Improved Gene Therapy against solid tumors

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Popular scientific summary

Cancer is the second leading cause of death in Sweden after cardiovascular diseases nowadays. Cancer is characterized by an abnormal and uncontrolled cell growth, which leads to the formation of a solid tumor that is the main form of cancer. The growth of malignant tumors is mainly determined by the cells capacity to proliferate and invade other tissues at different sites in the body (metastasize).

Our immune system protects us from infection of harmful microorganisms such as fungi, bacteria and viruses. Tumor cells have developed a large number of structural and genetic changes, which allow them to evade our immune system. For example, some molecules are down regulated from their surface which make them less visible to our immune cells. The tumor cells also produce and secrete substances that lead to an immunosuppressive environment.

Gene therapy is the insertion of genes into cells and/or tissues to treat a disease. This can be done by correcting the abnormal genetic change to repair cell function or to introduce a gene leading to tumor cell killing. Some gene therapies against cancer focus on trying to stimulate and strengthen our immune system by activating the immune cells to attack tumor cells. This project evaluated CD40L gene therapy, where the immunstimulatory CD40L gene was introduced into the tumor microenvironment. CD40L will activate dendritic cells which are a type of immune cells who present antigen to other immune cells. By presenting antigen to T cells, T cells can develop into effecter cells, which have the capacity of eliminating tumor cells. With CD40L expression on the surface, dendritic cells enhanced their antigen presentation function, and increase the proliferation of T cells. This gene therapy was evaluated in a mouse model and an increased anti-tumor immune response against established solid tumors were obtained.

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