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Precision medicine, challenges and opportunities

Prof. Jacques Beckmann

University of Lausanne, Switzerland

The recent years have seen the emergence of both ground-breaking scientific developments in high-resolution, high-throughput data gathering technologies enabling cost-effective collection and analysis of huge, disparate datasets on individual health, as well as of sophisticated clinical bioinformatics or machine learning tools required for the analyses and interpretation of this wealth of data. These developments have triggered numerous initiatives in precision medicine (PM), a data-driven and currently still, essentially a highly genome-centric initiative (additional dimensions will, in due time, have to be integrated as well).

Proper and effective delivery of PM poses numerous challenges. Foremost, PM needs to be contrasted with the powerful and widely used practice of evidence-based medicine (EBM). The latter is informed by meta-analyses or group-centered studies from which mean recommendations are derived. These amount at first approximation to a “one size fits all” approach, whose major limit is that it does not provide adequate solutions for outliers. Yet, we are all outliers for one or another trait. In contrast to EBM, one of the strengths of PM, which focuses on the individual, lies in the area of personalized management, including of outliers.

To achieve these objectives, it will be necessary to bridge PM and EBM. Through the collection, analyses and sharing of standardized medically relevant data globally, evidence-based PM will shift progressively from therapy to prevention, thus leading eventually to improved, clinician-to-patient communication, citizen-centered healthcare and sustained well-being. We will discuss challenges and opportunities towards these goals.