

Personalised Lifestyle Medicine: notes from a parallel universe

Dr Jeff Bland held his annual thought leadership conference at the Institute for Systems Biology with a stellar line-up of speakers. CAM contributing editor **NIKI GRATRIX**, BA, Dip ION, mBANT, reports.

The much anticipated second Annual Personalized Lifestyle Medicine Institute (PLMI) consortium met and exceeded expectations with an extraordinary speaker line-up. Leading figures included “greats” from preventative health science research, biotechnology, academia and functional medicine in both clinical and corporate settings.

The consortium took place in Seattle, an appropriate location for both the Personalized Lifestyle Medicine and Systems Biology Institutes. Information technology-based businesses are big there. Microsoft is headquartered in nearby Bellevue, WA, and Amazon calls the city home.

A recurring theme throughout the conference was the “quantified self”, a phrase originally coined by editors of the tech magazine *Wired* to describe a movement which started in the 1970s in Silicon Valley, where wearable computers for self-tracking health and the use of IT solutions such as mobile phone apps to “biohack” optimum health are the rage. This movement, in synergy with developments in computing analysis of “big data”, are nothing less than revolutionising healthcare.

Perhaps the best technology

development known to practitioners is 23andMe, the genetic testing company founded by Ann Wojcicki, wife of Google co-founder Sergey Brin. Google has invested millions in 23andMe. 23andme is now available in the UK: for just £125 people can get a broad genome profile and identify their SNPs, something that used to cost thousands of pounds.

Dr Bland and the PLMI succeeded in attracting a diversity of speakers this year that ensured not just an exchange of inspirational ideas but, importantly, support for applying them in real life.

P4 Medicine and Systems Medicine

Perhaps the highlight of the conference was delivered on the second day by the founder of the Institute for Systems Biology, Dr Lee Hood, MD, PhD.

Dr Hood explained that the convergence of systems biology, the digital revolution and consumer-driven/online crowd-sourced healthcare is transforming medicine from its current reactive mode, which is focused on treating disease, to a P4 Medicine model, which is medicine that is **predictive, preventive, personalised and participatory**.

Dr Hood is the recipient of 17



“Nutrition is in the Dark Ages” – systems biology pioneer Lee Hood MD, PhD.

honorary degrees, has published more than 750 peer-reviewed papers and, while at Caltech, co-developed the DNA gene sequencer and synthesiser which paved the way for the completion of the human genome project.

A pioneer in the systems approach to biology and medicine and a pillar in the fields of biotechnology and genomics, Dr Hood showed the audience how his fascinating personal journey overlapped with the history of systems biology, from the beginnings of his career in 1970 at Caltech, when neither the conceptual framework nor technical tools existed to deal with complexity and analysis of “big data” in biology: what was needed to design predictive health models.

In the early 1990s, Dr

Hood joined the faculty of the University of Washington to create the systems biology department with funding from Bill Gates, but later resigned after dealing with the challenges of trying work with cross-disciplinary departments, reductionist thinking and academic conservatism. He says of that time: “Bureaucracies struggle to deal with the present, and almost never can they deal with the future.”

He went on to found the Institute for Systems Biology, to “invent” systems science and, with the help of \$100 million provided by the health minister of Luxembourg over a five-year period, created strategies to develop “P4 Medicine.”

As many of us functional medicine practitioners now working with genetic testing know, understandings gained from completion of The Human Genome Project have blown apart some of the most basic principles of conventional medicine – such as “recommended daily allowances” (RDAs) of nutrients; drugs for an “average person”; the idea that there is a single linear solution (usually a drug) for a single cause of chronic illness; the idea that there is a one-size-fits-all protocol of treatment for illnesses including one diet for everyone (eg the government

food plate); and that statistical averages are relevant for an “average person” – a person that it turns out doesn’t exist.

Dr Hood concludes from all this: “I would argue the whole field of nutrition is in the Dark Ages, and the only way we’re going to move it forward is with strategically targeted experiments and patient-activated social networks”.

