"Immune frailty: role of viral infection and impact on vaccination in the elderly"

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The immune system defends against infection and possibly cancer, but older people paradoxically suffer both from failing immunity resulting in increased susceptibility to infections and decreased responsiveness to vaccination, and at the same time increased immunopathology accompanying immune responses. Interventions to reduce such immunopathology while enhancing protective immunity are challenging but need to be confronted if we are to deal successfully with the increasing numbers of elderly and frail people in modern societies. To do this, we need to define and understand the mechanisms responsible for age-associated alterations and identify reliable biomarkers for monitoring clinically-relevant immune status in the elderly. This means performing longitudinal as well as cross-sectional studies assessing innate and adaptive immune parameters and correlating these with morbidity and mortality at follow-up. The assembly of large-scale databases including psychosocial, nutritional, genetic and health information in different populations will be required to dissect out the multitude of interactions affecting immunity throughout the lifespan. Limited longitudinal studies have begun to reveal biomarkers of immune ageing increasingly recognized as an "immune risk profile" (IRP) reflecting immune frailty and predicting mortality in the very elderly. Hallmark parameters of the IRP may also be associated with poorer responses to vaccination. Initially surprisingly, usually asymptomatic infection with the widespread persistent β-herpesvirus HHV5 (Cytomegalovirus, CMV) has an enormous impact on these immune biomarkers. This is probably because, for reasons not fully understood, a large proportion of available human immune resources is committed to controlling CMV in infected individuals. The prevalence of CMV infection in the population increases with age, and within individuals, the degree of immune commitment also increases with age. This may cause pathology by maintaining higher systemic levels of inflammatory mediators and decreasing the "immunological space" available for immune cells with other specificities and those able to respond appropriately to vaccines. Interventions to prevent or reverse such "immunosenescence" and restore optimal responses to vaccination may therefore need to include targeting infectious agents such as CMV.

Bio

Graham Pawelec received an MA in Natural Sciences and a PhD in Transplantation Immunology from the University of Cambridge, UK. He is currently Professor of Experimental Immunology at the Center for Medical Research, University of Tübingen Medical School, Tübingen, Germany. He is a Visiting Professor, Nottingham Trent University, UK, and holds an Honorary Chair at Manchester University, UK. Research interests are currently centered on alterations to immunity, especially T cell-mediated immunity, in ageing and cancer in man and the influence these have on the outcome of vaccination. The impact of polypathogenicity (including multiple infections, cancer, Alzheimer´s, autoimmunity) as well as stress (psychological, nutritional) on immune signatures reflecting individual immune status is of particular interest in the clinical context.