Executive Highlights

The first World Congress on Targeting Metabesity featured two packed days of learning at the intersection of diabetes, obesity, CV disease, cancer, dementia, and the aging process itself. There was a sharp focus on prevention throughout the agenda, and the lineup of speakers represented true multi-disciplinary expertise - the great Dr. Zan Fleming offered a working definition of "metabesity" so that, collectively, we can do something about it, the esteemed Professor Philip Home discussed the origins of obesity in childhood, Dr. Brian Harvey from the Global Liver Institute shared lessons learned from NASH clinical trials, and more. We detail some of the highlights of the meeting on this page (though it was very hard to pick!).

At a high-level, we're intrigued by the concept of metabesity, and how a better understanding of comorbidities (or as Dr. Fleming has called it, "the constellation of interconnected conditions") could allow for optimal diabetes care. To be sure, managing this disease is becoming less and less about A1c, more and more about preventing macrovascular and microvascular outcomes. This includes CV events, from stroke, MI, and heart failure to death from CV causes. It also includes renal complications (worsening eGFR, micro/macroalbuminuria), eye disease, peripheral arterial disease, diabetes-related foot ulcers, liver fat and new-onset of NASH (which to-date has no FDA-approved therapies on the market) ... and the list goes on. From this lens (and we think this is the right perspective to be taking), those in the diabetes field should certainly collaborate with and learn from their colleagues in the cardiology world, the nephrology world, the liver world, the ophthalmology world, and of course, the regulatory world. And on the flip side, it's becoming increasingly important that HCPs across a wide range of specialties know how to treat patients with diabetes - for example, new CV indications for Lilly/BI's SGLT-2 Jardiance (empagliflozin) and Novo Nordisk's GLP-1 Victoza (liraglutide) have extended an official invitation to cardiologists to start prescribing these agents, and to start thinking about type 2 diabetes as a CV disease. This Metabesity Congress was an ideal setting to facilitate these valuable cross-disciplinary conversations.

Moreover, prevention rose to the top as a major theme at this conference. The most recent IDF Atlas (now in its eight edition) reports that globally, 425 million people age 20-79 have diabetes today, and projects that this number will increase to 629 million by 2045. One in eight global healthcare dollars are spent on diabetes, for a grand sum of $727 billion annually. This epidemic cannot and will not be curtailed by treatment alone - we have to mobilize around prevention. Novo Nordisk's Cities Changing Diabetes (CCD) program predicts that prevalence will rise to one in nine people (11.7%) by 2045 if nothing is done about it, at which point the world will spend upwards of $1 trillion on diabetes. If cities implement successful prevention initiatives, cutting obesity rates by 25%, we could keep type 2 diabetes prevalence below one in 10 (10%), and we could save $200 billion in healthcare expenditures. Several speakers at this Metabesity meeting highlighted efforts to support healthy lifestyle and prevention, through digital health (Ms. Stephanie Tilenius' Vida Health platform delivers the DPP, and also supports chronic disease management more broadly) and ethical arguments (Oxford's Dr. Joshua Hordern posed a thought-provoking question - "are we our metabese neighbors' keepers?"). Importantly, a similar story could be told about preventing diabetes-adjacent conditions like obesity, CV disease, and NASH, in that intervening earlier is key. Dr. Harvey reminded us that NASH is extremely under-diagnosed, in part because the current standard of practice for diagnosis is still an expensive, invasive biopsy. How can we prevent NASH if a majority of patients aren't aware of their own liver disease until it's progressed to end-stage cirrhosis? The power of a multi-disciplinary approach like metabesity extends to prevention as well as chronic disease management. How might we amplify prevention efforts by pulling in a diverse array of stakeholders with wide-ranging therapeutic expertise? Can we raise the stakes by devising a prevention movement not around one disease, but around the entire constellation of conditions that make up metabesity?

In the content below, you'll find a deeper dive on some of these talks, and we'll let you get to reading without further ado! This gathering in London was the first (hopefully, annual) World Congress on Targeting Metabesity, and we look forward to another conference on this topic in 2018 (we hear from co-chairs that it's planned for Washington, DC!).