The digital revolution, which enables the collection and analysis of huge amounts of data, is fundamental to P4 and what Dr Hood is calling the “democratisation” of healthcare. He says: “One essence is the idea that we will, for each individual patient, create virtual data clouds of billions of data points of many different types of data, very heterogenous, scaling from molecules all the way up to social networks, and we’ll be able to mine those data to create models that will let each individual’s wellness be optimised and disease avoided.”

The 100K Wellness Project

Dr Hood and his team’s main strategy to bring the P4 vision into conventional medicine is the 100K Wellness Project, a huge Framington-like longitudinal study tracking 100,000 healthy people over a 20-30 year period. Like Framington, the study may lead to defining the corporate winners and losers in healthcare in the coming decades.

The project began with 100 volunteer “pioneers” in March 2014, and is set to expand next to 1000, 10,000 then eventually 100,000 (funding permitting). Large amounts of data will be collected every three months from participants, starting with sequencing their complete genome profile, then with data collection of data on their

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– Dr Lee Hood

microbiome, heart rate, weight, respiration, blood pressure, quality of sleep, and so forth.

Key objectives of the study will be to:

- Prove that people can and will control their own health through the self-tracking health lifestyle (such as using mobile phone apps to monitor key health data).
- Prove that “your genome is not your destiny, it merely sets the limits of what you have to work with”.
- Be able to “quantify wellness” and to early identify “perturbed networks” which could later lead to disease.
- Identify multiple “actionable opportunities” – diet and lifestyle interventions that will allow participants to reset course to maintain and optimise health.

They are looking to raise a cool \$10 billion from US Congress to fund the whole 100K Wellness project. Despite the fact that the application of P4 to healthcare is anticipated to vastly reduce the unsustainable costs currently associated with conventional medicine, it remains to be seen if the money will we made available.

The Quantified Self: “Elementary, my dear Watson”

Continuing the digital revolution

theme, Michael Nova, MD, PhD, from Pathway Genomics, gave a mind-blowing presentation on his ongoing project “Panorma” – a consumer healthcare app powered by none other than IBM’s Watson, the most powerful super-computer in the world.

Dr Nova, with degrees in biochemistry, physics and medicine, founder of multiple health and biotech companies and developer of the original barcoded beads used by many diagnostic and DNA companies, took the audience through the realities of the current data explosion. Incredibly, 90% of the world’s total data was created in the last *two years*. Healthcare data has been doubling every two years, and by 2020 it will be doubling *every three DAYS!* A theme from Dr Nova’s presentation was: data is worthless unless it can be analysed.

If healthcare is a big systems/big data problem, who better than Watson to deal with it?

Other key takeaways from the presentation:

- Some 70% of doctors are expected to order some form of genetic testing in 2015;
- Focus is on gene-environment interactions, as genes are non-deterministic in numerous major illnesses.

• Targeted/customised therapies, cost reduction and prevention are the focal points of future healthcare.

Project iPop and the power of n = 1

Rui Chen, PhD, from the Department of Genetics at Stanford University School of Medicine, gave a dazzling “high science” presentation on results from a study on “integrated personal omics profiling” (iPop), where the genome of one male was sequenced and the epigenome, transcriptome, proteome, metabolome, autoantibodyome, microbiome and envirome were tracked over a four-year period, during which time the subject was diagnosed with type II diabetes.

The study found changes in the iPop data corresponding with physiological state changes. This is important, because it provides the first proof of principle for detailed personal health monitoring with integrative omics.

Academic research and functional and systems-based medicine

Roger Newton PhD, the co-discover of the drug Lipitor, gave a detailed presentation on cardiometabolic diseases, demonstrating how the current pharmaceutical paradigm does not adequately address multifactorial aetiology. Reductionist “silo” mindsets of the “ologists” need to be changed, he said. Systems biology and personalised approaches are the future.

The great James Fries, MD, Stanford University emeritus professor of medicine, a pioneer in researching strategies for healthy anti-ageing, covered his Compression of Morbidity hypothesis. This provides the

→ conceptual foundation for healthy ageing programmes (by the way: lifelong exercise is the most effective way to delay ageing).

