SYMPOSIUM REPORT

KEEPING PHARMA YOUNG IN THE AGE OF AGING

INTERNATIONAL CONSORTIUM for INNOVATION & QUALITY in PHARMACEUTICAL DEVELOPMENT

MARYAM RAFIE-KOLPIN, CHAIR, IQ SYMPOSIUM ORGANIZING COMMITTEE

Introduction

The seventh annual IQ Consortium Symposium, "Keeping Pharma Young in the Age of Aging" was held at National Press Club in Washington DC, on October 31st, 2017. Symposium participants engaged in discussions on new and innovative approaches used by the industry in drug development to meet the medical challenges and expectations of an aging population.

POL VANDENBROUCKE, MD, MBA, VICE PRESIDENT, MEDICAL STRATEGY, PFIZER INC.

Keynote Address: Can a Centuries-Old Industry be the Next New Thing?

It should be the best of times. Pharmaceutical innovation is essential to any vision of a lifespan of 100 years or more. But will pharma meet its potential? The industry still needs most of a generation to move an intriguing discovery forward to a safe and effective therapy. A laboratory breakthrough made this week may well not be available to patients before the advent of autonomous automobiles and pilotless flying taxis.

In the Symposium's keynote address, Pol Vandenbroucke, head of medical strategy at Pfizer, spoke about the disconnect between biopharmaceutical companies' breakneck advances in medical knowledge and their efforts to translate that knowledge into tangible products through a linear development process rooted in the industrial age. He entertained the question of how we make pharma as revolutionary as the biomedical insights we are gaining, and offered a number of suggestions to bring the industry's approaches into the present – and future.

The suggestions raised by Dr. Vandenbroucke were wide-ranging. He spoke about the need to change pharma's own conception of itself from an industry based in the industrial age into one grounded in the digital age. To illustrate this, he talked about how frequently microscopes are used in portrayals of pharmaceutical laboratories, and how the development process is so often portrayed as a straightforward series of boxes – and how outdated these images are. If pharma thinks of itself this way, it is only natural that others will. Dr. Vandenbroucke also called for a shift away from "gold-standard" trials to "pragmatic" trials that reflect how therapies will actually be used in the real world, and emphasized the need to "get serious" about patient centricity by cementing it into the paradigm within which the industry does its work.

Dr. Vandenbroucke concluded his talk by discussing the people who work for, manage, and own the companies that comprise the pharmaceutical industry. To keep pharma young, he posited that it will be essential to attract more young people to work in the industry. Generally speaking, millennials should be a natural fit for the pharmaceutical industry: they have a strong drive toward entrepreneurship, and a strong desire to make a difference in the world. But if you look at the top twenty companies that millennials say they want to work for, not one is a biopharmaceutical company. If pharma can change this, and bring millennials in alongside baby boomers to revamp the industry and ground its approaches firmly in the contexts of patient centricity and real-world contexts, the industry will succeed at keeping itself young.

EDDY ANGLADE, MD, CHIEF MEDICAL OFFICER AND GLOBAL THERAPEUTIC AREA HEAD, ASTELLAS INSTITUTE FOR REGENERATIVE MEDICINE (AIRM)

Pluripotent Stem Cell-Based Therapy for Age-Related Macular Degeneration

Age-related macular degeneration (AMD) is the leading cause of vision loss in developed nations in persons greater than 50 years of age and accounts for 8.7% of all blindness worldwide. Approximately 1.8 million patients are diagnosed in the U.S. each year with this relentlessly progressive form of vision loss leading

to loss of productivity and life quality. Globally, the burden of AMD is poised to increase from approximately 196 million to 288 million individuals between 2020 and 2040. Safe and effective treatment is currently available only to treat neovascular (wet) AMD, one of two late-stage manifestations of the condition with wet AMD accounting for only 10%-15% of all AMD patients. There are no approved treatments available for the more prevalent late-stage atrophic (dry) form of AMD, affecting 85%-90% of AMD patients. The dry form of AMD is characterized by progressive loss of a critical support tissue, the retinal pigment epithelium (RPE), followed by loss of the light-sensing photoreceptors. The Astellas Institute for Regenerative Medicine (AIRM) initiated first-in-human trials of retinal epithelial cells derived from human embryonic stem cells (hESC-RPE) in 2011. To date, 38 subjects have been treated safely in Phase 1/2 studies in North America and Europe. Further studies of this promising technology are planned in the hopes of better understanding the potential efficacy of hESC-RPE for the treatment of dry AMD.