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Detailed Discussion and Commentary

METABESITY - WHAT, WHY, AND HOW

Alexander Fleming, MD (Executive Chairman, Kinexum, Washington, DC)

Dr. Zan Fleming, who co-chaired this congress with Drs. Julia Manning from 2020health and Larry Steinman from Stanford (organized by Bioevents), emphasized that "metabesity" is still an emerging concept, with an in-progress definition. He called upon the conference faculty to continue refining the definition, so that the term could capture the full weight of what it means to be healthy vs. at-risk for morbidity/mortality. Importantly, Dr. Fleming clarified that "metabesity" does not equal "metabolic disease." Rather, it expresses the links among major, diverse biological conditions that share metabolic roots (he pointed to common underlying physiology for many of these seemingly-separate disease states - inflammation is one example). Metabesity encompasses diabetes and obesity, as well as CV diseases, neurodegenerative disorders (Alzheimer's, dementia), cancer, and even the aging process itself. The word might mistakenly be conflated as "metabolic disease" + "obesity," with an overemphasis on BMI and weight loss treatments, and to this end, Dr. Fleming suggested that perhaps the congress should consider "metadisity" instead. The exact definition may be refined by the second World Congress on Targeting Metabesity, but there's no doubt that this could be a very powerful term. By elucidating common core aspects of diabetes, obesity, CV disease, neurodegenerative disorders, cancer, and aging, HCPs could potentially discover new tools to treat a whole host of chronic diseases. What's maybe even more exciting is that societies could find ways to prevent a whole host of chronic diseases. Indeed, prevention emerged as a key theme during this two-day conference, and Dr. Fleming mentioned two pharmacotherapies that could be effective preventative agents:

- **(i) First, his self-proclaimed "favorite drug," metformin.** Dr. Fleming (who led the FDA review that approved it for the US in 1994) presented metformin as a candidate for metabesity prevention, a way to achieve an "early win." He grounded his argument in empirical and real-world evidence. The Diabetes Prevention Program Outcomes Study (DPPOS) found a significant 31% risk reduction for new-onset type 2 diabetes with metformin therapy vs. placebo after 2.8 years. After 15 years, diabetes incidence in the metformin group was still 18% lower compared to the placebo group. Dr. Fleming underscored that we don't want to overpromise and under-deliver with metformin, since intensive lifestyle intervention was the more efficacious prevention strategy at both time points (reducing incidence by 58% and 27%, respectively). That said, lifestyle modification in clinical trials is carefully supervised, which doesn't always translate or isn't always realistic/feasible in the real

world. What the DPPOS shows is that metformin should at the very least be considered for type 2 diabetes prevention, because it's an extremely viable option. Turning to real-world evidence, Dr. Fleming reminded the room that metformin has been on the market for >60 years: "We can say it's safe enough because it has been used for six decades as a treatment for type 2 diabetes. We know a lot about its drug safety profile, which is not perfect, but good." He further remarked that the ADA recommends metformin for people with prediabetes, but explained that his former FDA division has been unwilling to add a prevention indication to metformin's product label without a formal submission, "despite what I think is abundant persuasive evidence."

