our investing strategy,” he adds. “Our focus is on patient benefit. Patients benefit when a physician can prescribe a drug. We have to find the right early-science projects—invest in them, nurture them, and get them into late-stage clinical trials where biopharma can take over.”

The DDF looks for projects in which scientists have identified specific pathways in patients that could be modulated for clinical benefit. But the fund also looks downstream to see if the research will lead to a drug that could be prescribed. To find projects with potential, DDF relies on a team of scientists with expertise in neurodegeneration, inflammation, and other fields. They scour the scientific literature, attend scientific conferences, and meet with academic and company researchers, advocacy groups, and others. DDF started off with about $130 million in investments and eventually reached about $325 million with help from a diverse group of investors, including patient advocacy groups, industry, AARP, Bill Gates, commercial insurance companies, and the NFL Players Association. “Usually these investment funds are set up to have a return on investment in a 10-year window,” says Grant. “But because dementia is a very difficult area to tackle, it is a 15-year fund.”

The DDF’s investment efforts have begun to pay dividends. In February, Alector, a clinical stage biopharmaceutical company in which the DDF invested, commenced trading as a public company, following the successful completion of its $176 million IPO. The company is pioneering immuno-neurology, a therapeutic approach for treating neurodegeneration. Alector was the DDF’s first investment in 2015, and the completion of its IPO is a significant milestone that supports DDF’s mission. Alector is one of 16 companies and translational projects in which the DDF has invested.

Investing in repurposing

Meanwhile, Cures Within Reach is utilizing venture philanthropy and impact investing to generate financing for medical repurposing research, and to drive less expensive treatments to patients more
quickly. In repurposing, the organization aims to advance new indications of already-approved drugs, devices, and nutraceuticals.

The organization looks for technologies that are affordable to test, and which can be quickly incorporated into clinical settings. Newly validated repurposed therapies usually have completed Phase II clinical trials. They often are generic drugs.

Cures Within Reach requests repurposing proposals from academic, government, and company-based scientists. Selected proposals are reviewed and independently vetted. The organization connects potential funders to projects, and facilitates the entire research process, from the agreement with academic or company scientists, to reporting the progress of the research through completion, publication, and dissemination of results.

Funders can be wealthy individuals with interest in a disease that a family member may have or had; disease-specific nonprofit organizations interested in repurposing research; or corporations and foundations.

“Cures Within Reach does not ordinarily pursue development to the FDA approval stage because the cost would be prohibitive for the types of investors this work attracts,” says Dr. Bruce Bloom, CEO. “Our endpoint is often a robust human clinical trial, in which the data clearly support use of a therapy in a new indication. The results are published in a peer-reviewed journal. Physicians can review this information and prescribe the drug if they want.”

For example, Bloom points to the several rare pediatric diseases for which Cures Within Reach has validated a repurposed therapy. “These first-in-human, proof-of-concept clinical trials are enough for most physicians to consider prescribing the drug, which are safe,” he explains.

Cures Within Reach has made several investments. “One of our donors is a Chicago-based philanthropy which supported us to invest in an early-stage commercial repurposing company that met our criteria,” says Bloom. “So we established a SAFE (simple agreement for future equity) agreement with them, which gives Cures Within Reach an option to receive equity if a merger or commercialization takes place.”

Social impact bonds
The organization also is working on impact investing arrangements in which the funders could receive financial return, according to Bloom. Toward this end, Cures Within Reach creates social impact bonds, using investment dollars, but not philanthropic dollars, for repurposing research. “The donor does not receive a tax deduction for giving us the money. We give the money to commercial or academic entities to conduct the repurposing research, much like venture capital,” says Bloom. “When a repurposed therapy impacts patients, we get a return, and so would our funders.”

Payer impact
Social impact bonds also would be based on up-front agreements with government payers. The payers would agree to give impact investors financial returns that emanate from system-wide healthcare cost savings generated by the repurposed successes, says Bloom. Savings could include improved patient outcomes or fewer patient hospitalizations, which translate into savings for the overall healthcare system.

To specifically address unmet needs in cancer, Cures Within Reach recently established Cures Within Reach for Cancer. The cancer organization is following a similar blueprint as its parent entity in repurposing research. At first, it is targeting about 100 non-cancer generic therapies that have shown efficacy for cancer in early-stage clinical studies.

“We’re taking drugs that have already been FDA-approved for indications other than cancer and which are off-patent, and repurposing them for cancer. These drugs are readily available, inexpensive, and safe,” says Laura Kleiman, founder and executive director of Cures Within Reach for Cancer.

To gather data on potential investment opportunities, the organization is constructing the Oncology Repurposing Engine™, software for systematic evidence synthesis and analysis. The platform uses artificial intelligence to aggregate preclinical and clinical data on repurposed therapies and prioritizes repurposing opportunities.

The issue is that there has been little funding for Phase III cancer clinical trials for these generic
drugs, which require a significant investment, according to Kleiman. Thus, her organization is also harnessing social impact bonds as a way to leverage healthcare savings to gain ROI for impact investors. “The greatest challenge has been getting insurance companies and government payers on board to provide success payments,” notes Kleiman.

Combining data and investment models
The Kraft Precision Medicine Accelerator at Harvard Business School is catalyzing research in precision medicine. The Accelerator was established in 2016 with a $20 million endowment from the Robert and Myra Kraft Family Foundation. The organization brings together business and healthcare leaders to drive progress in both investment and data models. It is headed by Richard Hamermesh, senior fellow at Harvard Business School and Kathy Giusti, senior fellow and founder of the Multiple Myeloma Research Foundation.

“Our purpose is to play a catalytic role in identifying challenges and obstacles and improving results,” says Hamermesh. “We identify the key challenges and the key obstacles that are slowing progress in the field. A lot of progress in research is being made, and a lot of money is being invested, but the cycle could be improved and shortened.”

Impact investing has become an increasingly hot area, Hamermesh believes. “People want to know that in addition to earning a return, their dollars are having a social impact,” he says. “This market is led by a number of banks with clients looking to put a lot of money to work.”

The Accelerator has established teams of professionals that find sources of potential scientific research and funding. Among their tasks, they perform “landscapes” to identify new impact investing models and to find interested banks and investors. Giusti explains, “We look to build on models in venture philanthropy as well as models with banks and venture capital funds in our role as a catalyst. We try to marry impact investing with important areas of scientific innovation.”

Whether it involves data or investment models, the Accelerator stays in close touch with leaders in the precision medicine space, from oncology to Alzheimer’s, to drive cures faster. In one effort to exchange ideas, the Accelerator held a meeting in February to discuss how it could accelerate precision medicine through better investment models, Hamermesh says. The meeting was attended by venture philanthropists, banks, and scientific researchers who pointed out potential opportunities for investment.

Giusti further explains that the Accelerator also focuses on innovative data models. “For us, data can come directly from a patient, an academic center, or a pharma company,” she says. “Data modeling is important because you can’t do precision medicine without data. There is no doubt the data can then advise the investment models. Data and funding together will accelerate cures across diseases.”

Meanwhile, in April, the Multiple Myeloma Research Foundation launched the $50 million Myeloma Investment Fund, a venture philanthropy effort aimed at accelerating new therapies and diagnostics so that multiple myeloma patients have access to the best new targets and technologies. The fund is an independent, self-sustaining vehicle, and is the first and largest fund specifically focused in multiple myeloma. It will invest in seed, early-stage, or series A funding for emerging biotech companies or asset management groups.

In 2016, UBS raised $471 million for its UBS Oncology Impact Fund, an impact investing fund that supports companies developing cancer treatments. In April 2018, the fund, managed by MPM Capital, and the American Association for Cancer Research (AACR), announced the first funding gift to the joint AACR-PM Transformative Cancer Research Grants Program to support research that accelerates breakthroughs against cancer.

The first contribution totaled $1.2 million. The fund is also due to donate a second $1.2 million to UBS’s Optimus Foundation to support emerging market access to cancer care.

Treating and curing disease requires many investment dollars. Venture philanthropists, impact investors, and ESG investors will find many opportunities in the healthcare arena to get a financial return on their investments as well as to have a positive impact in the battle against disease.
The pharma revenue engine is stalling. A full 78% of Americans, according to the Kaiser Health Tracking Poll, say drug companies making too much money is a “major reason” why their healthcare costs have been rising, up from 62% who felt that way in 2014. The political winds have shifted and the risk of backlash is real.

Winning in a post-price-hike world. Price increases contributed a staggering $14 billion of the $23 billion in sales growth for the 45 top-selling medicines from 2014-2017, according to an analysis by research firm Leerink. Take away price hikes and you take away 61% of the growth in US sales for those 45 medicines over that three-year period.

It may be nearing last call for the price hike party and time for pharmaceutical leaders to mine new, more sustainable sources of revenue growth. Medication adherence has emerged as a viable and largely untapped source of revenue and earnings per share (EPS) growth for pharma.

Medication adherence is pharma’s new golden goose. Drug manufacturers lose an estimated $637 billion globally and $250 billion in the US each year from patients not taking their medications as prescribed. Recent analysis from Credit Suisse of the 21 largest pharma companies found that improved medication adherence has the potential to be one of the industry’s most important growth drivers over the next seven years.

According to that analysis, enterprise-level adherence programs could, for example, increase Sanofi’s revenue by up to 12% and EPS by 20% between 2020 and 2026. Adherence could drive revenue up 29% for Novo Nordisk between 2020 and 2026.

So how do we take these growth numbers off the pages of the Credit Suisse analysis and onto the balance sheets of pharma?

