Taking ABiTE out of Cancer: A Novel Aptamer-based BiTE for Cancer Immunotherapy

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Immunotherapy is a treatment in which the body's immune cells, are stimulated to fight diseases such as cancer. Several immunotherapies have been developed with the aim of helping T Cells target cancer cells. T Cells, once activated, release cytotoxic proteins such as granzyme B to kill cancer cells. One of these treatments is called Bi-specific T Cell Engagers (BiTE) and consists of two antibodies that are linked together. One antibody binds to a T cell, while the other binds to a cancer cell, helping T cells recognize the tumor. BiTEs have shown great success, however, they are still in clinical trials since they have three major limitations: 1) they are large complexes and only target the tumor surface, 2) they are protein-based and can cause an immune response, and 3) they are expensive to develop. In contrast, aptamers are short single strands of DNA or RNA that are cheap to produce. The short size of aptamers allows them to reach the tumor milieu and they are less immunogenic since they are nucleic acid-based. Therefore it was hypothesized than an aptamer-based BiTE (ABiTE) could bring cancer cells to immune cells, while also being a safer, cheaper, and more effective alternative. Two different designs of ABiTEs were developed and were tested on two types of breast cancer cells, a leukemic cell as well as a healthy cell line. Results showed that ABiTE was able to selectively bind to cancer and at cells, and ABiTEs were able to activate 1.6 times more T Cells than traditional BiTEs. ABiTEs can offer a safer, cheaper and more effective alternative to BiTEs and can provide individuals with a better chance of fighting cancer.

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