Harnessing the immune system to combat cancer

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Efforts to harness the immune system to treat cancer date back more than a century, but progress was slow for decades. However, the recent clinical success of several anticancer immunotherapies has provided a boost to the field. Approaches to induce an antitumour immune response (see centre image) can be broadly subdivided into non-antigen-specific or antigen-specific categories. Non-antigen-specific strategies include non-specific immune stimulation and inhibition of ‘immune checkpoint’ interactions, whereas antigen-specific strategies include adoptive cell transfer of autologous cancer-specific T cells and various therapeutic vaccination approaches.

Examples of anticancer therapeutics in both broad categories — such as the immune checkpoint inhibitor ipilimumab and the therapeutic vaccine sipuleucel-T — have recently received regulatory approval, and several other agents are in clinical trials (see table). Such trials are faced with challenges such as selection of optimal methods of evaluation, as those developed for typical anticancer chemotherapies may not be well suited to immunotherapies. Nevertheless, encouraging clinical results, as well as the unexpected finding of a positive interaction between immunotherapy and chemotherapy, may herald a new era for anticancer immunotherapy.

**Non-specific immune stimulation**
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