Introducing the chief adherence officer. The best way to capitalize on the medication adherence revenue opportunity is to designate a chief adherence officer (CAO) to lead the charge in a post-price-hike, outcomes-based world.

The chief adherence officer would report to the CEO and be connected to the board of directors. The CAO would be empowered with a material budget and P&L responsibilities, and would own enterprise-level adherence initiatives and not just brand-level, tactical projects.

CAOs would connect initiatives to revenue and outcome metrics and lead strategic, corporate-wide patient engagement initiatives to improve adherence. Their mandate would be to deliver scalable revenue growth and improve patient outcomes across brands and portfolios.

In addition, the CAO would have one of the most influential seats at the executive table because of their impact not just on company finances, but on other parts of the business, such as digital transformation.

Chief adherence officers play well with others. Organizational tension between departments tends to manifest itself acutely in the C-suite, yet a chief adherence officer, due to the additive nature of adherence programs, would bring a new dynamic to executive relationships.

Chief medical officers (CMOs) would love partnering with the adherence lead because of the widespread improvement to patient outcomes from increased adherence. Chief financial officers (CFOs) would cherish the ROI of adherence programs because the growth comes at a relatively low cost compared to the billions spent on new drugs or marketing to HCPs to get prescriptions written.

CEOs would be thrilled to kick-off an earnings call by announcing that their company was the first to deliver the “Pharmaceutical Triple Aim” of increased revenue, improved patient outcomes, and lower overall healthcare costs through a robust, enterprise-wide adherence program.

The benefits of an executive-level adherence leader. A C-level adherence executive could wring revenue from across the entire enterprise. They would weave together various brand-level projects into a company-wide program that scales adherence benefits across the firm. Even a small lift in adherence rates scaled across the enterprise has a powerful impact on total revenue and EPS.

If drug companies are allowed to raise prices every year, they will. This fact is not lost on regulators and consumers, nor is it lost on the pharma C-suite. Yet for those leaders that seek the Pharmaceutical Triple Aim, imagine the positive impact even a portion of the $637 billion of revenue lost annually to non-adherence would have, solely by having patients take their medication as prescribed.

Change starts at the top, and for pharma that means creating room at the table for a chief adherence officer.
Easing the Path to Profitability

Steps for startups in tapping non-dilutive financing options

Management teams of early-stage life science and biotech companies must constantly monitor the financial health of their organizations—especially their cash flow. Longer-than-expected product development schedules can substantially lengthen time-to-market and cash runways, which can mean a higher-than-expected cash burn rate. Running out of cash will quickly derail a new venture at any stage of its development, no matter how promising the business plan or how strong the initial proof of concept. Therefore, emerging life sciences companies tend to be in perpetual fundraising mode. Most rely on multiple rounds of equity financing from venture capital (VC) funds with sector expertise in health, biotech, and life sciences. But they often find that a private equity war chest, no matter how large, is only the beginning of their financing journey.

As firms progress toward a rollout of products and strive for initial revenue, they nearly always find it advantageous to evolve to a more robust and mature capital structure. That often means additional financing from later-stage private equity investors or large pharma partners that can support the companies beyond the initial VC equity capacity. And, sometimes equally important, it can mean one or more forms of debt financing as well.

Some of the most successful early-stage companies will establish a balance sheet with a capital structure fed by multiple forms of both debt and equity financing. Their stronger balance sheets can help position them to survive the long march to regulatory and market acceptance as well as positive cash flow. And pursuing the right financing options early in the game can make all the difference when it comes time for a liquidity event that delivers returns to early investors. A company with a strong cash position negotiates from a position of strength when either seeking an acquirer or pursuing an initial public offering.

Most startups progress through a familiar, time-tested funding process. But that slog through approvals to actual commercial revenue can be arduous and expensive. Clinical trials can take months or years to complete, and regulatory approvals can be a time-consuming process shot through with uncertainty. Running out of cash, in spite of strong prospects for success, is an ever-present danger.

Venture equity investors with life sciences sector expertise understand those dynamics. However, even the most patient venture investors need reassurance that the company has a strong enough financial foundation and management with the financial acumen to direct it toward an eventual successful liquidity event. That’s where debt comes into play.

Mix debt with equity

Why debt? First, it does not typically dilute equity (or if it does, only minimally so). As the loan is repaid, the investors and management maintain their percentage of ownership. In the meantime, it provides needed cash to help sustain operations between equity rounds without lowering the price of new shares. Adding some debt to the balance sheet also provides a cushion against the possibility that cash will run out due to the uncertainties inherent in the life sciences product development cycle. It can help extend a company’s cash runway and allow it to reach milestones and higher valuations that otherwise might be just out of reach. And it can expand and extend product pipeline development.

Also, debt can provide needed cash to help bridge the uncertain time required to position for an IPO or negotiate an acquisition. Finally, debt that strengthens an early-stage company’s cash position can help attract more equity financing in later rounds. Those later-stage equity providers tend to be slightly more risk averse than the intrepid venture capitalists who assume the biggest up-front risk in return for huge potential returns. They tend to want to see not only successful progress against clinical milestones, but also a strong financial foundation for future growth. A capital structure with a strong balance sheet and cash cushion reflecting an appropriate mix of debt and equity financing sends a signal to those risk-averse investors that the early-stage firm is well-positioned to transition to its rapid-growth stage.

In short, debt is not a replacement for equity. Rather, it works hand-in-glove with equity to provide optimum balance sheet leverage. When used appropriately and strategically, it helps management to more effectively manage cash
flow and hedge against risk while growing the business.

**Multiple sources of financing**

Many might assume a company must wait until it has substantial assets and multiple quarters of positive cash flow before it qualifies for a bank line of credit or standard business loan. But early-stage life sciences firms without near-term prospects for revenue can also qualify for loans. Debt finance providers with life sciences industry experience know how to identify early-stage companies with strong prospects. They tend to seek out startup companies that are backed by high-profile VC firms, have a decent cash life of at least 12 months, deep development pipelines, and promising early data, if available.

For managers of emerging growth companies in the life sciences sector, several specialized suppliers of non-dilutive financing have emerged to help ease the path to profitability:

- **Venture banks** provide venture debt to companies that are funded by top-tier VC firms and that have a strong IP portfolio. They often strike a deal with upside potential in the form of warrants, and they secure the loan with a senior lien on all assets other than the IP. Typical conditions of bank loans are that the borrower must bring all of their business baking services over to the bank from which they borrowed the funds.

- **Non-bank debt funds, or specialty finance firms**, also provide venture debt, but usually at a higher cost of capital than banks. They’re not able to lend using relatively inexpensive deposits, and they can’t offset a lower cost of capital with other services. However, these lenders also tend to be able to provide larger loans, sometimes with more flexibility in structure and terms.

- **Structured finance** providers cater to life sciences companies that are on the cusp of moving from clinical to commercial stages. They extend large loans sometimes in exchange for a percentage of the company’s future revenues over an extended period of time until the loan is repaid. This type of financing can be more expensive than traditional venture debt financing, but it can also provide much greater flexibility in terms and far larger financing rounds than standard venture debt.

Evaluating each option requires a careful analysis of the current cash runway and longer-term financing needs. The next step is to survey suppliers and line up bids from a small but appropriate group of potential competitive debt investors. Negotiation over terms might include potential warrants, royalties, or other incentives for the lender beyond interest and principal repayments. Fortunately, there are enough sources of financing to create healthy competition among lenders, which helps establish fair market prices. And because such investors pursue long-term relationships that will generate repeat business, they have an incentive to negotiate with borrowers.

**Align stakeholder incentives**

As entrepreneurs, founders, and their teams begin their journey with a new company, it’s important to get all stakeholders on board. The more clearly a company identifies and articulates its specific financing needs, the better the result. Having credible short-, medium-, and long-range plans for capitalization of the company helps get all stakeholders on the same page.

An appropriate mix of both equity and debt financing can help

Debt is not a replacement for equity. Rather, it works hand-in-glove with equity to provide optimum balance sheet leverage.
A Strategic Approach to R&D Portfolio Planning
Weighing the benefits of a deeper quantitative review for pharma

Drug developers rely on regular cycles of R&D portfolio review to decide how to allocate resources across current and potential projects—but in most companies, it is qualitative, highly subjective, and focused on near-term budget constraints. This article describes a way to inject a dose of strategy into the process.

**THE PROBLEM: Activities are mainly budget allocation tools**
Over several decades, many key principles of R&D portfolio planning have been codified by scholars in operations management and put into practice in pharmaceutical and other R&D-focused industries. Drug companies use these processes to “force rank” projects by various elements of cost, risk, and reward; allocate funds and personnel; and track resource utilization.

The problem is that most R&D portfolio planning approaches are primarily short-term budgeting tools, not strategic ones. Budgeting exercises are critical in pharma, but they do little to help companies objectively define their portfolio goals over broader time horizons and track performance against them. This lack of well-articulated, long-term aspirations supported by quantitative metrics creates challenges for executives who want to enact a long-term-focused R&D strategy and explain it to employees, investors, and journalists.

**THE SOLUTION: A parallel process focused on strategic goals**
One solution to this problem is to implement an independent but complementary strategic R&D portfolio review, which can run alongside current budgeting activities. Although the two processes share superficial similarities, the strategic review has three unique features:

» It explicitly defines the weights of various metrics relative to one another, and collapses them into reproducible, quantitative measures of value and feasibility. This provides a more nuanced view of the portfolio than a simple one-dimensional “rack and stack” approach, while also yielding intuitive outputs that can be communicated easily within and outside the company.

» It defines minimal and target thresholds for each component, which are held constant from year to year and let executives and the public track the portfolio against fixed goals.

