AptaCancer

Single-stranded DNA aptamer capable of specifically binding human PD-L1 as a new molecular probe in cancer diagnosis

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The aim of the project is to develop a universal molecular probe for the PD-L1 protein (programmed death receptor -1 ligand), which will facilitate the diagnosis of various types of cancer. PD-L1 is a protein found on the surface of many cancer cells, enabling them to bypass the immune system's natural defines system.
One of the components of the immune system are T cells, which recognize and attack cancer cells. These cells have structures called receptors on their outer surface, which act as keys to lock onto the molecules of attacking organisms. This molecular recognition is a major component of the immune response. One of the elements of this mechanism are so-called "checkpoints", which prevent T cells from attacking normal cells. A key part of this mechanism is the PD-L1 / PD-1 system. PD-L1 on normal cells recognizes and attaches to PD-1 on T cells, preventing them from attacking healthy cells. Unfortunately, some cancers have learned to produce large amounts of PD-L1 in order to trick the immune system into avoiding detection. Hence, the designed probes target PD-L1 binding and will be able to detect and locate neoplastic cells at a very early stage of the disease. These probes can be used in early diagnosis, increasing the chances of disease detection and treatment.
The development of a universal probe would create the possibility of imaging various types of tumors depending on their ability to overexpress PD-L1 and would provide a tool / finished product as a probe for future diagnostic and even therapeutic clinical trials.

The result of the work so far has been the development and patenting of a nucleotide sequence capable of specific binding of the PD-L1 (Programmed death-ligand 1) protein, which has been equipped with a fluorescent tag. Currently, the aptamer is being tested in vitro and in vivo (animal cancer models).