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Anti-cancer telomerase vaccines: Are they entering the age of maturity?

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Telomerase, the enzyme synthesizing the telomeric regions of chromosomes, is considered a universal tumor associated antigen because expressed by the majority of cancers. The several clinical trials performed adopting telomerase as immunogen confirmed the safety of telomerase vaccination, but raised doubts concerning: a) the immunogenicity of telomerase; b) the capacity of telomerase vaccines of inducing clinical responses. The immunogenicity concerns have been now dispelled by demonstrations that: 1) telomerase is presented by tumor and antigen presenting cells; 2) ex vivo generated telomerase-specific CTL kill efficiently telomerase-expressing tumors; 3) circulating telomerase-specific T cells are present in 90% of cancer patients and, surprisingly, in 100% of healthy individuals, as observed in two our studies. These findings boost the search for a new generation of telomerase vaccines able to overcome the limits of their first generation. In this effort, our group recently completed a phase I/II trial in prostate and renal cancer patients with GX301, a new generation cancer vaccine. This multi-peptidic vaccine includes four telomerase peptides, which bind promiscuously several HLA class I and II alleles allowing the coverage of the majority of HLA haplotypes and the induction of both helper and cytotoxic T cell responses. It also contains two adjuvants with complementary activities, making it able to efficiently activate both innate and adoptive immune responses. The results of a phase I/II trial, showing a 100% rate of telomerase-specific immune responses associated with evidences of clinical responses, suggest that innovative approaches may lead telomerase (and cancer) vaccination to an “age of maturity”.

Biography

Gilberto Filaci is Associate Professor of Internal Medicine and vice-director of the Centre of Excellence for Biomedical Research at the University of Genoa. He has published more than 80 papers in reputed journals and has been serving as official reviewer for international journals and research funding organizations. His scientific activity is mainly focused on immunoregulation and on the search for new diagnostic and immunotherapeutic agents (so far he applied for four invention patents). He is in the advisory board of pharmaceutical industries.

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