» It utilizes external advisors as reviewers, much like an NIH review panel, which eliminates internal biases and also reduces the time required from internal staff.

**Applying in practice**
An example of the analytic outputs of this sort of strategic review process is shown in Figure 1 on facing page. This anonymized example is based on work with a not-for-profit organization that currently deploys over $100 million of funding to diverse R&D activities across materials sciences, life sciences, and other areas—but it is easy to imagine a similar output from a pharma company working across multiple therapeutic areas.

This particular organization convened an external advisory board to score each of its R&D programs on over a dozen distinct metrics, such as expected economic value, team capabilities, and existing scientific validation, according to specified criteria. These scores were then mathematically combined and aggregated for “value” and “feasibility,” based on differential weightings of the metrics according to the management team’s determination of their relative strategic significance. The organization’s executives also defined the minimal and “stretch” targets for each distinct metric, which led to placement of thresholds to determine which projects were within the expected performance and aspirational vision.

The result was a familiar “2x2” matrix, easily interpreted within and outside the organization: the upper right quadrant represents high-value, high-feasibility projects, while the lower left quadrant contains underperforming projects. When the organization repeated the process in subsequent years and tracked the portfolio’s evolution over time, it examined more closely the projects in the less desirable quadrants, and adjusted its project funding processes to systematically reduce its investment in underperforming quadrants. It was also able to clearly communicate its strategic goals and progress to its external funders, which helped sustain support for the organization among key stakeholders.

This particular organization also looked more closely at common attributes of projects in less desirable quadrants—which provides a strategic view currently missing in most pharma R&D portfolio reviews. In this case, a
A deeper analysis of low-performing projects revealed that they scored poorly on metrics related to commercialization feasibility, which was weighted as one of the organization’s top strategic priorities. Much of the gap in this domain related to the involvement of academic collaborators, who were less focused on projects that could deliver economic returns.

Over the following year, the organization refocused its prioritization criteria to drive a higher concentration of projects into the high-value, high-feasibility quadrant, and it was able to quantify its progress in the following year’s portfolio analysis.

**Advantages for pharma**

A key element of this process that warrants highlighting is the involvement of an external advisory board. Although many organizations fear the loss of control from involving outsiders in their decision-making process, an external perspective, including subject matter experts with no affiliation with the organization, provides critical benefits for strategic R&D portfolio planning. When pharma companies rely solely on either employees or external parties with longstanding relationships to evaluate research programs, they frequently obtain biased assessments and skewed results. In addition, combining various perspectives on the evaluation board allows an organization to obtain a much broader view of the quality and direction of its portfolio.

Budgeting exercises are critical in pharma, but they do little to help companies objectively define their portfolio goals over broader time horizons and track performance against them.

The strategic portfolio assessment process described here can provide several advantages for pharma companies. First, it operates alongside and complements existing portfolio reviews—which remain critical to allocate budget and track resources—without adding undue administrative burden to R&D staff or senior managers. Second, it provides a quantitative, reproducible method to define the aspirational “ideal” balance of cost, risk, and reward; track performance toward it over time; and motivate the organization and its leaders to be accountable for the portfolio’s objective performance.

Third, it provides strategic context for evaluating the potential impact of pursuing specific new R&D programs, whether sourced internally or through licensing and acquisition.

Fourth, because the process is transparent, reproducible, and reliant on prespecified criteria and external assessors, it enables executives to objectively and dispassionately evaluate the portfolio’s distribution across disparate R&D areas (e.g., oncology vs. immunology).

And finally, it yields a simple, visual summary that clearly conveys the firm’s R&D priorities and performance to employees, directors, and investors.

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**Figure 1.** A value-versus-feasibility view of the R&D portfolio for an illustrative research-focused organization. Scores were calculated based on reviews by members of an external advisory board, and “aspirational” and “expected” performance thresholds were determined by the organization’s senior leadership team and held constant from year to year. Bubble sizes are proportional to R&D investment; colors reflect distinct R&D domains.

Source: Navigant Consulting, Inc.
Doing now what patients need next

We believe it’s urgent to deliver medical solutions right now – even as we develop innovations for the future. We are passionate about transforming patients’ lives. We are courageous in both decision and action. And we believe that good business means a better world.

That is why we come to work each day. We commit ourselves to scientific rigour, unassailable ethics, and access to medical innovations for all. We do this today to build a better tomorrow.

We are proud of who we are, what we do, and how we do it. We are many, working as one across functions, across companies, and across the world.

We are Roche.

In Roche Korea, every employee is working together to bring our innovation to more patients faster than ever before. In 2019 we are proud to be recognised as one of Asia’s best workplaces by the Great Place to Work Institute. www.roche.co.kr
Sometimes dubbed the “Miracle on the Han,” South Korea is indisputably an economic success story. Finding itself one of the world’s poorest countries in 1953 following the devastation of the Korean War, its meteoric development in the decades since has seen GDP per capita surge 31,000-fold, elevating the country to the world’s 11th largest economy.

With a population dwarfed by those of Asian rivals such as China and Japan, Korea’s success has come from innovation and the country now regularly tops the Bloomberg Innovation Index. Today Korea leads in industrial competitiveness for smartphones, semiconductors, and lithium batteries, and has created world-renowned conglomerates, known as Chaebols, such as Samsung, Hyundai, and LG. The products of Korean innovation stretch across a wide variety of industries; even the world’s first ice-breaking carrier for transporting liquefied natural gas (LNG) calls Korea its manufacturing home.

As other nations seek to emulate Korea’s standing within its historical powerhouse industries, the country’s government has already set its sights on the next generation of technologies ripe for Korean dominance. Under the presidency of Moon Jae In, Korea is gearing up to embrace the fourth industrial revolution, fusing the physical, digital and biological worlds. “When innovative growth is discussed, the strategy includes all sectors of the economy, including pharmaceuticals and the health sector,” asserts Yong Ik Kim, president of the National Health Insurance Service (NHIS).

Such sentiments tend to be echoed by the legislators and policymakers, many of whom seem to understand the life science industry’s fundamental importance as a lynchpin to economic resurgency. “We really need to think carefully about how to globalize and industrialize the healthcare sector. For example, which new technologies, and therapies to pursue,” insists Myoung Su Lee, chairman of the Health and Welfare Committee at the National Assembly of the Republic of Korea.
Indeed, life sciences are already a critical point of focus in the utilization of next generation Korean technologies, building upon the nation’s long-established reputation for biotechnology and regenerative medicine. “The world’s first stem cell therapy, Pharmicell’s Hearticellgram-AMI, was approved in Korea in 2011,” proudly recalls Jung Tae Park, senior managing director of the Korea Biomedicine Industry Association (KoBIA). Yet, as Han-Oh Park, president, founder, and CEO of leading Korean biotech Bioneer astutely notes, “This constitutes merely the tip of the iceberg for Korean biotech.”

Korea’s gross domestic R&D spending per capita – 4.5 percent – ranks first globally according to the OECD. Nonetheless, the situation for innovative pharmaceutical companies within Korea is becoming increasingly difficult as the government looks to keep down the costs associated with the country’s universal healthcare coverage, the National Health Insurance System. Under President Moon, there are plans for coverage to be widened and increased, taking even more of the cost burden away from the patient. Enterprising investment on one side, coupled with frugal savings on the other, reveals Korea to be a country of contrasts.

PRICING CONUNDRUM

Korea’s unique characteristics encompass a push for high-end innovation with a zealous pursuit of efficiency. Indeed, Korean drug makers are renowned for their aggressive pursuit of low-price points, egged on by national regulators pushing to maximize their savings vis-à-vis government expenditure on pharmaceuticals whenever possible. As Roche Korea president Nic Horridge notes, “regarding prices, we feel the reward for innovation could be improved: pharmaceutical prices in Korea fall at around 60-70 percent of the OECD average. Therefore, it is crucial to engage in constructive discussions between the industry and health authorities, putting patients’ interests first and ensuring we have a sustainable model in Korea.”

This mindset has resulted in efforts to minimize spending on pharmaceuticals, meaning that local generics players rather than original producers dominate the market; creating somewhat of a race to the bottom on pricing. “Since many generic companies market the same products, increasing the price is nearly impossible,” states Jai-Man Ryu, CEO of local firm Shin Poong. Indeed, the market for generics is now becoming saturated. As Professor Dukgeun Ahn, trade policy advisor to the Ministry of Health and Welfare notes, “we now observe that there are simply too many generics producers [in Korea].”

Moreover, low pricing for innovative drugs has rendered the relative price ratio of generics to innovative products reasonably high. These distortions have resulted in unusual consequences for the producers of innovative products. “While generic penetration in Korea is around 60 to 70 percent, it is interesting to note the volume increase for some off-patent originals, despite the fact that there can be up to 80 generic alternatives in some cases. This is the result of poor policymaking by the government,” perceives Sean Kim, senior director of the Korea Research-Based Pharma Industry Association (KRPIA), an association representing multinational pharmaceutical companies operating in Korea.

Partly responsible for these low pricing levels is the adherence to using outdated information when assessing the price of innovation. “One of the methods deployed by the government to assess and price innovation is to use a reference to assess the quality-adjusted life years (QALY) based on a GDP value – USD 25,000 per capita. In reality, the GDP in Korea is now close to USD 34,000. It’s like wearing old glasses to look at new products,” ventures Julien Samson, vice president and general manager of GSK Korea.

The low prices are creating fears that the reward for innovation is being eroded. “We continuously remind the government of this issue. KPBMA has been consistently emphasizing that an appropriate drug price is necessary for companies to keep investing in R&D,” stresses Hee-Mok Won, chairman of the Korea Pharmaceutical and Bio-Pharma

KOREAN REGULATORY APPARATUS OVERVIEW

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Manufacturers Association (KPBMA), an association representing the domestic pharmaceutical industry.