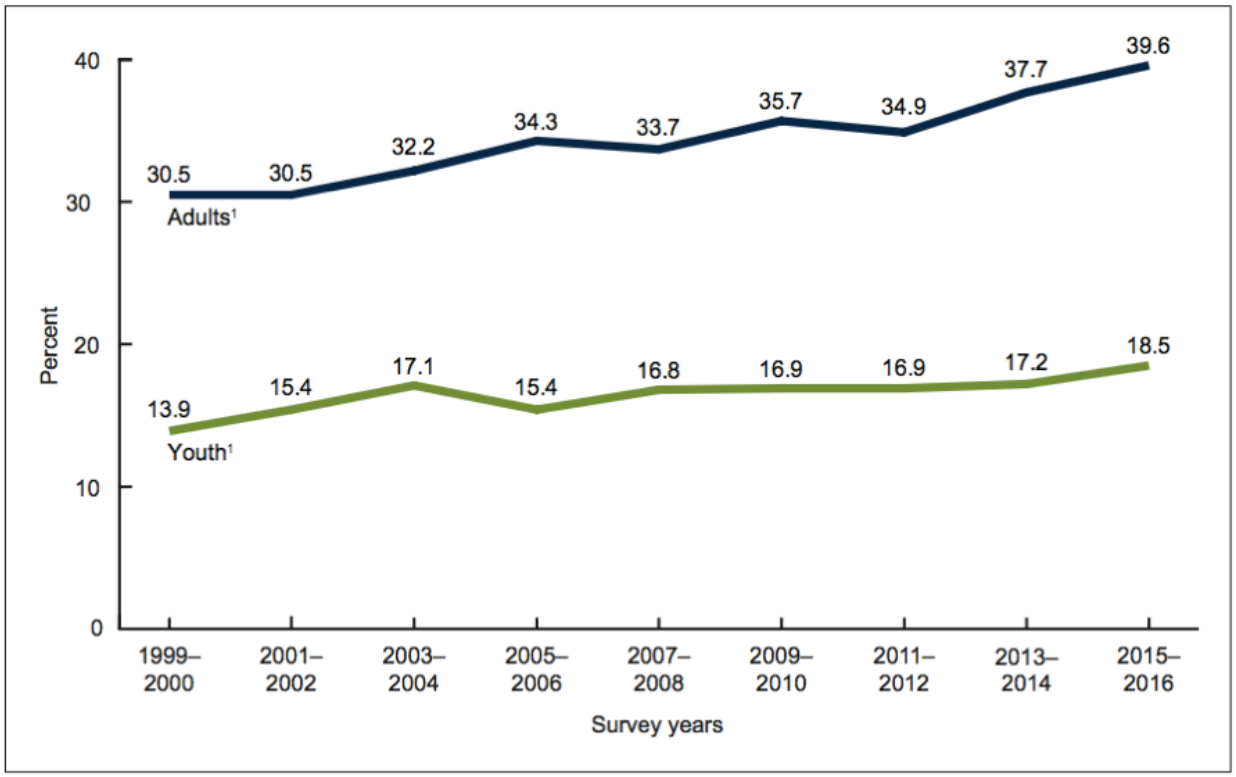
    - **Dr. Fleming added, "there's no other drug that's quite ready for type 2 diabetes prevention, but metformin is low-risk and could be applied to a large population."** The former FDA official is certainly not alone in this view among diabetes thought leaders. Dr. Clifford Bailey (Aston University, Birmingham, UK) made the same argument about 60 years of real-world safety data at EASD 2017, and at CMHC 2016, Dr. Anne Peters (USC, Los Angeles, CA) highlighted metformin's impressive efficacy in delaying the progression of prediabetes to type 2. Dr. John Buse (UNC, Chapel Hill, NC) shared a compelling health economic argument for metformin in prevention at WCPD 2016: It would cost a little over $4 billion to treat the entire US prediabetes population with metformin vs. >$1.2 trillion to treat this group with liraglutide and ~$1.4 trillion to treat this group with intensive lifestyle intervention as provided by the DPP (which at the time of the DPPOS, cost ~$100/person/session). These numbers make it hard to argue against metformin as a population-level solution, though we note that these figures may be slightly out of date, especially since new iterations of the DPP (group-based, digital platforms, etc.) are lessening the financial burden of a lifestyle modification treatment. Nevertheless, we'd love to see more applications of both metformin pharmacotherapy and intensive lifestyle intervention in the real world, where prediabetes more often than not goes entirely undiagnosed. We also appreciate the role of product labels in directing real-world prescription habits (busy HCPs rely on this information to inform treatment decisions), and we certainly see the enormous value in getting FDA to add a prediabetes indication to the metformin label.

- **(ii) Dr. Fleming listed statins as "another favorite drug of mine."** His first review assignment at FDA was for the first statin, lovastatin. Paralleling metformin and diabetes, he suggested that statins could be used even earlier in the course of hyperlipidemia, starting in people with normal cholesterol levels at-risk for CV disease. He acknowledged that there's perhaps more downside to statins vs. metformin, including some concern over increased risk for new-onset diabetes with statin use, although statins are still the standard of care for lipid-lowering therapy even in people with diabetes (to be sure, lipid-lowering is an important component of comprehensive diabetes management). Like metformin, statins also come with convenient oral dosing and lower cost than branded prescription drugs. Dr. Fleming alluded to mixed evidence on statins and risk reduction for Alzheimer's disease. With these perspectives on metformin and statins, he established prevention as a focus for the rest of the conference, and sparked fascinating discussion that continued nonstop for the remaining two days.
- **"This meeting will provide insights for everyone, regardless of what your discipline might be."** Dr. Fleming called out the multi-disciplinary faculty at this conference, and highlighted the need for more cross-disciplinary conversations on chronic disease management and prevention. We're intrigued by the notion that joining forces on prevention initiatives across a variety of diseases - all under the metabesity umbrella - could amplify the movement around healthier built environments that support people in health citizenship. As Dr. Fleming described, there are common systemic factors driving diabetes, obesity, CV disease, etc. in the population, and the more voices we have unified around a prevention message, the better.

