

P4 Medicine needs P4 Education

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Abstract: This monographic issue of Current Pharmacological Design discusses extensively on the innovative paradigms for disease control in Active and Healthy Ageing. Wellness, as a status to be achieved and maintained in our lives, getting longer and hopefully healthier, is the new and comprehensive declination of “health” itself, leading the shaping of research and research policy in the health domain worldwide. Many of the contributions describe the state of the art –and beyond- approaches for the most common diseases based on the available medical knowledge; two, in particular (Bousquet J *et al*, Cesario A, *et al*), extend to the innovative approaches defined in the framework of the holistic and integrative philosophy of the Predictive, Preventive, Personalized and Participatory (P4) Systems Medicine.

The availability of more and more powerful technologies to extract data coupled with the inclusion of information coming from the non-strictly-medical sphere of the patient/individual and his/her lifestyle along with the increase in computational power, will definitely set the stage for a paradigm-shift in bio-medicine with deep ethical and societal impact. The brief comment that follows speculates about the implications of this transition from the educational perspective taking stock of the direct experience of the Authors in the consultation process active in the scientific community.

Keywords: Educational perspective, NCDs, P4 Medicine, Systems Medicine.

INTRODUCTION

Systems Biology (SB) integrates high-dimensional omics data with biological, clinical, environmental and lifestyle information through iterative statistical analyses, computational modelling and experimental validation and triggers the transition from a reactive to a proactive practice of medicine towards the quantification of wellness (1-3). The effective development of Predictive, Preventive, Personalized and Participatory (P4) Systems Medicine requires harmonization of experimental and computational methods for data, information and knowledge collection, storage, mining, integration, modelling and sharing. Our prediction is that in 10 years each patient will be surrounded by a virtual data-cloud of billions of data-points and that we will have the computational tools to reduce this enormous data dimensionality to simple hypotheses about how to optimize wellness and avoid disease for each individual patient. Thus, big data from various levels of the biological organization combined with clinical and environmental information and its analytics are a central pillar of P4 Systems Medicine, oriented at boosting the understanding of Non-communicable Chronic Diseases (NCDs) beyond basic research activities and towards substantial application of personalized treatments (4,5). In order to address the ethical, legal, social and economical issues, especially those linked with the sustainability of healthcare associated with this transition and, most importantly, its subsequent validation through socio-economic impact indicators, the active participation of all stakeholders including researchers and clinicians in the academy and industry, regulatory and funding bodies, healthcare providers, individuals and patient organizations is essential. The technological framework in which Systems Medicine is set has indeed re-shaped the cultural understanding of many dedicated professionals by bridging traditionally disparate disciplines and including players not normally involved in research analyses profoundly grounded on recent technological advances. As well, the dialogue usually

restricted within the biomedical environment is clearly set to become rapidly insufficient to frame the universal implementation and adoption of Systems Medicine approaches and their validation in the real-life scenario. Moreover, current medical practice relies on the ability of individual experts (“doctors”) to translate experience gained from averaged populations into individual treatments, while P4 medicine will provide an overwhelming amount of individual level information which will, in turn, make available to doctors tools as such as clinical decision support systems (CDSSs) that must be generated, funded and accepted by the medical community and the healthcare providers.

For the socio-economical system to be ready to welcome this paradigm change we believe that a process of education for the Patients, the Public at large, the Professionals involved in medicine as well as the Politicians concerned with healthcare, as to the technological, medical and societal issues of P4 Systems Medicine, is essential.

Such is the depth of the paradigm shift that P4 Medicine is inducing (6) that we believe it will be successful only if coupled with a comprehensive “P4 Education”. Indeed we are aware of the fact that, at this stage of maturity of the P4 Systems Medicine evolutionary path, some questions are still to be answered to and these, specifically, are: what are the implications of the use of computational models compared to study-based evidence for medical doctors and therefore what educational need results from this; what are the influences of model-based predictions on disease prevention for individuals and public health programs; what educational needs for public health politicians result from it and, finally, how can efficacy assessment and budget allocations for CDSSs be managed and what educational needs for health system funders result from it.

Now, this P4 Education should thus include a simple consideration of the essence of P4 Systems Medicine and what it can (will) do in changing healthcare, as well as a consideration of the most important ethical and societal issues that it poses. One such societal question is how we can make available to qualified scientists increasing numbers of individual virtual clouds of billions of data points so that we can mine for the predictive medicine of the future.

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The question of how to achieve this “P4 Education” is a central challenge for P4 Systems Medicine.

We feel that the patient must be included in this educational process—hence how to educate the patient on the power of P4 Systems Medicine is absolutely essential as is the education of physicians and members of the healthcare community. We feel this education will be an important part of Information Technology for Healthcare of the future. It will also be important to encourage the initiation of “patient-activated” social networks—for these networks will be a source of transmitting knowledge and crowd-sourcing, as well as catalysing taking personal responsibility for ones health. Moreover, these patient-activated social networks may well be a key driving force of the acceptance of P4 Systems Medicine by the healthcare community.

CONCLUSION

P4 Systems Medicine is rapidly impacting the framework in which medicine is executed. This transitional process needs and adequate and integrative educational effort which implies the involvement of all the stakeholders around the centrality of the individual and his/her empowerment.

CONFLICT OF INTEREST

The authors confirm that this article content has no conflicts of interest.

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