Although the Korean pricing predicament creates headaches for the drug companies, the situation has created winners, namely those responsible for funding the healthcare system. With pharma expenditure constituting around 24 percent of the national health insurance system’s bill, the government’s tough negotiations on drug pricing are part of its battle to ensure affordable healthcare in a rapidly aging population. Understanding this position, Paul Henry Huibers, president of Lilly Korea, is quick to highlight the government’s success at the expense of the pharma companies. “From the Korean perspective, as the buyers in the market, they are doing a commendable job, negotiating the lowest prices in the world,” he asserts.

While Korean pricing is often perceived as problematic, debate rages as to what extent this is a local issue or simply indicative of overarching trends afflicting the global pharmaceutical sector. Uloff Münster, general manager of Merck Biopharma Korea, while acknowledging that “the low prices are an ongoing concern for all companies as prices are naturally one of the most important drivers of commercial success,” plays down the significance of Korea’s pricing woes. “At the end of the day, the reality is this is not profoundly different from what is going on in European countries,” he observes.

ENDURING ENTHUSIASM

Moreover, in spite of any perceived pricing challenges, interest in the Korean marketplace remains buoyant with companies still willing to launch their products on the market – “Roche’s global business is well mirrored in Korea as almost all our portfolio is represented here” remarks Roche’s Horridge. In March 2019, Roche Korea received approval for the combination therapy Tecentriq.
Fully Automated Nucleic Acid Extraction and Protein Synthesis & Purification System

**ExiProgen™**
1. DNA/RNA Extraction
2. mRNA Synthesis
3. Fast Protein Synthesis
4. Affinity Protein Purification

**Application**
- mRNA-based therapy
- Antigen/Antibody Screening
- Enzyme Engineering
- Protein Drug Screening
- Vaccine Development

Innovative Genome-Wide Drug Target Screening Technology!

**GPScreen™**
BIONEER’s unique Drug Target Identification Service

1. Genome-wide screening
2. High-throughput screening
3. Lived cell-based screening

**Application**
- Drug target identification
- Genome-wide drug target profiling for drug prioritization
- Natural drug target discovery
- Mode of action study
- Drug repositioning

![Chemical Structure of Cytochalasin A](image)

**A**
Cytochalasin A, an actin-binding inhibitor

![Graph](image)

**B**
act1, an ortholog of human actin

Fitness Score

S. pombe heterozygous deletion mutant strains
and Avastin, the only first-line treatment for metastatic non-squamous non-small cell lung cancer (NSCLC). Horridge continues, “These filings demonstrate Roche’s commitment to bringing innovative solutions for unmet medical needs. Of course, our next task is to work proactively with the Korean government to help ensure these drugs can be listed for national reimbursement so that more patients here in Korea can ultimately benefit.”

According to research and consulting firm GlobalData, the country’s pharmaceutical industry is expected to expand by 2.4 percent annually until 2020, when trends suggest that the total market size will hit USD 20.4 billion. Driving this growth is extreme ongoing demographic trends – Korea has the fastest ageing population in the world, fueling greater pharmaceutical consumption. According to IQVIA, 39 percent of Korean medical costs are now spent on patients aged 65 and above, a significant jump from 24 percent in 2005.

As a consequence of this rise in healthcare spending as a percentage of GDP and notorious over-provision – the average length of stay in hospital is over twice the OECD average in Korea, at 16.5 days – some pharmaceutical companies have capitalized on Korea’s high volumes to give patients access to their most advanced products. “Whereas Switzerland would be considered a low volume high price market, Korea could be characterized as a low-price high-volume market” affirms Huibers, whose focus on introducing new brands and innovation has facilitated double digit growth in the local affiliate.

This environment has enabled companies to continue their operations and with confidence. One such company is Novo Nordisk, who have been particularly bullish about the Korean market. “What differentiates me from my peers was my decision to expand the affiliate. Multinationals in Korea are usually limiting their operations to the greatest extent possible, prioritizing international partnerships to minimize liabilities. Novo Nordisk is moving in the opposite direction. When I joined, we had 110 employees and have increased this to 140. Furthermore, we have successfully launched Treshiba®, Saxenda®, and Nodiflex®. Next year we will launch Fiasb®. These products are the backbone of our growth, and

HEALTHCARE & LIFE SCIENCES REVIEW KOREA

TOP 20 PHARMA COMPANIES IN KOREA

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<td>$235,226,783.33</td>
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<td>20 BOEHRINGER INGELHEIM</td>
<td>$232,691,828.52</td>
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Data for 2017 Source: IQVIA; KRPIA

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Treshiba® has been a true success story,” asserts Rana Afzar, VP and general manager of Novo Nordisk Korea.

Korea also boasts a number of advantages over other developed markets in terms of launching products that further boosts the desirability of the market, “It is true that the headquarters prioritizes big markets such as the US or Europe, compared to small markets such as those of Korea or Taiwan. However, I do not agree that we must wait for approvals from those large markets if we can receive approvals at a faster pace from smaller markets like Korea. Mitsubishi Tanabe Pharma Korea realized that once the required documents for the government approval are in order, we could receive approval faster in Korea than in the US. This was achieved only six months after the headquarters obtained approval from the Japanese government. Consequently, I made the decision to challenge this approach and to launch the medication to the Korean market first; Mitsubishi Tanabe Pharma Korea obtained approval in Korea” remarks Narahiko Yoshii of Mitsubishi Tanabe.

DEMOGRAPHICS AND NEW NEEDS

The high volumes of the Korean market combined with the country’s demographic trends are colliding to create an excellent opportunity for a drug maker looking to expand their offering locally. According to the Institute for Health Metrics and Evaluation (IHME), Alzheimer’s Disease now represents the second largest killer in Korea, prompting several companies to switch their focus towards Alzheimer’s and other diseases of the central nervous system (CNS). “As Korea is the most rapidly ageing society in the world, the need to develop products to aid elderly patients is crystal clear. Focusing on the CNS area is part of following this trend,” remarks Narahiko Yoshii, president of Mitsubishi Tanabe Pharma Korea.

Operating in CNS affords plentiful opportunities to bring value to patients, with the market yet to adjust to the changing demographics. “When we entered the CNS segment 10 years ago, there were only three or four companies present in the market. It was very much overlooked,” recalls, Sang Joon Lee, president CEO of Hyundai Pharm, whose CNS business is now growing at a rate of between 40 to 50 percent annually.

The changing demographics are also altering the strategies of companies’ local operations. As Pil Soo Oh of Lundbeck remarks, “The ageing population will present an opportunity for Lundbeck. We used to focus on the large hospitals, lacking the resources to visit the small psychiatric and neurological clinics. However, the ageing population will lead more and more patients visiting small clinics and we must align our geographical strategy to reflect this.

Neither is CNS alone as a therapeutic area rich with opportunities. Oncology is proving to be a popular area for local investments with the potential for risk sharing agreements generating strong interest for those launching first in class products. Even those fast followers have ample opportunities to aid patients with their products, with changing epidemiology increasing the incidence of cancer. The IHME estimates that lung cancer deaths have increased by 38 percent, with colorectal cancer deaths increasing by over 50 percent in the last ten years in Korea. This is allowing companies with ambitions to gain a footprint in oncology to advance in this field. “The Korean affiliate has an annual growth rate of around 25 percent. We also grew in the oncology and rare disease sectors, our main focus points, and are gaining more and more market share every year,” recounts Min-young Kim, general manager of Ipsen Korea.

Nor are Ipsen’s endeavors an exception. Another company expanding its offering is Daiichi Sankyo. Traditionally strong in the

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Korean cardiovascular market, Daiichi Sankyo favorably views Korea as a market for implementing the company’s global initiative to become a ‘Global Pharma Innovator with Competitive Advantage in Oncology’. “Our first oncology product will reach the Korean market within two years. We have already recruited a medical doctor as a head of our oncology department,” Daiichi Sankyo Korea’s president Dae Jung Kim adds, whose affiliate is anticipating reaching an annual revenue of around 170 billion Korean Won (USD $150 million) this year, following the reversal of fortunes for Daiichi Sankyo in the cardiovascular area after launching their NOAC product, an anti-coagulant substitute for Warfarin, in 2016.

Navigating the Regulations

One factor that companies expanding their operations in Korea must contemplate is the administration’s tendency to amend regulation at very short notice. “It is very important to be aware of these changes and prepare in advance as, the government could easily amend legislation, asking for additional accompanying documents” voices Mitsubishi Tanabe Pharma’s Yoshii.

Despite the potential for disruption, companies have developed strategies to cope with such an erratic regulatory environment and minimize delays by targeting areas of highest stability. For example, Mitsubishi Tanabe has proceeded along the path of marketing orphan drugs in Korea where it identifies strong stability, “In Korea, if a medication is designated as an orphan drug, companies are not asked to submit clinical trial data with Korean subjects. Therefore, we can use data from the US, Japan or Europe, which accelerates the application and approval process,” points out Yoshii.

Others have been taking advantage of the favorable regulation for orphan drug status for a lot longer, with Korean company ISU Abxis receiving their initial orphan drug approval from the Ministry of Food and Drug Safety (MFDS) in 2006 for Clotinab®, the first antibody therapeutic in Korea. “Orphan drugs are an issue of high priority in reimbursement policy,” affirms Seok Joo Lee, CEO of ISU Abxis. Benefiting from policy changes in 2015, risk sharing agreements were introduced in Korea for high-priced innovative products in the fields of oncology treatments and orphan drugs. Merck was one of the early movers to capitalize on this policy as the first company to negotiate a risk sharing agreement for their oncology product, Erbitux. “The agreement has its drawbacks in terms of price but is ultimately a mutually agreeable way to ensure availability of the product to patients in need of innovative solutions,” avows Merck Biopharma’s Münster.