WHY CAN'T I PREVENT OBESITY AND TYPE 2 DIABETES?

Philip Home, MD (Newcastle University, UK)

Professor Philip Home argued that obesity has its roots in childhood, which is why it's so exceptionally difficult for people to meaningfully change eating behavior later in life, when they're prescribed a diet for chronic weight management. In his words, "eating behavior is programmed during childhood," and dietary interventions in adults are often "frustrating failures." Prof. Home described a paradox that occurs with weight loss drugs, focusing specifically on SGLT-2 inhibitors. This class is known for its glucose-lowering efficacy as well as its favorable effects on body weight (these agents - canagliflozin, empagliflozin, dapagliflozin, ertugliflozin, ipragliflozin- work by increasing urinary glucose excretion, resulting in calorie loss for the individuals taking them). The paradox arises when patients on an SGLT-2 inhibitor unconsciously eat more to restore their calorie balance, and Prof. Home pointed to this behavioral side-effect as a reason that SGLT-2 therapy hasn't produced as much body weight reduction as we might expect in the real world. Even when people show early motivation to change their diet/lifestyle, Prof. Home explained that will power is a limited resource - it's hard to keep up meticulous calorie counting, for example, when other aspects of life become more complicated or stressful, and feelings of low self-efficacy only exacerbate the problem. He concluded his talk with possible solutions, the overarching message being that we have to introduce concepts of healthy eating and teach what it means to be a healthy body weight during childhood itself - that is, we have to start earlier. He suggested we target interventions to school-age children, and implied that these healthy habits might also carry over to their parents. To firmly establish obesity and childhood obesity as public health crises, Prof. Home cited the most recent NHANES data, from the 2015-2016 survey: Prevalence was 40% among US adults (up from 38% between 2013-2014) and 19% among US youth (up from 17% in 2013-2014). These numbers are far, far too high, and they're trending in the wrong direction.



[1]Significant increasing linear trend from 1999–2000 through 2015–2016.
NOTES: All estimates for adults are age adjusted by the direct method to the 2000 U.S. census population using the age groups 20–39, 40–59, and 60 and over.
Access data table for Figure 5 at: https://www.cdc.gov/nchs/data/databriefs/db288_table.pdf#5.
SOURCE: NCHS, National Health and Nutrition Examination Survey, 1999–2016.

- **Prof. Home explained that diabetes is a result of calorie toxicity (or overconsumption) rather than obesity per se. He presented studies to show how reducing calorie intake**

can normalize glucose tolerance even when an individual's BMI still indicates obesity. This bolstered his argument about the need to target anti-obesity initiatives to school-age children, since healthy eating habits that avoid over-nutrition could delay or prevent type 2 diabetes (and metabesity) as well.

METABESITY: 21ST CENTURY SOLUTIONS FOR A 21ST CENTURY CRISIS

Richard Barker, PhD (University of Oxford, UK)

According to Dr. Richard Barker, metabesity is a 21st century problem, and it's futile to approach this public health crisis with 20th century solutions. He shared a four-P model for healthcare systems of the future: predictive, preventive, personalized, and participatory. These four P's stand a chance in the battle against metabesity, and Dr. Barker particularly emphasized the last, arguing that patient participation is vital since so much of chronic disease care is self-management ("this isn't something that doctors can just decide to fix"). We've heard this message many times at diabetes conferences - Dr. Deborah Greenwood (Sutter Health, Sacramento, CA) emphasized at WCPD 2016 that the average person with diabetes spends only 0.007% of his/her time with a healthcare professional - and so we absolutely agree that patient engagement needs to be a priority. In speculating on possible 21st century prevention strategies for metabesity, Dr. Barker displayed items like technology-based adherence programs, genomic risk assessments, and personalized nutrition/medication regimens in a cloud around "patient self-engagement," emphasizing that this must be at the crux of whatever we do next to improve healthcare.