Wayne Jonas, MD, ex-director of the Office of Alternative Medicine at the National Institutes of Health and president of the Samuelli Institute, a non-profit medical research organisation investigating healing processes, gave a powerful, moving and inspirational talk on “resilience” and the healing process, and integrative wellness systems.

Dr Edgar Staren, MD, PhD, MBA, ex senior vice-president for clinical affairs and chief medical officer for Cancer Treatment Centers of America, gave an important presentation on how to manage and implement personalised medicine in an organisational setting. He has a unique perspective as a medical professor, surgeon, business leader and cancer survivor.

Dr Joe Pizzorno, ND, co-founder and professor emeritus at naturopathic medical school Bastyr University, presented his development of an artificial intelligence tool that aids the implementation of wellness programmes based on personalised medical approaches. Dr Pizzorno presented data from one case study demonstrating how the technology created at SaluGenecists was able to produce

an average reduction of 25% risk and average 40% reduction in high risk individuals in a corporation of 9,000 employees. They achieved a 93% engagement rate with the online programme.

Functional and systems-based medicine in the clinic

Continuing on the topic of applying systems and personalised medicine approaches in real life, this time in the clinical setting, Dr Sara Gottfried MD, a Harvard- and MIT-trained physician and author of *The Hormone Cure*, gave an insightful and unique presentation into the role of the estrobolome (the aggregate of enteric microbial genes whose products metabolise oestrogens), dyscircadianism and diurnal cortisol imbalances in female hormone health and breast cancer.

Deanna Minich, PhD, scientific advisor to the PMLI, gave her customary powerful and thoroughly research-based guide to the application of nutrigenomics and personalised medicine in clinical practice, using toxin exposure and metabolic detoxification as a case study.

Dr Stacie Stephensen, DC, chairman of the Functional Medicine Cancer Treatment Centers of America, guided the

audience through the Patient Empowered Care model of integrative medicine in the practice of oncology, including a comprehensive look at how they work with the core physiological systems in a functional medicine model and use genetic testing in cancer treatment and recovery.

As if that wasn't enough, the conference ended with the next functional medicine superstar Dr Dale Bredesen, Augustus Rose Professor of Neurology at UCLA, presenting some of his pioneering systems-based functional medicine approaches to the treatment of Alzheimer's. On starting his presentation, Prof Bredesen talked about his early training at Caltech, where Dr Lee Hood, no less, was his biochemistry lecturer (which resulted in a spontaneous round of applause from the audience). His now famous published papers on the 36 causes of Alzheimer's shouldn't be missed by any functional medicine practitioner (reviewed by editor Simon Martin in last month's *CAM*) and are already classics in the application of a systems biology approach to chronic disease.

Intuition and The Unquantifiable Heart

Lastly (and my personal favourite presentations), were the talks first by David Jones, MD, president



A place for love: Dr Dean Ornish, MD.

emeritus of The Institute for Functional Medicine, then by Dean Ornish, MD.

Whether it is because Dr Ornish is just incredibly bright, an outstanding educator, or because he must have presented data on his pioneering research that proves lifestyle changes may stop or reverse the progression of heart disease thousands of times (probably all of the above), his presentation was breath-taking and unforgettable, and probably explains why *Forbes* magazine

“Not everything that counts can be counted.”

– Dr Dean Ornish

Conclusions from a parallel universe

Two major take-aways from attending an event like the PLMI consortium:

• **First** – the reinforcement that the principles that underlie the functional and personalised medicine movement aren't just a passing fad, the practice of “quacks” and fringe CAM practitioners, nor an interesting past-time for health tech nerds. They are based on observing principles of how *reality* works. Systems biology and complex adaptive systems explain how *everything* works.

Despite this, conventional medicine marches on as if in a parallel universe, basing its version of reality on a limited Newtonian, linear understanding of the human body, which is hundreds of years out of date. It's not sustainable, not based in truth, nor is it rational – and millions of people are suffering as a result.

