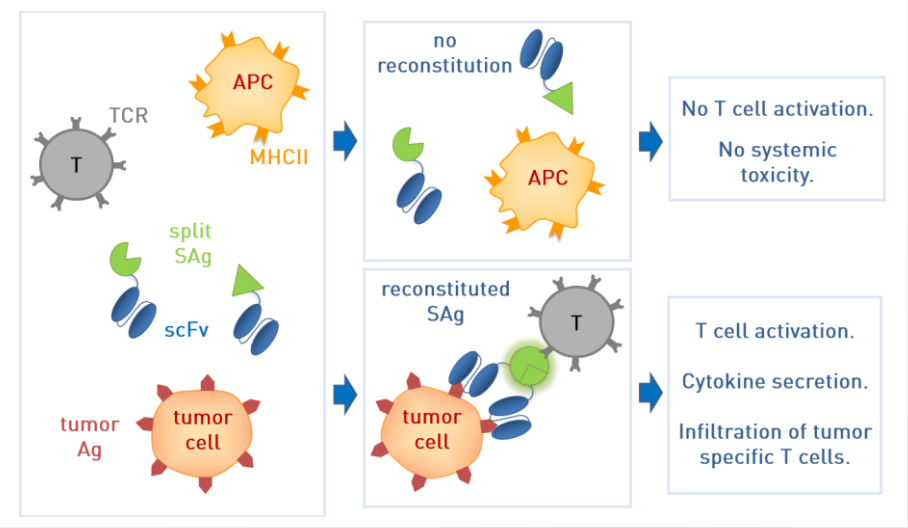
NATIONAL INSTITUTE OF CHEMISTRY

RESEARCH DOMAINS: Life Sciences, Medicine, Biotech

INDUSTRIES: Health, Oncology, Immuno-oncology

DESIGN OF SPLIT-SUPERANTIGEN FOR A SAFER CANCER IMMUNOTHERAPY



The global cancer immunotherapy market is growing due to an increasing incidence of cancer and new opportunities are emerging with a concept of deploying immune system to fight the disease. In 2016, the value of the market was at approximately USD 61 bn and the projected CAGR is 14% by 2021. One of the potential therapies is to use superantigens (SAg), which are proteins produced by bacteria or viruses and are one of the most potent activators of the immune system. Strong T cell activation is also one of the main weaknesses of this strategy as it may lead to systemic T cell activation. Therefore, we designed a split SAg, where SAg is split into two fragments, each by itself inactive. The fragments are brought in close proximity by binding to cell surface antigens, dimerize, and reconstitute into a biologically active form capable of activating T cell response.

Technology

As SAg we used highly potent and well characterized staphylococcal enterotoxin A (SEA) from *S. aureus*. Proof-of-concept fusion proteins were designed, where split SAg fragments, individually inactive, were genetically fused to a single chain variable fragment against B cell antigen CD20 (scFv–CD20). Binding of scFv fused with split SAg fragments to target tumor antigens, brings the inactive split SAg fragments into close proximity, so they could reassemble into the biologically active form and trigger the T cell response. This strategy opens an additional option by the possibility of linking split SAg fragments with two different antibodies, each specific for different tumor antigen, which could increase the selectivity for tumor cells. The technology is tested in laboratory setting, *in vitro*, for a CD20 tumor antigen.

Main advantages

- Targeting only the tumor cells with no affect on other healty cells, which overcomes the systemic immune activation and dose-limiting toxicity (common in standard approach with wild type SAg fused to antibody).
- High specificity by linking split SAg fragments with antibodies, which can be the ones that are widely used in clinical practice to treat cancer;
- Screening technique for detecting SAg with a favourable splitting site to retain its efficacy.

Key words

Superantigen, T cell, Antibodies, Antibody engineering, Immuno-oncology, Oncology, Cancer Immunotherapy

TYPE OF COOPERATION
Technology licensing opportunities

INTELLECTUAL PROPERTY
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MORE INFORMATION ABOUT THE INVENTION

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