While facilitating the introduction of new innovative products, risk sharing has not, however, emerged as the silver bullet for the industry that some were hoping for. “Risk sharing has become a valuable tool in the Korean market. However, the practice is, so far, still limited in scope, covering only oncology and rare diseases. The other restrictive factor is that it is only in place for the first drug in a class – the second follower is not entitled. Consequently, we have requested an expansion of the program,” elucidates Lilly’s Huibers.

Consequently, widening risk sharing agreements is recognized as a necessary step to ensuring that innovation will continue to reach the Korean market and Korean patients.
from orphan drug status, ISU Abxis have reached further success, “We successfully launched two other orphan drug products in Korea, Abcertin® for Gaucher disease in 2012, and Fabagal® in 2014, treating Fabry disease,” he expands.

**NOT A COOKIE CUTTER MODEL!**

Companies operating in the Korean market, in particular MNCs, cannot expect to simply copy and paste their strategies elsewhere and expect them to work locally, forcing drug companies to refocus their operations in new areas to remain competitive. “What differentiates this local affiliate from Ipsen globally is the neurotoxin market. Globally, it is still one of the priority areas. However, in Korea, we have divested from this sector and increased our focus on rare disease and oncology as there is significant competition locally within the neurotoxin market” remarks Ipsen’s Minyoung Kim. Ipsen are not alone in their struggle to implement their traditional solutions locally, with Daiichi Sankyo meeting resistance for their triple combination cardiovascular product, “we focused on the triple combination market, where we have an exclusive product. However, this market is very difficult in South Korea: drug prescribers are very reluctant to change from single or double combination to triple combination, despite the fact that it brings the patient a number of benefits, such as a reduced pill burden and more efficient price. There was a clear resistance to embracing this change” declares Daiichi’s Dae Jung Kim. Other companies such as GSK, aware of the discrepancy between their global and local position, are seeking Korean customized solutions to establish themselves on their traditional footing. “GSK is the leading vaccine company in the world, but this is not yet the case in Korea, so there is huge ambition to assist the government in supporting the immunization of the population. Moving forward, we have a new generation of vaccines being introduced, and we look to bringing these products to the Korean market” posits GSK’s Samson.

**MOONCARE: A HEALTH SERVICE FIT FOR PURPOSE**

The government strategy for life sciences is not limited to the pharmaceutical and biotech sectors, but to healthcare provision also, in particular to addressing the problem of out-of-pocket payments within the Korean system.

The Korean National Health Insurance System is a mandatory government-run single insurer system which covers all permanent residents of Korea. Medical fees are then reimbursed at different rates depending on the treatment and cost, with the remainder of the bill financed from co-payments by the individual. “In terms of expenditure, 62.6 percent is currently covered by the NHI, the remaining expenditure comes through out-of-pocket payments by patients,” explains Yong Ik Kim, president of the NHIS. Korea currently reports one of the highest out of pocket consumption allocated to medical care of any country in the OECD, 1.7 times higher than the average. Such a figure has forced around 87 percent of Korean residents to take out private insurance as a complement to the national health insurance according to a survey by the Health Insurance Policy Research Institute.

As a result, legislators understand that amendments must be made. “We have a very well-established national health insurance in Korea, which has a reputation as a successful example of universal welfare. However, we would like to upgrade it so that the public can gain access to higher quality public welfare services,” posits Myoung Su Lee, chairman of the Health & Welfare Committee. He continues, “Essentially what we are aiming for is to offer a higher quality service sustainably and to lessen the burden on individuals.”

Acknowledging the need for further improvements to the system, President Moon Jae In has pledged to expand coverage.
to over 70 percent of total costs. The 30.6 trillion won (USD 28 billion) plan, dubbed “Mooncare”, will be implemented in stages through 2022. “We are trying to include all essential medical care into the National Health Insurance System. By 2022, we will include all services deemed medically necessary,” announces Yong Ik Kim. “For the NHI (National Health Insurance), we are investigating the best approach to integrate this policy into our system and expand insurance coverage to more therapies which are non-reimbursable at this present time,” he adds.

The reforms have created largely unanswered questions surrounding their proposed financing. “Mooncare will require a huge budget if it is delivered as planned,” asserts the KRPIA’s Sean Kim. The main concern is its future impact on already challenging drug pricing. “Pharmaceuticals comprise 25 percent of total healthcare expenditure, and the biggest proportion is the medical sector,” adds Kim. Consequently, the drug prices are viewed as an easy target to find cost cutting savings as a means to finance the reforms. “While Mooncare should certainly be viewed as a positive step for patients, there is still uncertainty around how this will be funded over the long run, stoking fear among the industry players that it may trigger a new round of drug price slashing,” explains Lilly’s Huibers.

Nevertheless, the government points to increased contributions as their funding source. “To increase the scope of these benefits, contributions will have to be raised. However, while

Overview of the Mooncare Reforms

1. South Korea’s National Health Insurance program is a compulsory social insurance system which covers the whole population
2. On average, the South Korean healthcare system currently covers 62.6 percent of all necessary medical costs for individual patients, who pay for the remaining 37.4 percent themselves.
3. According to the OECD, one out of every twenty-five households face the risk of becoming the “medical poor” — going bankrupt due to high medical bills from treating serious illnesses.
4. President Moon Jae-in’s pledge to expand healthcare coverage to cover 70 percent of people’s costs and expand reimbursement to previously uncovered treatments
5. This will be done through 30.6 trillion won ($28 billion) plan—dubbed “Moon Care” to be implemented in stages up until 2022
6. This investment will be accompanied by moves to reduce unnecessary patient visits - The average number of doctor consultations per citizen each year in South Korea is 14.6, the highest in the OECD. Hospital beds are very much oversupplied: in Korea there are 12 beds per 1,000 of the population, almost three times the OECD average of 4.7.
patients will pay higher contributions, these costs are spread across all the insured, so their total healthcare costs should be lower than the previous out-of-pocket payments” explains Yong Ik Kim.

It is not just in the pharmaceutical industry where the ambiguity of Mooncare’s funding is causing apprehension, but also in the legislature. The National Assembly’s Myoung Su Lee shares his own reservations surrounding the implications of the reforms: “Of course, we have to answer the public’s demands, but in a realistic, sustainable way. Healthcare cannot be used as a political football with pledges made merely for electoral gain.”

Despite pricing pressures remaining in the back of the mind of the drug companies, the new opportunities created by Mooncare must not be ignored. The cash injection into the system is predicted to increase demand for medical services and devices, while widening reimbursement introduces new opportunities seen as critical for players in a volume driven market. One of those viewing the potential of such reforms is Merck Biopharma’s Uloff Münster. “To give an example that Merck Biopharma Korea is directly involved in, for IVF, the reimbursement laws were amended in October 2017, and we now see the number of treatment cycles gone through by couples reach a conception increased by 15 percent, which we believe is the result of changes to reimbursement,” Münster affirms.

While the government continues to try and put the industry at ease in a time when the long-term term funding still remains opaque. In spite of this, the Mooncare reforms continue to be welcomed rather than resisted. Sean Kim underscores this rationale, “Many parts of the medical fees are still under negotiation with the government and therefore this time no one can actually estimate the total budget required to deliver these reforms. Nevertheless, we [the industry] are supporting Mooncare for coverage expansion with innovative medicines,” he concludes.

RAMPING UP R&D

Innovation is a crucial step towards the goal of ensuring that the pharmaceutical sector is Korea’s growth driver for the future and a hotbed for Korean expertise. To facilitate this, the Korean government has founded a number of institutions to support different areas of the value chain. For example, the Korea Drug Development Fund (KDDF), a consortium of three health-related Korean Ministries - the Ministry of Science and ICT; the Ministry of Trade, Industry, and Energy; and the Ministry of Health and Welfare, is a drug development program providing support to early stage Korean discoveries, with the goal of licensing out to global pharma. “We have supported more than 100 promising projects and provide them with funds and consulting support” avows Samuel Muk, president and CEO of KDDF.

Korean generics companies have also succeeded in achieving licensing out and partnership agreements for their in-house innovation. Local giant Hanmi has partnered on a co-development agreement with Sanofi and Lilly, meanwhile Yuhan formed a partnership with Janssen to develop an oncology product. Even in this early stage, the proceeds of these deals have already reached USD 1.5 billion.

Korea is not only striving to lead in producing innovation, but also in the adoption of this innovation, incorporating new treatments and medical techniques into its healthcare provision. One such example is in the field of respiratory illness treatments, adopting dual therapy treatments for conditions such as COPD – “Korea is one of the first countries in the world where dual therapies were positioned as a first line treatment. This has created a paradigm shift, and now over 50 percent of patients are treated with dual therapies, still the only market of its kind in the world, explains GSK’s Julien Samson.

While sights are set on propelling a Korean company into the global top 50, the old ways still remain a hindrance, in particular the limited size of R&D spending. “There is an ocean between the R&D spending of global and local pharma; Korean pharmaceutical companies spend only around USD 100 million...
on R&D, compared to USD 10 billion for Roche. We cannot compete with companies which are 100 times bigger,” insists BG Rhee, CEO of SCM Life Science and former president of Korean pharma company Green Cross Corp. “Compared with the US and Europe, Korea is lacking fundamental resources to cover all stages of new drug development. In addition, high costs of long-term R&D are problematic,” adds Peter Kim, CEO of ST Pharm.