Following his presentation, Dr. Anglade answered questions from the IQ Symposium's attendees:

Q: Do you check the condition of photoreceptors when selecting patients for trials?

A: Yes, and we have a selection committee deciding where to inject the treatment. The selection process is slow but very deliberate and careful – looking at the anatomy and corresponding function and vitality of the cells.

Q: What is the source of stem cells in your trials?

A: Currently, human embryos but there is a potential to use other sources in the future.

Q: In cardiology, there has been interest in transplanting stem cells, and there have been some successes showing modest function improvements. However, the stem cells themselves turn out to be short-lived, so the benefits outlive the stem cells. Do you see anything similar in the eye?

A: It depends on severity of the disease and the area that needs to be filled in AMD cases. However thus far, cells appear to last. The 2011 surgery patients still have their stem cells intact. Gains in vision also appear to be stable, and the need for repeated administration has not been confirmed. Nevertheless, there is a paracrine component, and when it dominates, we should see improvement away from the injection site. If direct contact effects are dominant, we see benefit only in the immediate vicinity of the injection site. It seems to be case-specific.

Q: So far, your clinical trials have been progressing slowly. Do you see the rate accelerating in the future as this technology progresses and you become more confident? Also, can this methodology be transferred to other diseases?

A: Our progress has been incremental because our trials are very complex. If the treatment is ineffective, we do not want to waste everybody's time. In ophthalmology, we do a lot of phenomenology. It is very important to understand the disease. There are currently no models and little understanding of AMD. The same could be said of other degenerative conditions such as cardiovascular disease, Alzheimer's, etc. Perhaps replacement of cell types will present a cure.

Q: For your current patients, have you transplanted stem cells in the other eye?

A: No, not yet. This disease can proceed asymmetrically. When it is genetically driven, then it is more symmetric. There are questions about the immune response. Should we use the same or different cell type? The eye is an immune-privileged organ but there still could be some sensitization from the first injection.

Q: You are following patients over the long term. What is "success" enough to progress to commercial applications? For example, would 5-7 years of transient improvement be "good enough"?

A: Yes, transient improvement is still a good result. Our current long-term follow-up is for safety only. Regarding the period of improvement – that would need to be decided in discussion with regulatory agencies. We do not know yet what improvement over 6 months, or 1 year, or 3 years would be required for approval. In addition, the approval requirements usually go up as the degree of innovation goes down.

JOSHUA T. SMITH, PHD, IBM T. J. WATSON RESEARCH CENTER, RESEARCH STAFF MEMBER AND SILICON DEVELOPMENT TEAM LEADER

Emerging Nanotechnology for Streamlining Early-Stage Disease Detection

IBM Watson's efforts to enable early-stage disease diagnosis have centered on coalescing current technologies to develop a transformative route to personalized healthcare. The world population over 65 years of age is projected to increase to 1.5 billion people by 2050, thereby stressing the existing healthcare system and placing a burden on the pharmaceutical industry to improve treatment and prevention of cancer and other age-related diseases. Early-stage disease detection technology would allow healthcare systems to transition from symptomatic treatment to measuring health status based on bodily signals.

IBM Watson has coalesced research in pharmaceutics, nanotechnology, and biofluidics to measure circulating metastatic biomarkers for disease indicators. Using deterministic lateral displacement (DLD), researchers can separate particles as small as 20 nanometers to capture tumor cells, exosomes, viruses, and DNA fragments, as well as to examine the surface markers of exocomes. DLD provides improved quality and concentration with smaller volumes over ultracentrifugation: DLD does not shear off surface markers, provides a tenfold increase in total RNA yield, and shows a reduction in larger RNAs. IBM Watson is working to understand multi-modal separation in nanoDLD, including pitch, transfers in longitudinal directions, and the size of pillars. Researchers have noted that as the diameter for a given pitch increases, partial displacement of particles occurs.

IBM Watson is also working on personalized healthcare initiatives to enhance the longevity of chips, to enable sample preparation for rapid sample processing, and to develop potential use cases for nucleic chip technologies.