• **Second** – “rational science”, a systems biology approach both conceptually and in practice, and even the quantified self movement, won't be enough on their own to

trigger a transformation in healthcare.

It will also have to come about through enough of us health consumers having a change of *heart*, a change in inner consciousness. We must have enough personal sense of empowerment to affirm that we can and DO deserve a better system, to be run by political and corporate leaders who must qualify for leadership by displaying enough basic humanity to care about us patients; only then will we reach a tipping point of people who vote enough is *enough*.

“The job for the 21st century clinician is the discovery of the person – finding the sources of illness and suffering within the person, and with that knowledge developing methods for their relief, while at the same time revealing the power within the person, just as the 19th and 20th centuries revealed the power of the body”

– Eric Cassel, *The Nature of Suffering and The Goals of Medicine* (1991).

named him as “one of the seven most powerful teachers in the world.”

The most memorable part was where, with acknowledgement to David Jones for opening the space to openly talk about love, Dr Ornish pointed out that one of the most important factors for the health of his heart patients were whether they felt loved or lonely and isolated. Then he summed it up by pointing out a very relevant point in the world of quantified health: “Not everything that counts can be counted.”

This followed on from the poignant heart-felt presentation by Dr Jones, which started by quoting Frances Peabody: “The secret of the care of the patient is in caring for the patient”. He went on

to explore how intuition, pattern recognition, practical reasoning and empathy are fundamental tools in clinical practice – which differs great from the kind of rationality that science idealises.

Overall the conference covered a depth and width that could only be made possible by the capacities of Dr Jeff Bland, whose own presentations and panel discussions enhanced and supported a highly successful conference.



About the author

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23andMe has stormy launch in the UK

Pioneering genetic testing company 23andMe has launched its service in the UK.

For just £125, anyone can learn their risk factors and traits for more than 100 health conditions, as well as information on ancestry. The test is already a massive hit in the US, where it costs only \$99 to receive the saliva test kit, but has been hit by an over-the-top response from the US Food and Drug Administration. The FDA has banned 23andMe from providing interpretation of the tests which, for example, can give you some idea of how likely you are to get diabetes and Alzheimer's. Separate genetic testing for these conditions costs hundreds of dollars – and the FDA doesn't want consumers to have the information unless they get it from a doctor. In the UK, those restrictions won't apply. At least for now. However, there has been an instant backlash from establishment medicine, and mainstream media has almost universally labelled the test “controversial”.

Our FDA equivalent, the MHRA (Medicines and Healthcare Products Regulatory Agency), says the test “can be used with caution”, BBC news reported.

‘They’ don't want you to know

The notoriously inept Alzheimer's Society commented: “If you are worried about your memory, your GP should be the first port of call – not a home DNA testing kit. Research has identified a number of genes that may play a role in the development of dementia, but we don't know enough to use these as a diagnostic tool.” True to form, the Society ignores the relevant research, in this case that showing a potentially critical role for variations of the APOE gene – which the 23andMe test identifies.

The US National Institute on Aging says of the APOE4 variant: “APOE ε4 is present in about 25 to 30% of the population and in about 40% of all people with late-onset Alzheimer's. People who develop Alzheimer's are more likely to have an APOE ε4 allele than people who do not develop the disease.”

As Niki Gratrix reports here, the advent of low-cost genetic testing “for all” is helping to drive the move to personalised medicine; it is exposing the logical flaws in the conventional medical approach. In the US, one of the major objections the FDA found to 23andMe testing was that it could help to identify potential negative or positive responses to specific pharmaceuticals. Apparently, this sort of information is too dangerous for individuals to have.

23andMe chief executive Anne Wojcicki says: “23andMe's mission is to ensure that individuals can personally access, understand and benefit from the human genome”.

In the UK, registered nutritional therapists have already begun using 23andMe testing, not only for their patients, but also to shed light on their own SNPs, methylation status and a host of other factors. If you combine genetic testing with functional testing, you really are bringing nutrition out of what Lee Hood calls the Dark Ages.

• www.23andMe.co.uk

SIMON MARTIN