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# Network medicine as a genetic theory of disease

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## Abstract

Session : Biological Theories and Theories in Medicine (Darrason, Demazeux, Kincaid, Lemoine)

If some authors challenge the very existence (Severinsen, 2011) or the usefulness of theories in medicine (Kincaid, 2008), others (Thagard 1999, 2006) acknowledge their diversity but consider that there is a strong delineation between ancient medical theories such as the humoral theory of disease and our modern medical theory. While ancient theories would rely on a general definition of diseases as imbalances, our modern medical theory would be nothing more than a sum of heterogeneous theories, each of them being specific to a class of diseases (such as the germ theory for infectious diseases). We beg to differ and in this contribution, our aim will be to demonstrate that such a general *theory of disease* by opposition to a mere *theory of diseases* is not only possible but also desirable. We will achieve so by presenting network medicine that is recently born from the synthesis between genomic medicine, systems biology and network theory (Barabasi, 2011) as a genetic theory of diseases. Indeed network medicine (a) relies on a general and interactionist definition of disease, based on the identification of functional modules (Lesne et al., 2010) (b) explains new classes of facts such as comorbidity and syndrome families through the common genetic origin of diseases (c) explains differently the distinction between monogenic and polygenic diseases (d) questions the way we classify diseases and (e) has a heuristic dimension since it predicts the existence of new diseases genes and suggests new therapeutic targets.

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