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From evidence-based to precision medicine: Challenges and opportunities

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round-breaking scientific developments in high-resolution, high-throughput data gathering technologies enable cost-effective J collection and analysis of huge, disparate datasets on individual health. This is also accompanied by the emergence of clinical bioinformatics tools required for the analyses and interpretation of this wealth of data. These developments have triggered numerous initiatives in precision medicine, a data driven and currently still, essentially a highly genome-centric initiative, centering on the individual. Proper and effective delivery of precision medicine poses numerous challenges. Foremost, precision medicine needs to be contrasted with the powerful and widely used practice of evidence based medicine. The latter is informed by metaanalyses or group centered studies from which mean recommendations are derived. These amounts at first approximation to a "one size fits all" approach, whose major limit is that it does not provide adequate solutions for outliers, which for one or another trait we all are. In contrast to evidence based medicine, one of the strengths of precision medicine lies in individualized management, and this includes outliers. Here, we argue that to achieve these objectives, it will be necessary to bridge between precision medicine and evidence-based medicine. We will also discuss the challenges and opportunities to bridge this gap thereby achieving clinical utility in precision medicine. First, clinical implementation of precision medicine will require worldwide and responsible data sharing, as well as regularly updated training programs. Second, it will rely on a systemic approach, encompassing among others, all human organs, and our complex multicomponent holobiome, i.e., including our virome and microbiome, and our environment. Furthermore, we project that through collection, analyses and sharing of standardized medically relevant data globally, evidence based precision medicine will shift progressively from therapy to prevention, thus leading eventually to improved, clinician-to-patient communication, citizen-centered healthcare and sustained well-being.

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