

## The nutrition researcher cohort: toward a new generation of nutrition research and health optimization

Ben van Ommen

Received: 14 May 2013 / Accepted: 21 May 2013 / Published online: 7 June 2013  
© Springer-Verlag Berlin Heidelberg 2013

It is now possible and affordable to sequence my own genome and multiple aspects of my phenotype. In a recent paper (Chen et al. 2012), Mike Snyder demonstrated the beauty of this by “self-quantifying” his “integrative Personal Omics Profile” during one year. Interestingly, he did not “quantify” his lifestyle (dietary intake, physical exercise). When, halfway during his experiment, he curiously developed type 2 diabetes, the cure was eating less (which was neither specified in the paper). Apparently, “big science” does not realize the need for quantification, nor the impact of the environment. Nutrition research is developing in a genotype  $\times$  phenotype  $\times$  environment interaction science. Actually, the capacity to constantly adapt to a changing environment is now being coined as a new definition of health (Huber et al. 2011; van Ommen et al. 2009). On a molecular regulatory level, a multitude of processes is constantly fine-tuning aspects of our phenotype to maintain and regain homeostasis after dietary, metabolic, oxidative, inflammatory and other challenges. We have coined this as “phenotypic flexibility.” Quantification of our health status thus needs to take into account our ability to cope with these challenges. If my health is determined by my “genotype  $\times$  phenotype  $\times$  environment,” we need to properly “quantify” each of these components.

Modern nutrition science has seen a number of major developments over the last 10 years: the inclusion of omics technologies (nutrigenomics), the modern version of “back to physiology” (nutritional systems biology), the personalized nutrition hype, new metabolomics-based methods of food intake quantification, etc. The big question now remains: Is nutrition science ready to “quantify” my

personal health status and provide related personal dietary and lifestyle advice based on quantification of my own genotype  $\times$  phenotype  $\times$  environment interaction? A careful look at changes in healthcare points at the urgent need for both prevention and personal empowerment (Fani Marvasti and Stafford 2012). Each individual, in order to properly take control of one’s own health, needs access or even better, needs to own all relevant information regarding personal health status. Apart from the above-mentioned integrative personal omics profile, other activities point in this direction. There is a push from the “medical records” front, and more interestingly, the Quantified Self crowd source movement (<http://quantifiedself.com>) launches all kinds of initiatives. Developments in personal sensors are exploding and the European Commission takes this very seriously with action plans on eHealth and mHealth (<http://ec.europa.eu/digital-agenda/en/eHealth>).

An interesting feature of most of the above-mentioned initiatives is that the generated data usually become open access. This is not just an enforced action from the journals or funders, but actually is a new trend in science on top of the “big data” wave, where new science and business models develop on the awareness that it is more advantageous to share than not to share (Friend and Norman 2013).

Now, imagine that we have access to thousands of “Mike Snyder” datasets, extended with proper dietary intake data and all other relevant parameters and that all these data sources were standardized, open access and covering all relevant aspects of genotyping, phenotyping and “exotyping” over a number of years. This would become a treasure for nutrition and health research! NuGO, the Nutrigenomics Organisation has taken up the challenge to organize this: an open access cohort where each individual provides and owns her/his own health data that both provide an empowerment for individual health optimization and,

B. van Ommen (✉)  
TNO, Zeist, The Netherlands  
e-mail: ben.vanommen@tno.nl

brought together, a powerful open access cohort. As a first step, a 2-year project is being launched to establish all analytical methods, standards and operation procedures, data infrastructure, ethical and privacy aspects, governance, etc. We have decided to stay “close to home” in this experimental phase and enroll ourselves, (nutrition) scientists, as participants. Who else then us can best evaluate how to quantify food intake, assess the real use of genetic variation for our nutritional phenotype, determine the best “do it yourself” challenge test to determine phenotypic flexibility, etc. Thus, the “Nutrition Researcher Cohort” (NRC) is born. Details are provided at [www.nugo.org/nrc](http://www.nugo.org/nrc). The NRC is thus a “crowd science” project, where we, as experts/subjects, both participate and build. If you are interested, please join, either as participant and as scientist.

Once the two year initial phase is passed, we can implement the lessons learned in a really new mix between a nutrition and health cohort and a personal healthcare setting.

## References

- Chen RR, Mias GII, Li-pook-than J, Jiang L, Lam HYKYK, Miriami E, Karczewski KJJ et al (2012) Resource personal omics profiling reveals dynamic molecular and medical phenotypes. *Cell* 148(6):1293–1307. doi:[10.1016/j.cell.2012.02.009](https://doi.org/10.1016/j.cell.2012.02.009)
- Fani Marvasti F, Stafford RS (2012) From sick care to health care—reengineering prevention into the US system. *N Engl J Med* 367(10):889–891. doi:[10.1056/NEJMp1206230](https://doi.org/10.1056/NEJMp1206230)
- Friend SH, Norman TC (2013) Metcalfe’s law and the biology information commons. *Nat Biotechnol* 31(4):297–303. doi:[10.1038/nbt.2555](https://doi.org/10.1038/nbt.2555)
- Huber M, Knottnerus JA, Green L, Horst HVD, Jadad AR, Kromhout D, Leonard B et al (2011) How should we define health? *BMJ* 343(jul26 2):d4163–d4163. doi:[10.1136/bmj.d4163](https://doi.org/10.1136/bmj.d4163)
- van Ommen B, Keijer J, Heil SG, Kaput J (2009) Challenging homeostasis to define biomarkers for nutrition related health. *Mol Nutr Food Res* 53:795–804. Retrieved from PM:19517455