PHIL GUTIS & TIM WEAVER, EARLY-STAGE ADVISORY GROUP, ALZHEIMER'S ASSOCIATION

Patient Perspective: Facing Early-Stage Alzheimer's

This year's IQ Symposium offered a patient perspective by Phil Gutis, who described his struggle with early-stage Alzheimer's and how the disease has affected his life. Phil's husband, Tim Weaver, also shared with attendees his experience as Phil's primary caretaker. Phil learned, at age 54, that he suffers from younger-onset Alzheimer's disease. He explained that his family history with Alzheimer's is slim and this disease only impacted a couple of his relatives very late in their lives. Phil described his struggle to remember words, to recall where he had placed things, and realizing that he was often forgetting things that happened earlier in the same day. He told of his frustration and discouragement as his disease adversely affected his daily activities. He noted that research indicates that Alzheimer's is present a long time before making itself known. Receiving a diagnosis for younger-onset Alzheimer's disease remains a struggle. When Phil reached out to medical professionals to seek help for his memory loss, several told him that nothing was wrong with him. Even after receiving his diagnosis, a general practitioner told him that he did not have Alzheimer's.

Phil learned of his diagnosis as a result of a study of a drug that demonstrated some success in slowing down the progression of memory loss. The key test for the study was RBANS, a series of mini-memory and cognitive tasks. Individuals had to score an 85 or less to be considered for the trial; Phil scored a 71 and was accepted into the study. Through that study, Phil was diagnosed with early-stage Alzheimer's.

Phil shared his insights on living with Alzheimer's at a relatively young age, and emphasized the need for more research and help for patients suffering from this disease. He recalled a TED talk by Dr. Samuel Cohen, an Alzheimer's researcher in London, who noted that 116 years after the first patient diagnosed with Alzheimer's died in Germany, the medical world has little more hope to offer Alzheimer's patients. Although medical researchers have discovered antibiotics and vaccines to protect human beings from infections, developed numerous treatments for cancer, antiretrovirals for HIV, and statins for heart disease, there has been essentially no progress in treating Alzheimer's disease. Phil described Alzheimer's as one of the biggest medical and social challenges of our generation – currently affecting 40 million people worldwide. He explained that the disease is projected to impact 150 million people by 2050. According the Alzheimer's Association, every 66 seconds someone in the United States develops Alzheimer's dementia and by 2050 this will be every 33 seconds. In the U.S. alone, Alzheimer's costs more 200 billion dollars every year. It is the most expensive disease and costs are projected to increase fivefold by 2050 as the baby boomer generation ages. More funding for Alzheimer's research is needed. Phil encouraged the industry to support the Alzheimer's Association in its efforts to obtain more research dollars.

Phil also explained that while many have heard of Alzheimer's disease, and some worry that they have it or will get it, the disease remains in the shadows because it cannot be cured. Some are discouraged to seek help because nothing can stop the disease from progressing. He described conversations with people who know something is wrong with their brains, yet they refuse to seek a diagnosis. He encourages everyone suffering from memory loss to get a diagnosis. Since receiving his diagnosis, Phil has taken important steps to get his affairs in order – living wills, financial planning, etc. – and equally important, is participating in research that could help beat the disease. Each month he hooks up to an IV machine in hope for better treatments and maybe a cure. He recognizes that even if this research will not help him personally, it could help the next generation. He emphasized the need to teach the next generation about Alzheimer's disease – and noted that if we want to stop this disease, young people need to know more about it. In closing, Phil quoted Bailey Reis, a sixth grader in Northern California, who wrote this in a school assignment: "If there was a secret door in my classroom, it would lead to a world without Alzheimer's. I would want the secret door to lead to a world without Alzheimer's so no one would die from the disease and everyone that has it now wouldn't have it as soon as I walked through the secret door."

Tim Weaver then shared his perspectives on living with someone with early-stage Alzheimer's. Tim is Phil's primary caretaker. As Phil's disease has progressed, Tim's responsibilities have multiplied. He shared the frustrations of being a caretaker for someone with memory loss at a young age and described a range of the unexpected challenges and changes to their lives as a result of the Alzheimer's diagnosis. Tim's reflections highlighted that Alzheimer's impacts more than just the person suffering from the disease. He echoed Phil's comments in encouraging more research and funding to help find a cure for Alzheimer's disease.