- **As a stark reminder of challenges to obesity pharmacotherapy, Dr. Barker shared that US patients go to a pharmacy 15x more frequently to pick-up diabetes drugs vs. obesity drugs.** He described reluctance from patients/HCPs to consider pharmacotherapy for weight loss, citing concerns over side-effects (we suspect this stems from first-generation obesity drugs, which did come with substantiated safety concerns) and provider bias, or the misconception that obesity isn't something you can treat with a pill or injection. We certainly see these commercial obstacles manifest in sluggish obesity sales. Novo Nordisk's Saxenda has been the sole growth driver for the class of-late, although Orexigen's Contrave has also experienced a spike in sales in light of the company's anti-stigma marketing campaign. We're hopeful that concerted marketing/education efforts from Novo Nordisk, Orexigen, and other obesity manufacturers might slowly lower the barriers that block obesity drugs from many patients who could benefit from them. We can't forget that access is also a key issue for obesity products, and the number of patients picking up prescriptions won't rise until reimbursement is markedly improved.

WHAT DO NASH TRIALS TEACH US?

Brian Harvey, MD (Global Liver Institute, Washington, DC)

Dr. Brian Harvey described liver disease as a "silent" epidemic, because most people aren't aware of their hepatic dysfunction until it's at the point of end-stage cirrhosis. He attributed this inertia in large part to an expensive, invasive liver biopsy as the standard of care for NASH diagnosis. Indeed, management from companies developing NASH therapeutics (including Gilead) has cited low diagnosis rates as a hurdle to clinical trial recruitment and to identifying the true size/scope of the market for NASH drugs. Notably, to this day there are no FDA-approved treatments for NASH, and so any barrier to clinical development is significant in our view (see our NASH competitive landscape for an overview of the pipeline). Dr. Harvey highlighted the substantial overlap between NASH and the rest of metabesity, delivering this memorable quote: "It'll be sad to have a generation of people with type 2 diabetes with good A1c control who go on to a liver transplant as their ultimate demise." He discussed a few potential solutions, so that we might curtail this crisis. FibroScan is an ultrasound-based liver diagnostic technique in development from Echosens, and Dr. Harvey commented that ultrasound is easy to do, acceptable from the patient perspective, and much (much!) less expensive than a biopsy or an MRI. He acknowledged the criticism that ultrasound is "fairly primitive" and that FibroScan may not meet the most rigorous standards for sensitivity (does it catch all cases?) and specificity (does it avoid false positives?), but he maintained that it's still "head and shoulders" above lab tests for liver enzymes because the positive predictive value is high. In other words, FibroScan

might miss a few cases of early-stage NASH (sensitivity), but providers can trust that positives are true positives (specificity). Dr. Harvey also advocated that hepatic data be more systematically collected in diabetes CVOTs, large outcomes studies that are being done anyway, and that could provide substantial knowledge on liver disease. We were intrigued by this argument, especially given how common NASH is as a diabetes comorbidity, and we'd love to glean as much insight as possible from diabetes CVOTs - to be sure, these are massive endeavors, and we want to see all findings translated into real-world patient care. On the other hand, Dr. John Buse (UNC, Chapel Hill, NC) pointed out at Keystone 2017 that increasing the number of measurements sometimes makes it more difficult to retain clinical trial participants, especially for studies of long duration (like CVOTs). We still feel that designing these studies to look at a wide range of safety and efficacy endpoints makes sense, due to the range of relevant comorbidities and complications when it comes to diabetes, but Dr. Buse's point is certainly one to keep in mind.

- **Dr. Harvey shared that he sees combination approaches as the future of NASH therapy, and he specifically mentioned Novartis/Allergan's collaboration around cenicriviroc/FXR agonists.** Through a new agreement announced in April, the two companies will conduct a phase 2b trial of Allergan's cenicriviroc (CVC) co-administered with one of Novartis' FXR agonists in development for NASH. Cenicriviroc was also spotlighted as a "trailblazer" treatment at the recent NASH Summit Europe, and we do sense enthusiasm building for this candidate and its potential in combination therapy. Like type 2 diabetes (think: ominous octet) NASH is a highly heterogeneous disease, with underlying physiological elements of inflammation, fibrosis, and metabolic distress, which makes combination approaches all the more necessary to address the multiple facets of the condition.
- **Dr. Harvey briefly touched on The Liver Forum, a public/private partnership that aims to engage regulators in discussions around fatty liver disease and NASH.** As we learned at the NASH Summit Europe, there is little consensus or understanding around what regulators are looking for in NASH drug development and late-stage clinical trials. Investments in NASH seem to be increasing, and as knowledge accelerates and the field rapidly evolves, a primary endpoint can go from critical to meaningless before a clinical trial has completed. Navigating the regulatory scene will be particularly challenging and particularly important for the leaders in NASH drug development with agents in phase 3 right now (Genfit, Intercept, Novartis/Allergan, Gilead, etc.) - to this end, we were glad to learn about The Liver Forum and recent productive meetings with regulators in DC.

