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Universally protective vaccines: A revolution in modern vaccinology

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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 induce immune responses that 'correlate' with natural protection. These Ags, however, are composed of antigenically variable or conformation-dependent epitopes (e.g., B cell epitopes) and/or subject to immunogenetic restriction (e.g., linear, T cell epitopes). In addition, the immunogenicity of conventional 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 can occasionally lead to immune pathology. On the other hand, pathogens have evolved to incorporate into their arsenal of peptides self-mimicking motifs that are highly conserved and vulnerable as they are exposed on the surface of infected or pathologically altered host cells. These Ags, however, are either not immunogenic or subvert the host immune system. Hence, they are not used as vaccinal Ags in contemporary vaccines. We consider that new vaccines enabling immune targeting of these Ags by MHC-unrestricted memory NK cells are the new Holy Grail in 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 the University of Hohenheim (Germany), he was given the Venia Legendi and subsequently held adjunct faculty appointments at the University of Hohenheim (Germany), the University of Leuven (Belgium) and the European Faculty for Environmental Sanitation at the University of Ghent (Belgium). He then transitioned to the Vaccine Industry to serve various senior roles in both early and late vaccine development (GSK, Novartis, Solvay). In 2008, he joined the Bill & Melinda Gates Foundation in Seattle to serve as Senior Program Officer in Vaccine Discovery for Global Health. Furthermore, he also founded UNIVAC LLC, a start-up vaccine company, and coordinated the Ebola Vaccine Program on behalf of GAVI. He is now the Head of Vaccine Development Office at the German Center for Infection Research (DZIF) in Germany. He is board certified in Virology and Microbiology, the author of over 30 publications, and inventor on a patent application for universal vaccines. He has presented vaccine- and adjuvant-related topics at multiple international congresses.

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