JOHN DOENCH, PHD, THE ELI AND EDYTHE L. BROAD INSTITUTE OF MIT AND HARVARD

CRISPR: A New Hope in Functional Genomics

The human genome, though sequenced, represents a large number of genes whose functions are not known or well understood. CRISPR CAS9 technology holds promise as a useful research tool that can help researchers better understand the function of specific genes as therapeutic targets for various diseases. CRISPR CAS9 system, which was found in the bacterial immune system, has been shown to be more precise in gene perturbation than RNA interference (RNAi). It shows more "on target" effects than RNAi, and therefore could be considered a powerful additional tool in perturbing genes with specific effects on phenotype.

The Broad Institute has developed the Genetic Perturbation Platform (GPP), through which they collaborate with industry, academia, and other stakeholders to, among other things, identify novel therapeutic targets. The Platform includes genome-wide pooled screening processes to develop a range of sgRNA (for the CRISPR system), and can include an in vivo screen to identify therapeutic targets. Dr. Doench presented a case study in which a screen was done to look for genes that could be manipulated to achieve improved cellular response to immunotherapy, in this case to reduce the possibility of tumor cell resistance to T-cells. It sought to determine what genes could be removed in order to sensitize cancer cells to immunotherapy. The study used sgRNA developed from pooled screening processes incorporated into an in-vivo screen in immunotherapy treated mice, which helped researchers identify a potential gene target for therapy that previously was not understood as an immunotherapy target.

A key element in developing a robust perturbation process is to start with a robust model, for example mouse models, cell cultures, or primary cells. The model selected must be relevant to the human disease. Often the bottleneck to successfully conducting pooled screening is the development of good models. Nuclease inactive CAS9 can be used in the functional genomics process as a flexible tool to turn genes on or off and to edit DNA bases directly. The Broad Institute has developed pooled CRISPR libraries, which are available via their Addgene program. Many of the challenges in the CRISPR field are associated with applying CRISPR CAS9 as a gene therapy. However, the sequence specificity and permanence of change provided by this technology holds promise.

In response to questions, Dr. Doench noted: Models used in this scheme need to be relevant to the disease in humans; often collaborations with industry do focus on developing relevant models. One can look at a genetic screen via integrating data and information from orthogonal sources indicating that information from a model is useful. It is possible to "triangulate" perturbations to identify relevant genes/effects and onecould look for genes with respect to phenotype and vice versa. For example, he has looked for norovirus receptor using the population of cells lacking the receptor.

GABRIEL VARGAS, MD, PHD, AMGEN

Introducing Digital Health into Clinical Trials

Many new personal technologies such as smartphones and wearable devices are being leveraged to enable a new age of digital clinical trials where these trials are being brought directly to the patient. Dr. Vargas discussed the results of two digital clinical trial pilots. The first of these included 30 healthy patients who wore an activity tracker and medical device patch for a 14-day period to facilitate our understanding of how to collect and retrieve the approximately 9 billion data points produced over the trial period from the wearable devices. The second trial involved chronic migraine suffers who received a wearable device to monitor heartrate and kept a daily migraine diary through a custom app over a three-month period. Overall, 78 subjects elected to participate through completion of a consent form and eligibility questions with about 70% study compliance. The presentation concluded with an overview of a digital cognitive platform used in the treatment of attention-deficit/hyperactivity disorder (ADHD) which is being evaluated by Pfizer to determine whether it can be used in the detection of Alzheimer's disease in the very early stages where treatments are currently focused.

There are still barriers to widespread adoption of digital clinical trials and adoption of new technologies such as ensuring HIPAA compliance, maintaining data integrity and security, and determining how to deal with large amounts of data along with a general strategy towards risk aversion. However, these barriers are not insurmountable and can be overcome through learning how to address the challenges involved and demonstrating the benefits to patients and the clinical trial process.

IQ Working Group Presentations

DPLG PATIENT CENTRIC

- Over the past 12 to 18 months, the IQ Drug Product Leadership Group has been discussing the value behind creating a working group focused on Patient Centric Drug Product Design. Patient Centricity is a real buzzword in the pharma industry today, used by many different groups to mean various things, but all centered on understanding end-user needs. In order to help others within IQ better understand what the DPLG Patient Centered Working Group is about, Glinda (played by Qun Lu), Clark (played by Mark Argentine), Count Pilz (played by David Tan), and Lucifer (played by Bob Ternik) poked fun at the pharmaceutical industry on Halloween to illustrate the point. As product developers, the PCWG believes that we can, and must, do a better job of understanding our patients and customers' needs and preferences for the purpose of using that insight to design products and information that lead to the desired outcome.

