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COLEY'S TOXINS AND THE CURRENT HYPE ON CANCER VACCINES

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Already in the 1890s, William B Coley injected streptococcal organisms in patients with solid tumours (Coley's toxins) to activate the immune system. Coley (1862-1936) was an American bone surgeon, cancer researcher and pioneer of cancer immunotherapy. He was convinced that post-surgical infections had helped patients to recover better from their cancer by provoking an immune response. Because of severe adverse effects due to the living streptococcal organisms, he switched to use dead bacteria. But Coley's published results were difficult to interpret with confidence. More research would be needed to determine what benefit, if any, this therapy might have for people with cancer (American cancer society). Nevertheless, William B Coley is known as the Father of Immunotherapy.

Modern cancer vaccines : Prophylactic cancer vaccines may be an option in case of involvement of viruses such as human papillomavirus (HPV) and cervix carcinoma or other microorganisms. This anti-HPV vaccine is in a classical sense an antiviral vaccine only and can prevent a chronic inflammation. Chronic inflammation causes genotoxic stress in form of mutations or genomic instability and is known to enhance angiogenesis and tissue remodelling. Chronic inflammation has a deep impact on tumour initiation. It takes about 20 years from HPV infection to cervical cancer. The typical time course of the infection begins with HPV acquisition in adolescence and early adulthood, around 17-25 years, and cancer arises around 45-60 years. During this dark period accompanied with chronic inflammation innumerable mutations took place finally resulting in cancer. So far, there are no clinical data demonstrating anti-tumour efficacy of the diverse commercialized anti-HPV vaccines. Prophylactic cancer vaccines may be no option for cancer diseases caused by other agents beside microorganisms. The high mutation rate in tumour cells can generate a mutational load of 1-10 mutations per mega base of coding DNA. The prophylactic selection of proper tumour antigens would be a lottery, an endless cycle of try and error. The genetic instability produces permanent changes of epitopes. The efficacy of therapeutic cancer vaccines is still disappointing. Since the first scientific report on an experimental autologous (personalized) cancer vaccine (whole tumor homogenate, mixed with Freund's adjuvant and 3X injected intramuscularly in patient) was published 1964, the clinical efficacy of cancer vaccines was not as expected until today. Clinical validation remains elusive. The reduced efficacy of vaccines in the elderly is generally attributed to immunosenescence. Age-associated immune changes take place in the innate and acquired immune systems and affect not only lymphocytes, but also myeloid cells with a change in pro-inflammatory cytokines. The functional decline that characterizes aging begins after sexual maturity. Thymus involution begins with the puberty by the early teens.

Conclusion: Immunotherapy by vaccination is possible but a question of timing. Immunosenescence, immune dysfunctions are not limited only to the normal process of aging but also linked to cancer diseases. It makes no sense at all to vaccinate a cancer patient suffering from loss of important immune functions. A risk analysis of several parameters before vaccination could help to understand the current disposition of the immune system: makes a therapeutical vaccination sense or not.