A potential solution could be through open innovation, in particular via partnerships with the innovative bio ventures flourishing in the peninsula. However, Korean generics companies have proven more conservative than other more risk-taking sectors in Korea’s economy. “Older Korean pharma companies prefer late-stage drug candidates for collaboration and investment. They are traditionally focused on generics and incrementally modified drugs. Moreover, they are not willing to assume large risks, despite possessing the financial capabilities. Instead, they maintain a preference for in-licensing foreign products,” explains Shingyu Bae, founder and CEO of MDimmune, a biotech company specializing in producing anti-cancer drugs through its DDS technology, enabling anti-cancer drugs to be delivered only to cancerous tissues, minimizing side effects.

Notwithstanding the challenges of altering this established mindset, progress has been made through fostering the initiatives of local industry associations such as the Korean Drug Research Association (KDRA). “We have put in place initiatives to foster partnerships, and licensing agreements between pharmaceutical companies, and academic and public research organizations domestically and internationally” explains Jae Cheon Yeo, the association’s executive director.

Embracing this trend devising new techniques to innovate efficiently is ST Pharm an established player in the USD seven billion market for oligonucleotide APIs. ST Pharm’s Peter Kim adopted concepts from Eli Lilly’s chorus platform to initiate its “virtual R&D” strategy. “Our strategy is open innovation with “virtual R&D” - licensing in the very early stages of drug discovery.
projects, incubating those projects internally, and then licensing out to global pharma companies,” he expounds. Such a strategy along with the NRDO (No Research Development Only) concept is gaining significant traction within the pharma industry. “Low cost, high efficiency and agile development processes are key factors in this strategy,” he adds.

Furthermore, the virtual R&D strategy remains one of several moves Korean pharma can make to establish its global presence. “More and more Korean companies are pursuing global strategies similar to those which Japanese companies took before. In the past decade, Japanese companies became global players through M&A, beyond just increasing market share but also enhancing technological capabilities and industrial know-how,” notes Jeewoong Son, CEO of LG Life Sciences. He continues, “Later down the line, we might use a similar approach if it makes sense.”

**A THRIVING BIOTECH ECOSYSTEM**

A further arm set to drive Korea’s innovation in life sciences spans from the highly active biotech scene. Bio ventures in

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**Realizing Global Potential through International Partnerships**

The underlying goal of the overwhelming majority of Korean biotech firms is to find international partners who can bestow upon them the expertise and support critical if they are to be in the one percent of ventures that succeed.

PharmAbcine encapsulates this vision. A clinical stage publicly traded company, listed on the KOSDAQ in 2018, the company is focusing on innovative next generation therapeutics to bring clinical benefit to patients’ lives. Its most advanced candidate is Tanibirumab, an anti-KDR neutralizing fully human IgG, which has displayed a 25 percent disease control rate, a clear safety profile and very positive results “The average life span of recurrent GBM patients is less than four months. Not only do some patients live longer thanks to Tanibirumab, but they incur fewer side effects. No common side effects like hypertension, haemorrhage, gastric/lung perforation or proteinuria were observed,” posits Jin-San Yoo, PharmAbcine’s president and CEO.

Where PharmAbcine stands out from the pack is through its partnership with American giant MERCK (MSD globally). “I first visited MERCK’s Research Laboratory in Boston and presented my proposal for the combination of Tanibirumab and Keytruda as a research collaboration,” Yoo recounts. Despite his offer being initially rejected, Yoo exemplified both tenacity and conviction in the merits of his drug candidate. “Since then, I continued to challenge people at MERCK Research Laboratories on both the east coast and west coast with stronger scientific and clinical rationale and evidence,” he continues. Yoo’s persistence was vindicated when last year MSD agreed to partner on a Tanibirumab-Keytruda combination therapy.

“I am very excited about this clinical collaboration with MERCK’s team, We are learning and experiencing enormously from their experience. The MERCK team are very supportive and considerate, so I am very grateful for the opportunity,” he declares.

Yoo following tremendous success in 2018 is firmly keeping his foot on the accelerator “We are pushing to reach the IND enabling stage within this year for two candidates. In parallel, we will have a significant presence in Australia, the US and Europe and will play pivotal role in innovative oncology drug development”. he concludes, “I am optimistic that we can make cancer a manageable disease through providing the right drugs and combination therapies to the right patients in near future.”

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Korea are nothing new. “There is a long history of biotechs in Korea, dating back to 1987. The 2000s then saw many university professors starting their own biotech companies. Through this experience, we have cultivated a social and financial system that serves this industry,” recounts James Kim of Bridge Biotherapeutics.

“In order to solve contemporary global health problems, Korean biotech plays a significant role in providing innovative diagnostics and therapeutics. The Korean government and large Korean companies have continuously invested in biotech and genetic engineering,” adds Han-Oh Park, CEO of Bioneer.

Bioneer stakes its claim as Korea’s oldest running biotech firm and Han-Oh Park exemplifies the movement of those in academia across into bio ventures. “I founded Bioneer in 1992 as the first spin off company from the Korea Research Institute of Bioscience and Biotechnology,” he notes. “The goal of the company is to develop innovative tools for genetic engineering including instruments and reagents”, he continues, “At the beginning of the global swine flu outbreak, we developed the first Swine Flu diagnostic kit, supplying 2.5 million tests. We also developed the first Zika, Dengue, Chikungunya multiplex kit and registered a first WHO EUAL. In total, we have developed more than 50 different molecular diagnostics kits including HIV, HPV, viral load test kit, respiratory infection, gastrointestinal infection, sexually transmitted infections, and pharmacogenomics kits”.

Although the industry has historical routes, its traction and attention has accelerated in recent years, driven by the government’s ambitious vision for the sector. One of these strategies is ‘The 3rd Basic Plan for Biotechnology Support: Innovation Strategy 2025 for bio-economy based on Science Technology’. It aims to increase Korea’s share of the global bio market from 1.7 percent in 2015 to 5.0 percent in 2025 through R&D innovation, creating 100 global new drug candidates and five blockbuster drugs, while increasing global technology exports by 500 percent.

“Korea has always held the potential to develop new visionary biotechnologies, but only recently has the industry realized how to evaluate and commercialize the findings made in research centers and universities” concludes Shingyu Bae of MDimune.

The industry’s potential has been steered on by interest from venture capital investors. Former venture capitalist Shingyu Bae concurs, “I worked as a venture capitalist from 1997 to 2005 when there were scarce opportunities to invest in Korean biotech companies offering impressive technological advances. Today, however, the market is flooded with fruitful Korean biotechs possessing innovative technologies.” Companies with strong ideas and technology do not struggle to receive funding. “Last year, the private sector invested a total of USD 0.6 billion into the bio industry,” asserts Seung-Kyou Lee, vice-president of Korea Bio.

While venture capitalism is aiding the industry, government assistance is the main driver in the early stages, when investing poses a higher risk. The government invests, fully aware that less than one percent of projects will be commercially successful. “After some start-ups make tangible progress, two, three years into the project, the private sector steps in and starts investing” reveals Seung-Kyou Lee. Chae-Ok Yun, founder and CEO of GeneMedicine, a biotech which develops cancer treatments through development of oncolytic adenoviruses, which selectively replicates in and destroys cancer cells, agrees, “First, we received a government grant that supported our pre-clinical development. Then, we received investment from angel investors and venture capital firms. We are currently finalizing the series A investment round with USD 12 million” Yun recalls.

Aside from the strong venture capital environment, Korean life sciences companies have an established history of guaranteeing

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longer term funding by launching IPOs and listing on the Korean stock exchange (KOSDAQ). A recent example is PharmAbcine, who successfully listed on the KOSDAQ in late 2018. Of the top 20 KOSDAQ listed firms by market cap, ten of them represent biotech or pharmaceutical companies.

To successfully list, companies must satisfy a number of strict requirements, such as an operating history of at least three years, over KRW three billion (USD 2.6 million) of shareholders’ equity or a market capitalization of over KRW nine billion (USD eight million) and positive income from continuing operations before tax for the latest fiscal year.

Bio ventures offer Korea the risk-loving nature that has thus far held back traditional pharma, actively seeking international opportunities and partnerships to solidify their success. “We have already licensed out an anti-obesity product in the USA and Canada and it will be launched globally this year. In addition, we are aiming to also spin off a drug development company this year too. We have some promising compounds for lung disease, lung fibrosis, and lung cancer,” reveals Bioneer’s Han-Oh Park.

The rise in Korean biotechnology has caught the attention of international players seeking to partner with or license-in from the Korean players - “Interest in the scientific output in Korea is globally significant. Many developments in the pharmaceuticals and biotech arena are coming from Korea”, asserts Ulf Münster.

An example of such success is from the biotech GeneMedicine, “our lab has continued to excel in forming strategic global partnerships with as we have licensed out our technologies to two U.S. biotech companies in 2016, further highlighting the prominence of our oncolytic adenovirus technologies declares Chae-Ok Yun. However, biotechs such as GeneMedicine remain agile to adopting multiple possible strategies to ensure their success adding that, “after positive results through clinical trials, we can adjust our business model, and allow our products to be developed through different strategies, such as: licensing out, collaborative development, or even independent development”.

The rise in interest has been met with positive responses from global pharma, looking at how they can capitalize on the new technology stemming from Korea. “Despite the fact that Ipsen

Quegen Biotech specializes in the production of chemical Beta-Glucan, derived from the fermentation of mushrooms. “We secrete the beta glucan outside of the cell wall so that we do not have to rupture it. From glucose we ferment mushrooms, which creates the beta glucan” explains Jong Dae Lee, CEO of Quegen Biotech.

