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From big data to smart data in CNS disorders, developing predictive models by combining systems biology with quantitative systems pharmacology

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Massive investment and technological advances in the collection of extensive and longitudinal information on thousands of Alzheimer patients results in large amounts of data. These "Big-Data" databases can potentially advance central nervous system (CNS) research and drug development. However, they are not sufficient and we posit that they must be matched with analytical methods that go beyond retrospective data-driven associations with various clinical phenotypes. While these empirically-derived associations can generate novel and useful hypotheses, they need to be organically integrated in a quantitative understanding of the pathology that can be actionable for drug discovery and development. We argue that mechanism-based modeling and simulation approaches, where existing domain knowledge is formally integrated using complexity science and quantitative systems pharmacology can be combined with data-driven analytics to generate predictive actionable knowledge for drug discovery programs, target validation, and optimization of clinical development.

Biography

Hugo Geerts has spent 17 years in the (CNS) Drug Discovery Area, with Paul Janssen, probably the greatest drug hunters in history at the Janssen Research Foundation in Beerse, Belgium doing research in Alzheimer's disease with targets in tangle and amyloid pathology. He was involved in supporting the successful preclinical, clinical and postmarketing development of galantamine. Since 2002, he became CSO of In Silico Biosciences, a company providing mathematical modeling of pathological interactions in the brain for supporting the whole process of drug discovery from target validation to clinical trial design in Psychiatry and Neurology. He is the faculty of the University of Pennsylvania, Perelman School of Medicine and Drexel Dept. of Pharmacology and has over 80 peer-reviewed publications and patents.

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