

Meanings and Concepts of Standardization in Systems Medicine

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Abstract : In systems medicine, high-throughput technologies produce large amounts of data on different biological and pathological processes, including (disturbed) gene expressions, metabolic pathways and signaling. The large volume of data of different types, stored in separate databases and often located at different geographical sites have posed new challenges regarding data handling and processing. Tools based on bioinformatics have been developed to resolve the upcoming problems of systematizing, standardizing and integrating the various data. However, the heterogeneity of data gathered at different levels of biological complexity is still a major challenge in data analysis. To build multilayer disease modules, large and heterogeneous data of disease-related information (e.g., genotype, phenotype, environmental factors) are correlated. Therefore, a great deal of attention in systems medicine has been put on data standardization, primarily to retrieve and combine large, heterogeneous datasets into standardized and incorporated forms and structures. However, this data-centred concept of standardization in systems medicine is contrary to the debate in science and technology studies (STS) on standardization that rather emphasizes the dynamics, contexts and negotiations of standard operating procedures. Based on empirical work on research consortia that explore the molecular profile of diseases to establish systems medical approaches in the clinic in Germany, we trace how standardized data are processed and shaped by bioinformatics tools, how scientists using such data in research perceive such standard operating procedures and which consequences for knowledge production (e.g. modeling) arise from it. Hence, different concepts and meanings of standardization are explored to get a deeper insight into standard operating procedures not only in systems medicine, but also beyond.

Keywords : data, science and technology studies (STS), standardization, systems medicine

Conference Title : ICCCB 2017 : International Conference on Computational Chemistry and Biology

Conference Location : Venice, Italy

Conference Dates : June 21-22, 2017