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Effective vaccine design: Back to the drawing board?

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To eliminate safety risks related to infectivity, inactivated pathogens and, more suitably, well-characterized pathogen-derived antigens (Ags) have increasingly been used as immunogens in 'modern' vaccines. The selection of these Ags is usually based on their capacity to naturally induce immune responses that 'correlate' with protection. These Ags, however, are often variable (e.g., conformational Bc epitopes) and/ or subject to immunogenetic restriction (e.g., linear, cell-bound epitopes). In addition, the immunogenicity of 'good' vaccinal Ags is largely dependent on memory $CD4^+$ T helper cells. However, activation of the latter upon natural infection or foreign Ag exposure of genetically predisposed subjects has been associated with immune pathology. Priming of CD4+ T helper cells by adjuvant vaccines is, therefore, increasingly raising safety concerns. On the other hand, Ags that are highly conserved, universal and of vital importance to the pathogen (hence, called 'protective') are either not included in contemporary vaccines or not effectively recognized by the host immune system since capable of imitating self-molecules and outcompeted by other pathogen-derived 'decoy' epitopes for binding to MHC molecules. Hence, we consider that new technologies enabling immune targeting of such protective epitopes by natural, universal (i.e., nonallotype-specific) immune helper cells is the new Holy Grail for modern vaccinology.

Biography

Geert Vanden Bossche obtained his DVM at the Veterinary Faculty of Ghent and his PhD in Virology at the University of Hohenheim, Stuttgart. Following his Postdoctoral training in virology, immunology and molecular biology at the Free University of Berlin and Hohenheim (Germany), where he subsequently held adjunct faculty appointments, he transitioned to the Vaccine Industry where he served various senior roles in both early and late vaccine development at GlaxoSmithKline Biologicals, Novartis Vaccines & Diagnostics and Solvay Biologicals. He then joined the Bill & Melinda Gates Foundation to serve as SPO in Vaccine Discovery for Global Health. He is founder of UNIVAC LLC in the US and UNIVAC NV in Belgium and visiting scientist at the REGA Institute, University of Leuven (Belgium). He is board certified in virology and microbiology, the author of over 30 publications, and inventor on several patent applications. He has presented vaccine- and adjuvant-related topics at multiple international congresses.

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