What makes this special are the multitude of medical possibilities Beta Glucan offers. It has anti-cancer properties and can kill tumor cells indirectly by activating immune cells. Beta-gluten also possesses anti-biotic and anti-inflammatory properties and has been shown to reduce glucose and cholesterol levels, very good for obesity” opined Lee. “We are also developing a hangover cure containing beta-glucan”, Lee adds.

Manufacturing of beta-glucan is complex, especially if high purity is to be achieved. Consequently, it remains a blue ocean market due to the barriers to entry.

Dr Lee’s sights are set firmly on the international potential of Beta Glucan, “there will be a huge market for it in the future and our export operations are expanding. We are in the process of opening a branch office in the USA. That way we can better target the USA and other Western markets” Lee declares.
does not have its own R&D facilities in Korea so is not directly involved in local innovation, we involve ourselves with third party R&D centers,” announces Ipsen’s Minyoung Kim. Merck’s Uloff Münster concurs, “We are interested in engaging in new partnerships on all levels, from preclinical to clinical and also for marketing, paying particular interest to pre-marketed products.”

Such optimism surrounds the industry, that Jung Yun Taek, president and CEO of PSI, a consultancy advising biotechs on their strategy concludes, “I think that it is very likely that a Korean biotech company will license out a drug to a global company that will go on to achieve more than USD 1 billion in sales.”

REGENERATIVE MEDICINE: ROCKET FUEL

“Ten years ago, a special committee was set up to establish the direction for the bio health industry in Korea. The bio health Industry is the least globalized industry in Korea, making up only 1.5 percent of the global market. This committee sought to determine the areas of biopharmaceuticals which Korea could lead in. They concluded that Korea could excel in biosimilars, and cell therapy,” recalls SCM Life Science’s B.G Rhee. Regenerative medicine is an area that has already borne fruit for Korean biotech companies. Consequently, of the seven stem cell products on the global market, four of them are Korean, including Corestem’s product neuromata for the treatment of ALS, also known as Lou Gehrig’s disease. “Korea must carve out for itself a very niche area where it can be a global leader. In my opinion, this could well be the regenerative medicine field, including stem cell treatment,” postulates SCM Life Sciences’ BG Rhee.

Korean stem cell companies have capitalized on government support and more lenient regulations related to stem cell medicine where conditional approval may be granted after phase II trials. “We have received significant government support in the early stages too,” opines Kyung-Sook Kim, CEO of Corestem, which received approval for their stem cell ALS treatment Neuronata in 2014. “The government was interested in building a new innovative technology like stem cell therapy from scratch on Korean soil,” Kim declares.

There is hope that deregulation can go further, comparable to Japan, which grants conditional approval after phase I trials and allows for seven years spent collecting data from patients for phase II and III trials “We are currently in discussions with the Korean government with the aim of amending the laws further relating to advanced biopharmaceuticals and regenerative medicines,” affirms BG Rhee.

It is not only stem cell products that are creating a new lease of life, many gene therapy products are going through stage III clinical trials, one receiving approval last year. “The release of those products is anticipated to increase the market share of Korean industry internationally,” says KoBia’s Jung Tae Park

A Korean-made both cell and gene therapy with global potential is Kolon Life Science’s Invossa, treating osteoarthritis of the knee and already commercialized on the Korean market. “Cell and gene therapies were low priority for big pharma until very recently. Nowadays, this area is receiving a lot of interest. For Kolon specifically, we have over 20 years of unique experience, possessing unmatched know-how. As a result, we are regarded as a leading player in this area,” boasts Woosok Lee, CEO of Kolon Life Sciences.

Kolon’s strategy for commercialization and to obtain a broader reach in Korea has been to license out to mundipharma in the Korean market, and seek similar licensing out deals abroad – “we are a fully integrated company for Invossa. Nevertheless, we have reached the conclusion that this approach is sub-optimal, and thus we will take a different path with the remaining pipeline candidates. We do not believe this to be the best way to develop cell and gene therapy. I believe that we will establish global partnerships...
in the global market. We have signed a several sales/license contracts with global partners like Mundipharma for the domestic market and Japan. Furthermore, we are under discussions with global partners for the international markets” reveals Kolon Life Science’s Lee

With regenerative medicine in its infancy, Korean companies must find solutions to the major stumbling blocks in its way if they are to fully capitalize on this potentially massively profitable niche. “There is a key issue of adequation between supply and demand. The market for cell therapies is highly uncertain. As cell therapies can actually cure patients, the business model is entirely different from traditional pharmaceutical treatments,” reveals David Kim, CEO of Cure Therapeutics.

MANUFACTURING: EVER BETTER

Korea, thanks to its plentiful experience in industrial manufacturing and innovation mindset, is uniquely placed to succeed in the often complex and challenge-filled arena of life sciences manufacturing.

For example, supply issues are not the only problem in the expansion of regenerative medicine. As Cure Therapeutics’ David Kim explains further, “The main hurdles in cell therapy are manufacturability and manufacturing costs. Novartis’ CAR-T therapy is priced at USD 475,000 because the manufacturing process is labor intensive. Scaling up is one approach companies are taking.” Kolon’s Woosok Lee concurs. “This is a hurdle which every biotech company will have to overcome.”

Companies like Kolon are already ahead of the game in leveraging Korea’s abilities to unveil new solutions to problems that have held back fields such as regenerative medicine. “Innovating within the manufacturing process is our strategy to cut the production cost. We have been developing state-of-the-art 3D cell culturing process. Theoretically, this 3D cell process can reduce the cost of manufacturing by 80 percent,” Lee explains.

Korea’s manufacturing innovation is not just limited to regenerative medicine, with the country having significantly boosted its manufacturing capabilities in the field of biosimilars. “While biopharma is very innovative in terms of research and development, it has lacked innovation in plant construction and operation,” comments TH Kim, president and CEO of Samsung Biologics. Today, Samsung Biologics’ Incheon site also enjoys the world’s largest biologics manufacturing capacity at 362,000 liters. “We applied our past experience in

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non-pharma industries such as semi-conductors and determined that Samsung could reduce construction timelines, with higher quality and more efficient operations than available in the market as that time,” he recalls.

BIOSIMILARS IN FULL BLOOM

As a consequence of this ingenuity, Korea has overaken many of its competitors to boast a highly impressive biosimilars pipeline. As TH Kim avows, “Samsung Bioepis has the largest number of approved products by the FDA or EMA, followed in second place by Celltrion.” Not only in terms of approvals is Korea on top either, in terms of company rankings by biosimilar revenue, Celltrion is leading the way and Samsung Bioepis is second.

However, for Korea to truly entrench itself as a biologics leader, the challenge is not only to innovate within manufacturing, but to develop the most innovative products. Despite recent manufacturing successes, some have voiced the concern that fast followers will emerge with which Korea cannot compete on costs. “I do not think that biosimilars will be very attractive for Korean companies in ten years. Costs in Korea will further increase and developing countries will catch up. Even today, countries like China and India can produce biosimilars, obviously at a lower price,” declares Soon Jae Park, CEO of Alteogen, a biotech developing biobetter products - derivative variants of the original biologic molecule which show improvement in one or more attributes over the original.

The next stage for the industry is to leverage its strengths in biosimilars as a launch pad for new biologics and biobetters. “Korean companies will need capabilities to develop their own biological drugs based on new chemical entities in order to compete,” proposes Park.

CHAEBOLS: CONSOLIDATING A FOOTHOLD

Much of Korea’s previous economic success stems from the role that large, family owned conglomerates, known in Korean as Chaebols, played in their economy. Several of these have grown into internationally ubiquitous household names, including Samsung and LG. Samsung and its affiliates’ revenues alone are equivalent to around 17 percent of total South Korean GDP.

Seok Joo Lee CEO of ISU Abxis, part of the ISU Chaebol, focusing on developing orphan drugs explains, “In 2000, the group pondered the idea of where it had to expand in order to maintain its growth. The most feasible new area for expansion was determined to be biopharmaceuticals. Thus, ISU Abxis was established in 2001. ISU was a very early mover in Korea, focusing on antibodies and enzymes. The strength and capabilities of the group have been critical in the success of ISU Abxis’ operations. “The company’s development is based on the willingness of our parent organization, the ISU group. Through the ISU group, we have a strategic network utilize their technologies should it be beneficial,” remarks Lee.

The size and network of the Chaebols offer them capabilities that local pharma is still developing. “We are one of the few Korean companies to possess the full value chain needed to bring innovative drugs on the worldwide stage, from early discovery to clinical development, manufacturing, marketing and sales. This makes LG Life Sciences well-positioned to become a truly global player,” elucidates Jeewoong Son, president of LG Life Sciences, whose Euvax B vaccine for Hepatitis B is received by a child somewhere globally every four seconds With this firm footing,
the Chaebols are able to scale up the value chain, moving into new areas they deem as future growth drivers, such as biosimilars and cosmetics — “The next step for LG Life Sciences is to develop innovative new biologics. We have already launched a new DPP-4 inhibitor, the fifth of its kind on the global market. We also have a portfolio of dermo-cosmetics such as Yvoire, a hyaluronic acid filler, which is leading the Chinese market” posits Son.

In contrast to local generics players, the Chaebols have excelled in internationalizing, in part due to their global brands. For example, LG Life Sciences, with a diversified portfolio composed of chemical drugs, vaccines, biosimilars, biologics and dermo-cosmetics generates 43 percent of its revenues abroad in over 70 countries.

