



Fractalkine Binding Aptamers for Drug Delivery (20120074, Dr. Efrosini Kokkoli)

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Category

Life Sciences/Pharmaceuticals

DNA Aptamers Bind Fractalkine for Targeted Drug Delivery

The DNA aptamers that bind specifically to the human protein fractalkine (FKN) are better suited for targeted drug delivery than other technologies such as antibodies and are non-immunogenic. Fractalkine is a recently discovered chemokine that acts as an adhesion molecule for leukocytes. This feature makes fractalkine a preferred candidate for targeting. Chemokines are a class of cytokines that are released from cells and can induce chemotaxis, the transportation of cells. Within the vascular system, fractalkine is expressed only at sites of infection or inflammation. Fractalkine is involved in different types of cancer such as lymphoma, prostate, lung, and colorectal cancer. It is also active in various clinical disease states beyond cancer, such as atherosclerosis, glomerulonephritis, rheumatoid arthritis, cardiac allograft rejection, HIV disease, and sepsis.

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Non-immunogenic and Non-toxic Treatment

There is a need for improved methods of drug delivery for cancer treatments and other disease states. Some treatments being developed are not effective or have dangerous side effects. These aptamers have shown to be non-immunogenic and non-toxic in preclinical and clinical tests. This is the main advantage of antibody based methods that have immunogenicity. This leads the FDA to favor aptamers for drug delivery, these aptamers will have less hurdles to approval than antibodies. They are easy to produce and can be efficiently scaled up because they do not require animals for production. This makes aptamers a less expensive alternative to antibody targeting.

BENEFITS OF APTAMERS THAT BIND FRACTALKINE FOR TARGETED DRUG DELIVERY:

- DNA aptamers bind to fractalkine with high affinity. Useful for increasing drug efficacy by targeting correct cells and decreasing drug side effects caused by non-specific delivery to healthy cells
- Fractalkine is an adhesion molecule for leukocytes, helping aptamers congregate in areas with high white blood cell presence
- Aptamers are simple DNA molecules, purified without the use of animals
- Production scale up is less expensive compared to antibodies
- FDA has favorable opinion on aptamers compared to antibodies
- Aptamers are non-immunogenic and non-toxic

Researchers

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Dr. Kokkoli's research focuses on targeted drug delivery and peptide hydrogels for tissue engineering.