DMLG QSP: APPLICATION OF QSP TO DISCOVER INNOVATIVE THERAPEUTIC PARADIGMS FOR AGE-ASSOCIATED DISEASES

- The most important factor impacting the overall cost of drug development is the poor success rate in the Phase II Proof of Concept study, and therefore new approaches are needed to improve the probability of success of new drugs in terms of clinical efficacy and safety. Since most current drug-discovery efforts are targeted toward complex diseases, understanding the (patho)physiology at a systems level has been recognized as an important aid in target validation, biomarker selection, (pre)clinical study design, and patient stratification aiming for higher success rates in clinical trials.

- Quantitative Systems Pharmacology (QSP) is an emerging field which offers a quantitative framework to support translational drug discovery and development by integrating knowledge on biochemical, biological, physiological, pharmacological, and clinical systems into a mathematical or computational representation of disease and drug mechanisms.

- The WG advocated that to keep pharma at the cutting edge and expedite drug development, industry can benefit from expanding their internal QSP resources to help improve the probability of success of new drugs and decrease attrition in Phase II-IV trials, thereby reducing overall costs.

DRUSAFE – REVISED EMA GUIDANCE ON EARLY CLINICAL TRIALS

- In November 2016, the EMA released a draft guidance on early clinical trials with new investigational products, in response to a January 2016 clinical study (sponsored by Bial) with serious outcomes in healthy volunteers. The IQ Consortium, along with other associations (such as EFPIA), provided comprehensive, science-based written comments on the draft guidance, and attended a workshop with the EMA to discuss those comments and the guidance's impact on drug development. Maz Derzi (Pfizer) of DruSafe presented the impact of the revised EMA guidance and the industry's responses.

- The EMA later issued the final guidance with most of the nonclinical comments incorporated. A few comments in clinical study design and conduct, and industry's view that only "high uncertainty" programs need justification and documentation, were not adopted. The revised EMA guidance requires additional nonclinical and clinical documentation for all CTA submissions and has the potential for substantial impact on Phase 1 trial design and timelines. Notably, sponsors have received queries from EU health authorities based on the draft guidance since the beginning of 2017.

- In response to the Bial trial, IQ member companies also published a manuscript on their nonclinical approaches to progress small molecules to early clinical trials, concluding that the current nonclinical practices, together with science-based risk assessment and management, support safe FIH trials while advancing development of important new medicines. This is further supported by an IQ/DruSafe nonclinical to clinical translational database which indicates that the absence of concerning toxicity in animals predicts similar clinical outcomes.

Speaker Panel

Q: Where do you see IQ Consortium fitting into the emerging pharma industry?

A1: Partnerships across companies are very valuable.

A2: IT companies can create disruptive technologies and innovative solutions but we need industry to help identify applications and types of innovations that would be most impactful. Collaborations represented in the IQ Consortium are very important because no one individual company can do that alone. Collective input is needed to create transformative technologies for the long-term future.

A3: Innovation and Quality, for which IQ stands, are very important in generating cross-industry conversations about most important, overarching topics, not limited to a particular product application. Even side conversations at a meeting like this are very valuable. The pharma industry will need to continually think about the themes explored during today's meeting.

A4: In the field of digital health, we need to understand how to leverage animal/preclinical data and other early data once you get the data off digital devices. How do you analyze that data? There is value in collaboration so we can increase understanding of how these devices can work and can contribute to a more efficient product development.

A5: IQ databases can help discover patterns, trends, and can reveal the bigger picture, and thus multiply the value of data compared to single-company's efforts.

Q: Today, we heard that patients will be more and more in the center of product development and therapeutics of the future will be very different from today's. The web of interactions among stakeholders is much deeper and wider than before. Do we need to re-define what the pharma industry is and which companies can become IQ members?

A1: In recent FDA advisory committee meetings, patients are clearly having a lot of influence over outcomes and decisions. The patients' voice cannot be ignored. Going digital makes a lot of sense, and will help establish a patient centric mentality. Getting patient advocacy groups onboard is one mechanism to facilitate that process.