ETHICS FOR AN AGE OF METABESITY

Joshua Hordern, PhD (University of Oxford, UK)

Oxford's Dr. Joshua Hordern left the Metabesity Congress with four though-provoking questions, all related to the role society must play in chronic disease prevention. If metabesity has any roots in the built environment - and Dr. Hordern pointed to many examples, including choice architecture that could nudge people toward disease-preventing behavior, but instead nudges people toward unhealthy behavior - than these environmental factors must be addressed in any successful prevention initiative.

- **(i) Are we our metabese neighbors' keepers?** Dr. Hordern reviewed the ethical basis for this notion that we are responsible for the wellbeing of our neighbors. Chronic disease has a distinct adverse impact on society, especially at the local "neighborhood" level, with productivity loss, resources drained that could otherwise go elsewhere in the community, etc. Thus, there are clear reasons that individuals should support their neighbors in preventing chronic diseases like diabetes and obesity, and Dr. Hordern suggested that health needs to be a higher priority for the public.
- **(ii) How will we love both later life and younger generations?** The aging process was a major theme at this meeting, and Dr. Hordern picked up on it in his take-home questions. Aging is certainly a component of chronic disease development, and metabesity management must consider best practice treatment for an older population. On the other hand, prevention was also a key theme at this conference, with speakers placing a sharp focus on younger generations (see above for

Professor Philip Home's perspective on anti-obesity initiatives targeted to school-age children). Balancing these goals will be an important task ahead for the metabesity movement.

- **(iii) What qualities should mark a ripe old age?** This question reminded us of the very definition of metabesity, which is still being refined, but which aims to capture the difference between being healthy vs. at-risk for morbidity/mortality. In an era where people are living longer, how can we prevent chronic disease to extend not just life, but healthy life?
- **(iv) What political culture of compassion and responsibility should we pursue?** Dr. Hordern acknowledged that there are many ethical questions remaining when it comes to every stakeholder's responsibility in public health and wellness: What is the policymaker's obligation? What is the neighbor's obligation? What is the individual's obligation? What is certain is that we need to take action at the population-level to prevent diabetes, obesity, NASH, CV disease, and other aspects of metabesity, with prevalence otherwise on a steady incline - in our view, changing this trajectory will require commitment from all stakeholders, meaning everyone needs to shoulder some of the compassion and responsibility.

VOICE OF PATIENTS AND THEIR ADVOCATES

Payal Marathe (Close Concerns, San Francisco, CA)

Ms. Payal Marathe (a senior associate at Close Concerns) outlined five goals for a future healthcare system that is proactive instead of reactive - where HCPs support people in staying healthy, rather than the current paradigm of getting sick people back to baseline, and where the built environment facilitates healthy behavior, rather than the current paradigm of placing the burden on individuals to seek out healthy choices. She spoke to the patient/consumer perspective on what people need to feel empowered in leading a healthy lifestyle. As diabetes and obesity rates continue to rise (NHANES reported an increase from 38% adult obesity prevalence in 2013-2014 to 40% in 2015-2016, and the eight IDF Atlas - published on World Diabetes Day - reported that 425 million adults globally have diabetes today, with a projected climb to 629 million adults by 2045), it's becoming increasingly clear that we can't dampen these epidemics with treatment alone. We have to think about prevention.

