Special Focus Issue: Cancer vaccine clinical trials

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We are delighted to announce the release of our latest themed issue, which highlights developments in the field of cancer immunotherapy with regard to current cancer vaccine clinical trials.

Cancer immunotherapy has come of age in recent years, with cancer vaccines emerging as a novel approach to cancer treatment. A greater understanding of how cancer cells escape recognition and are attacked by the immune system has enabled the development of therapeutic vaccines capable of either activating cytotoxic T cells or antibody production, thus eliciting an immune response.

In many clinical trials, cancer vaccines are combined with other forms of therapy, such as surgery, chemotherapy and radiotherapy in order to improve efficacy [1]. There are many therapeutic vaccines under development or being evaluated in clinical trials. These can be classified into several major categories, including cell vaccines (tumor or immune cell), protein/peptide vaccines, and genetic (DNA, RNA and viral) vaccines [2]. As of yet, only two vaccines have been approved worldwide. In April 2010, the US FDA approved the first and only cancer treatment vaccine in the US, sipuleucel-T (Provenge®) for treating metastatic prostate cancer [3]. Oncophage is not yet approved in the USA but was approved in Russia in April 2008 for patients who have earlier stage kidney cancer [4].

This special focus issue covers the latest advances in cancer vaccines undergoing clinical trials, the status of vaccines that are currently on the market, and finally, obstacles in achieving effective cancer vaccine therapy, with the aim of directing the improvement and optimization of future cancer vaccines.

Xu *et al.* begin by describing T-cell-based vaccines that comprise polyclonal CD4+ T cells armed with antigen-specific dendritic cell (DC)-released exosomes, and discusses how these vaccines may assist in the treatment of cancer [5]. This issue also features timely interviews, the first of which is with Angus Dalgleish (St George's, University of London, UK), who is renowned for the discovery of HIV using CD4 as a receptor and other significant contributions to the immunotherapy field. Dalgleish gives an in-depth account of his experiences within the field and the outcome of the clinical trials he's been coordinating [6]. The second interview is with Ghassan Abou-Alfa (Memorial Sloan Kettering Cancer Center, NY, USA), a specialist in gastrointestinal cancers, who has led many clinical trials involving various immunotherapies for liver cancer, including Sorafenib (Nexavar®) which received FDA approval in 2007. Abou-Alfa discusses the latest developments with regard to the ongoing clinical trials involving the cancer biotherapeutic Pexa-Vec, and gives his perspective on the major challenges hindering the advancement of immunotherapy and cancer vaccine development [7]. In a commentary by Correale *et al.*, cancer vaccines that are currently available for the treatment of colorectal cancer are evaluated. Correale *et al.* also discuss combining chemotherapy with monoclonal antibodies and describes two large ongoing clinical trials, IMPALA (NCT02077868) and MODUL (NCT02291289), which are aimed at the treatment of metastatic colorectal cancer [8]. A well-received review by Winograd *et al.* concisely evaluates vaccine approaches and complementary strategies currently under

Sonia Mannan

Future Science Group, Unitec House,
2 Albert Place, London, N3 1QB, UK
s.mannan@futuremedicine.com

investigation for glioblastoma [9]. Koido *et al.* summarize the early-phase clinical trials of WT1-targeted peptide and dendritic cell-based cancer vaccines for pancreatic ductal adenocarcinoma [10]. Following on from that, Wada *et al.* further discuss cancer peptide vaccines undergoing clinical trials [11]. Marron *et al.* provide an update on the vaccine strategies currently available for the treatment of lymphoma and give an overview of current approaches to induce or amplify vaccination against this type of cancer [12].

In summary, this special issue highlights the promising advances being made in the cancer vaccine field, challenges that need to be overcome to ensure

continuing progress, as well as future directions. We hope that the contents of this issue will provide a valuable resource for the immune–oncology research community and that the expert perspectives presented will help drive this exciting area forward.

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