A2: We already see the expansion of the "pharma" world. Small startups that search for genes or engineer viruses to deliver therapies to target tissues are not engaged in typical "pharma" activities. Technology companies such as IBM and others are also getting more and more involved in this field because the rise of big data necessitates having IT companies at the table.

A3: We may also need to redefine what is "therapeutic". It is no longer just "small" or "large" molecules. Things are moving to personalized medicine and it will take multiple disciplines to make it possible. In today's engineering schools, the lines are already blurring between bioengineering, materials science, biologics, etc. Better care will require better understanding of what happens in our bodies. Therefore, the "pharma" world has to expand.

Q: What do you see as future of "Point of Care", digital medicines, and fabricating of medicines at the bedside?

A1: Interoperability of data is an important challenge to overcome. Data must be able to move between platforms to realize its full value. Technology protocols must be developed. For example, in the current state a simple upgrade to a smartphone could cause you to loose several years' worth of data.

A2: The threshold is getting lower for new technology, but we must decide what to do with it. That will require new talent – and it takes years to train it; we need to start thinking now about the future. The human aspect will also be important – how do we create loyalty among patients and health-care providers so they make use of the new technology and all its capabilities? Without users' commitment, the promise of breakthroughs may go unrealized.

A3: With the spread of digital products, clinical trials are becoming more virtual, but this also enables information sharing among patients, so the concept of blinding is changing. It is already happening and will happen more in the future.

A4: Fabricating medicines on demand is another aspect that we may see more of in the future. If there is a strong market need, technological solutions will be found, but it will require a partnership between traditional chemistry-based pharma and IT/hardware companies.

A5: Should we think about creating a bank of data on each patient? This could help us predict recurrence of cancer, or susceptibility to certain drugs. We could combine genetic, phenotype, behavior, and lifestyle information in that patient profile, and that would enable truly personalized care.

Q: We heard about demographic changes today. There already are special programs for pediatric patients and pediatric products. However, are we doing enough for the elderly?

A1: No, but we should. Most clinical trials exclude elderly patients. Digital technologies can help here as well. For example, using voice-activated products such as Alexa or Siri, could help engage the population of 65 to 70 year-olds.

A2: In ophthalmics, diseases in the elderly are different from those in the young. Assisted technology will be very helpful. More work needs to be done, however, to make a real difference on a large scale.

A3: Digital technologies could also help navigate the healthcare system more easily. Currently, your neurologist may not know what your cardiologist is finding or prescribing. Data sharing will break the walls between silos.

Q: What are the reasons that the pharma industry changes so slowly?