- **(i) Reduce stigma.** There will be no room for stigma within a prevention-focused healthcare system - after all, we can't expect to prevent obesity if there is an intense social stigma that precludes talking about it (and the same applies to diabetes). As possible solutions to reduce stigma, Ms. Marathe underscored the importance of person-first language (i.e. people are not "obese," they are affected by the biological disease of "obesity"). She showed a slide of NFL football players wearing pink to support breast cancer awareness, suggesting that there is a lot of power in finding advocates in unlikely places. There are certainly athletes who have family members with diabetes or obesity, if they're not affected by these conditions themselves. Could we find anti-stigma advocates in this group? Novo Nordisk recently launched a partnership with TV/movie actor Anthony Anderson (currently the star of "Black-ish") around a new campaign to "Get Real About Diabetes." We're very excited about the potential for this campaign to combat stigma and encourage patient engagement in diabetes management.
- **(ii) Make the healthy choice the easy choice.** To promote health engagement, salad should be cheaper than pizza, and healthy foods should be the default option. Ms. Marathe described the halls of the San Diego Convention Center, where ADA 2017 took place - Mrs. Fields cookie stands were everywhere, and to buy salad, fruit, or any healthy snack, ADA attendees would have to leave the convention center and go out of their way. On the flip side, she provided an example of good choice architecture - at Novo Nordisk's New Jersey headquarters, one slice of pizza costs $10, but salad only costs $2. A built environment that supports physical activity is just as important as supporting better diet, and ideally, buildings would be designed with the stairs front-and-center, so that most people have to go out of their way to take an elevator or escalator. That is, stairs should be the default option. On a larger scale, Toronto (with its waterfront revitalization project, creating community spaces for walking, jogging, etc.) and Copenhagen (with safe bike paths) are examples of cities supporting physical activity - public health is informing urban planning decisions, not the

other way around. In contrast, when our team was in Houston for the recent Cities Changing Diabetes summit, we could hardly find sidewalks, and walking felt unsafe because of traffic and a broken crosswalk signal.

- **(iii) Patient/provider conversations should cover what really matters.** There is an important distinction to be made between patients and consumers, in that consumers feel ownership over their purchase decisions - they feel invested, they ask questions. Most people today don't feel the same level of ownership over their health. As we shift toward prevention-focused healthcare, we need people to visit their HCP before the onset of disease, to ask questions, to be informed about their own health. Decision-support systems could be instrumental here, offering personalized treatment plans so that patient/provider conversations can focus on what really matters, including patient preferences and priorities.
- **(iv) Patients should have a say in how much risk they're willing to take on.** Take metformin, as one example. Dr. Fleming reviewed the six decades of real-world safety data we have on this agent, plus the clinical trial evidence that shows significant risk reduction for new-onset diabetes. Ms. Marathe thus suggested that people can decide if this is a pill they'd be willing to take to prevent diabetes. To be sure, this effort is already underway, with FDA doing more to incorporate the patient voice into the regulatory process, and hopefully the effort will only be amplified going forward.
- **(v) Foster health citizenship.** Ultimately, people do need to take responsibility for their health and wellbeing, and for the health and wellbeing of people around them, but that starts with strong built environments and anti-stigma efforts. Hordes of people have embraced their role in protecting the environment - now and for future generations. It would really be something if all people began to feel this responsibility for health, just as fiercely as they feel responsibility to recycle and reduce their carbon footprint. Ms. Marathe ended with this fifth wish for the future of proactive healthcare systems, a culmination of the four wishes outlined before.

BEFORE PILLS: PREVENTION THROUGH DIGITAL HEALTH

Stephanie Tilenius (Vida Health, Palo Alto, CA)

Ms. Stephanie Tilenius, CEO and co-founder of Vida Health, represented the digital health world at this Metabesity Congress. She elaborated on the Vida Health platform, and emphasized the potential for technology-based solutions in chronic disease prevention. Vida Health helps people manage a range of chronic diseases, including diabetes, and it delivers the DPP, pairing each user with a health coach and/or team. The product leverages machine learning to mine patient data. Vida prides itself on addressing co-morbidities, and reports that patients with diabetes and depression are four times more expensive. According to Ms. Tilenius, 30%-40% of cardiometabolic health patients are experiencing simultaneous depression or anxiety, which motivated the addition of a behavioral component to the Vida platform - she presented the equation behind the mobile experience she created as "personal + engaging = outcomes." Vida partners with academic medical institutions like Duke University, employers like eBay, and providers like Aurora to engage tens of thousands of patients. As healthcare costs continue to rise, solutions like Vida Health, which have helped people with diabetes cut down on their number of medications, will be critical. Ms. Tilenius shared a couple anecdotes of people who were able to stop all pharmacotherapy. Recently, Vida Health worked with patients who suffered a heart attack or underwent cardiac surgery at Duke to help avoid re-admission, slashing healthcare costs.

-- by Payal Marathe and Kelly Close