“In addition, our data systems are quite advanced and patient pools can be easily identified using the current hospital systems. KoNECT has a system called KIIS (KoNECT Integrated Clinical Trial Information System) that can locate a specific target patient pool and determine where it is located and how many patients might be available”, comments Sora Lee, vice president and general manager of Syneos Korea.

“In Asia, especially in Japan, Korea and China, patches, which deliver drugs through the skin to the body to relieve localized joint pain are commonplace. iCure is a biopharmaceutical company building on this concept to create patches for systemic drug delivery through its transdermal delivery technology. “Our expertise lies in the development of transdermal patches against CNS amongst other treatment areas, such as a delivery system for donepezil, a treatment against Alzheimer’s disease (AD)” posits Young Kweon Choi, founder, chairman and CEO of iCure.

In the case of Alzheimer’s Disease (AD), multi-day transdermal patches are advantageous compared with oral dosages: “Given that memory deficit is one of the main symptoms of AD, a multi-day transdermal patch can enhance patient compliance, which can also be visualized. They increase therapeutic efficacy by allowing constant blood concentration and reduce adverse side effects such as gastrointestinal disorders, hepatic effects and high blood pressure.”

“As part of the LG Group, an internationally recognized brand, it eases the ability to form connections around the globe, whether in the academic or corporate world, even though there is still not universal awareness that LG has a life sciences business,” Son affirms.

One of the aims of the Chaebols is to help launch Korean pharma into a leading position, believing their success can have a trickle-down effect across the Korean industry. “LG Life Sciences, and the all other Korean pharma companies for that matter, should be global players and should not be content with the current 1.5 percent share of the global pharmaceutical market. We have to start winning in the advanced major markets,” declares Son. This sentiment is shared by Jeong Woo Cho, president and CEO of SK Biopharmaceuticals: “if Korean companies can collaborate and support the growth of R&D, Korea can excel within the global pharmaceutical sector.”

CLINICAL TRIALS: BUTTRESSING BIOTECH INNOVATION

Korean companies are not only innovating in terms of the molecules offered, but on the method of delivery for old treatments, finding new uses for established technologies.

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A key pillar holding up this biotech expansion has been Korea’s establishment as a global hub for clinical trials. Korea ranks sixth globally with Seoul the leading global city for clinical trials. Deborah Chee, president of the Korea National Enterprise for Clinical Trials (KoNECT), an organization set up to promote Korea’s clinical trial environment, comments, “Korean hospitals have a designated infrastructure to support clinical trial quality and large volumes of clinical trials. We provide high volume patient access as well as medical sophistication and research interests. Global partners perceive Korea as “technology positive”, as we support molecular testing and scientific innovation.” Furthermore, Korea’s high population density and abundance of large hospitals in the Seoul Metropolitan area has played a crucial role in the country’s strong positioning for clinical trials. “In Korea, clinical development costs are 40 percent lower than in Western countries, with the exception of Eastern Europe. The reason is that Korea is a small country and half of the population lives in the Seoul Metropolitan area,” adds David Kim, CEO of Cure Therapeutics.

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This environment has caught the eye of global pharma, eager to incorporate Korea’s capabilities in clinical trials into their own operations. One example is Roche. “We have a strong clinical presence here: Korea ranks in the top 10 in the number of clinical trials at the group level,” notes Nic Horridge. “To date, we have carried out more than 100 clinical trials in Korea in which about 6,000 patients have participated, including early-phase clinical trials. In fact, Roche was among the first multinational groups to take advantage of the country’s excellent clinical infrastructure.
by participating in Phase I clinical trials for new drug candidates here,” he affirms.

Korea is not resting on its laurels, rather continuously building its capabilities, led by the activities of KoNECT, which seeks to further expand the sophistication of Korean clinical trials, an example being the SMART clinical trial platform, developed by KoNECT in collaboration with the government which is set to launch this year. “This will be a nationwide technology-convergence-driven clinical trials center network with the goal of significantly improving the efficiency and safety of clinical trials. It will play an integral role by leveraging the IT technologies and data-driven approaches to facilitate faster and safer delivery of world-leading clinical trials. Through this project, we hope to build the consensus and synergy to address unmet needs in clinical trials,” elaborates Chee.

In spite of the current success, visible challenges lie on the horizon. “In clinical research, Korea has established a strategic position in a short period of time, but things have plateaued. The number of clinical trials is no longer increasing as fast as before. Since 2013, clinical trials have plateaued. That means we have to create new markets,” says Ji-Young Lee, senior director of clinical operations at PAREXEL.

**CLINICAL RESEARCH ENJOYING A REBOUND**

In response to the global slowdown in clinical trial numbers, Korea is contemplating the potential of growing competition from new players, harboring their own ambitions as clinical trial destinations. In spite of the assets within Korea’s clinical trial arsenal, the Achilles heel remains population size, and demographic homogeneity. A combination of these factors, and new incentives from overseas have even enticed local Korean companies away from clinical trials. One example is PharmABCine, choosing to conduct some of their clinical trials in Australia. “There is a high possibility of recruiting
Caucasian patients [in Australia], which is significantly limited in Korea’s homogenous society. In general, global pharma prefers to have clinical studies from Caucasian patients,” remarks PharmABcine’s Jin San Yoo. Korea’s cost effectiveness advantages were also neutralized by Australia’s tax incentives for clinical trials, “about 43 percent in total expenditure is reimbursed by Australian Government,” says Yoo.

“Korea may need to shift focus in earlier phase trials such as phase II, or first in human studies, requiring added expertise and smaller population numbers”, suggests Sora Lee. Not only is this shift being driven by necessity, but also through leveraging Korea’s competitive advantages. “Korea also boasts a highly educated medical community with the required clinical and regulatory expertise, especially in early-stage clinical trials. Thus, they can help companies design early-stage clinical development programs to produce results faster and save costs,” insists David Kim of Cure Therapeutics.

Such a strategy has not found complete unanimity. “We have little interest in the early phase clinical trials in Korea. However, Korea’s strength really lies in the phase II and phase III trials, which is where Daiichi Sankyo holds an interest,” exclaims Daiichi Sankyo’s Dae Jung Kim.

Notwithstanding some disagreement, such a strategy has already displayed success, “Recently, we have been specializing in more complicated and sophisticated clinical trials, so this makes us quite unique on a global stage. We have successfully conducted some multi-ethnic phase I trials in a single center for a well renowned multinational pharma company. These types of trials are very complex and often lack efficiency, however the fact we managed to perform them shows our expertise” proclaims Chee.

AIMING FOR THE STARS

With opportunities abounding, the question remains, can Korea replicate their success in other industries and break through on the global bio-pharmaceutical stage? Seok Joo Lee of ISU Abxis asserts that Korea’s success in the field of biotechnology is not a question of can but a must. “Korea is already leading in the fields of semi-conductors, and information technology - Korea has the fastest internet speed in the world, perhaps even up to ten times faster than the USA. After that, the next generation technology is biotechnology. Korea has no natural resources, only human capital. This is the only way we can maintain a competitive advantage” he posits.

While the Chaebols have asserted themselves within the life sciences, local Korean pharmaceutical companies and Korean bio ventures are still in the embryonic stage of their journey towards the levels of global prowess held by the established Korean industries like mobile phones and semiconductors. For Young Kim, founder and CEO of Synex Consulting, Korea’s emergence is only a matter of time, “I believe Korea has large potential to become the leading country in biotech, AI, and Nano-technology.” She continues, “More time is needed for real innovation. Korea is only ten years into what is a 30-year process.”

Leveraging the competitive advantage of these developing life science industries will be the critical factor in determining Korea’s global position. “If Korea ever hopes to have a pharma company in the top 50, a global business model that utilizes the technological, financial and human resources of pharmaceutical companies, biotechs, VC funds, universities and research institutions should first be created,” postulates KDRA’s Jae Cheon Yeo. Given that Korea possesses strong development in all of these areas, sanguinity is high. As Young Whan Park, president of National OncoVenture, a governmental funded Korean drug development program concludes, “Korea achieved this in the past in the information technology sector. Now biotechnology, with the support of information technology, for which Korea is already first in the world, can become a leading area in the era of the Fourth Industrial Revolution. I fully expect Korea to become a leading player on the global market.”
Over the next decade, there’s not a single profession or specialist group in healthcare that will be untouched by digital technologies. Currently, stakeholders across the spectrum are focused on easing and promoting the adoption of technology and innovation.

**Barriers**

One of the biggest barriers to broad adoption continues to be cost. New technologies are usually more expensive than commodity products and require investment. Which raises the question by insurance companies, patients, and physicians: who should pay for new technology? The industry has seen many pilots and trials in which one stakeholder is willing to bear the full cost of the innovation for a short period of time. Few of these transition into sustainable business models with adoption at scale.

The promise of an innovative solution that can help doctors and patients isn’t enough to get a product to market. The payoff for these investments must be clear. Each solution must prove on its own merit how it improves patient care and reduces cost. The industry has moved past the “just trust me” phase. Adoption of investments requires clear ROI within a few years.

The long haul

As we work to fully understand the needs of all stakeholders and provide solutions to these adoption barriers, those of us in the drug delivery space recognize that patients are often the best advocates for technologies in healthcare. We continue to listen to patients and study their behavior. We know that patient adoption of a technology isn’t driven by innovation or trendy solutions. It’s driven by solutions that are simple and meet patients’ basic needs.

We also know that our work doesn’t end when those solutions reach the hands of patients. We have to be attentive and responsive to the changing needs of the various stakeholders and we must adapt our solutions to evolve with them. It isn’t a launch-it-and-leave-it scenario. Evolution is inevitable.

**CHRISSY BELL**

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