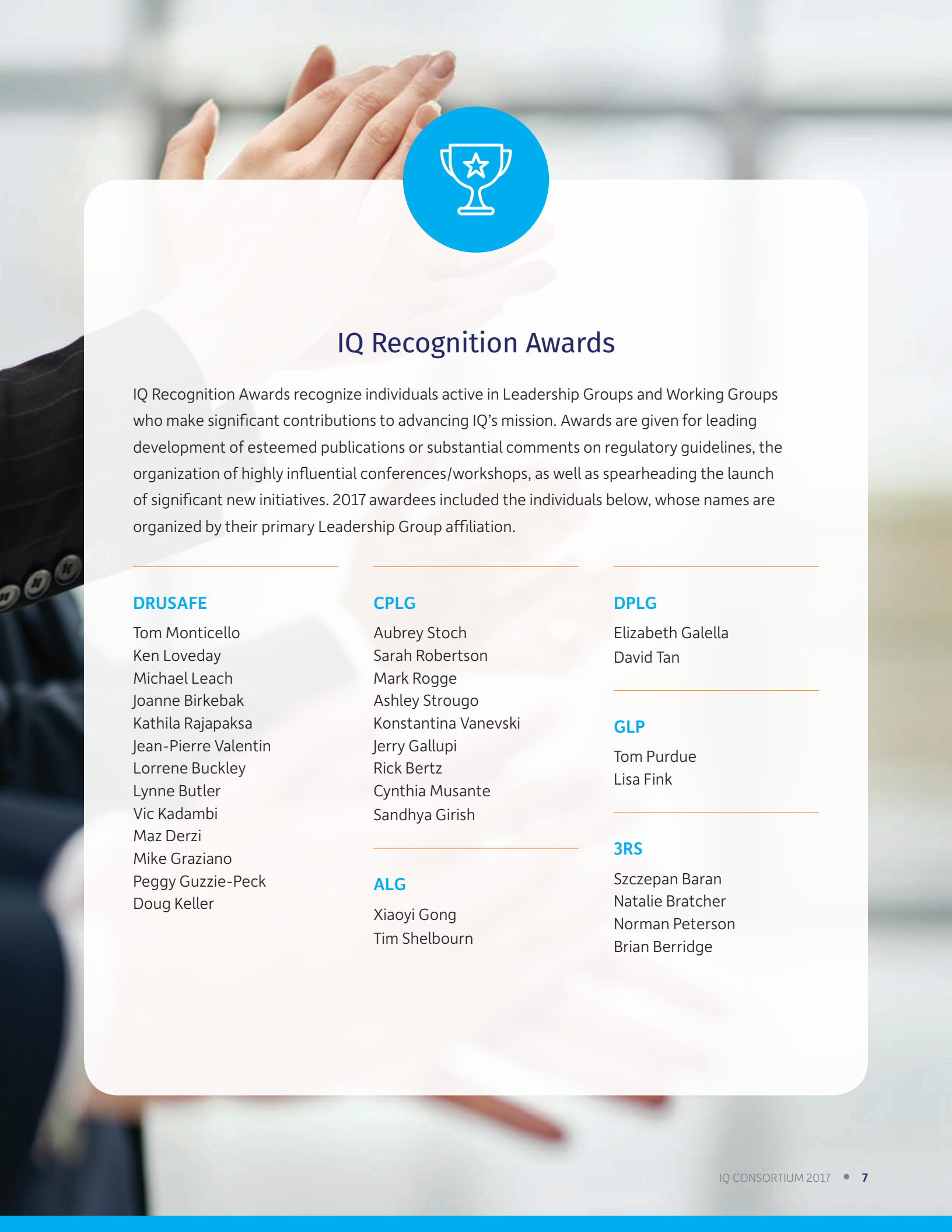
A1: Regulation is one of the reasons, but the risk-averse culture and conservatism within companies also play a role.

A2: This industry is conditioned to think about chemistry. Now it is asked to move into digital space, biology, and genetics. The time window for execution of new ideas is also getting shorter and shorter. Business models may need to change accordingly. Now is a highly dynamic time and it requires a shift in mindset.

A3: Collaborations and partnerships among companies that we see today were unthinkable 20 to 30 years ago. The growth of interconnected, collaborative approaches is required for this industry's evolution. There are certain things that are changing faster when done together than when left to an individual company.

Q: What do you think of the role of media in drug development?

A: It is difficult, if not impossible, to manage media, but we as an industry need to be better at communicating what we are doing and why. Patients are smart enough. Educating patients should be part of our mission. We need to increase transparency, especially when missteps happen. Lack of information leads to overblown reactions. We all need to do a better job explaining what we do.



IQ Recognition Awards

IQ Recognition Awards recognize individuals active in Leadership Groups and Working Groups who make significant contributions to advancing IQ's mission. Awards are given for leading development of esteemed publications or substantial comments on regulatory guidelines, the organization of highly influential conferences/workshops, as well as spearheading the launch of significant new initiatives. 2017 awardees included the individuals below, whose names are organized by their primary Leadership Group affiliation.

DRUSAFE

Tom Monticello
Ken Loveday
Michael Leach
Joanne Birkebak
Kathila Rajapaksa
Jean-Pierre Valentin
Lorrene Buckley
Lynne Butler
Vic Kadambi
Maz Derzi
Mike Graziano
Peggy Guzzie-Peck
Doug Keller

CPLG

Aubrey Stoch
Sarah Robertson
Mark Rogge
Ashley Strougo
Konstantina Vanevski
Jerry Gallupi
Rick Bertz
Cynthia Musante
Sandhya Girish

ALG

Xiaoyi Gong
Tim Shelbourn

DPLG

Elizabeth Galella
David Tan

GLP

Tom Purdue
Lisa Fink

3RS

Szczepan Baran
Natalie Bratcher
Norman Peterson
Brian Berridge

INTERNATIONAL CONSORTIUM *for*
INNOVATION & QUALITY
in PHARMACEUTICAL DEVELOPMENT

The IQ Consortium is dedicated to augmenting the capability of member companies to develop transformational solutions that benefit patients, regulators and the broader R&D community.

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