Editorial Note on Cancer Immunotherapies

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Editorial

Immunotherapy for cancer treatment dates back to the 1890 s, when a New York physician named William Coley used heat-killed germs on cancer patients, which became known as "Coley's toxin." Some tumours regressed in the over 900 cancer patients he treated, and some patients remained free of recurrence for several years. The toxin component, on the other hand, was inconsistent, patients' reactions were unexpected, and the anti-cancer mechanism remained unknown. Coley's toxin was no longer employed after the introduction of radiation therapy and chemotherapy in the twentieth century.

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Despite the fact that more treatment choices are becoming available, problems persist. Immune Checkpoint Inhibitors (ICIs) are effective against certain cancers, such as melanoma, but not all cancers react. Even with melanoma, half of patients do not have a meaningful beneficial response, and a large number of responding individuals have cancer return following the initial response. Unfortunately, these ICI therapies are frequently linked with a high rate of toxicity, with severe toxicities occurring in 20%–50% of patients. Other immunotherapies may experience similar issues. Certain malignancies, such as pancreatic cancer, have proven challenging to treat even with all of the current immunotherapies.

Based on the efficacy of ICIs, various immunotherapies have been explored in conjunction with other immunotherapies or with certain already available medicines. Anti-PD1 antibodies, for example, have been explored in combination with CAR T-cell therapy, oncolytic virus treatment, and cyclin-dependent kinase inhibitors. Given the efficiency of the individual therapy components as monotherapies, it is not surprising that a number of these combinations resulted in synergistic efficacy. With a plethora of ongoing combination immunotherapy trials, more and more elements that influence therapeutic success has been uncovered, and synergistic design of distinct combination medicines may provide optimal benefit to patients with various forms of cancer. Despite the fact that success in solid tumours has yet to be demonstrated, great efforts have been made in CAR T-cell research. These include the identification of additional tumour antigen targets, the development of more alternatives for combination therapy, the development of T-cell products with a more desirable phenotype, enhanced manufacturing techniques, and novel strategies for increasing CAR T cell *in vivo* proliferation. Although T cells are the focus of most contemporary immunotherapies, alternative cellular treatments such as NK cell cytotoxicity, dendritic cells, and macrophages are also being studied.

The study of Tumour Micro Environmental immunosuppression (TME). Tumor cells, immune cells, stroma, extracellular matrix, and some soluble components comprise the TME. This complex milieu influences tumour growth, alters the tumour immune response, and ultimately decides the success of immunotherapies. Various techniques have been discovered in recent years to change the TME to favour anti-tumor immunity, and clinical trials have validated several TME indicators predicting tumour responsiveness to immunotherapies.

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