International Journal of Drug Research and Technology

Available online at http://www.ijdrt.com

Perspective

APTAMERS IN DRUG DELIVERY

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INTRODUCTION

Aptamers are single-stranded DNA or RNA molecules with 20-100 nucleotides in length that can create three-dimensional structures to precisely attach to target molecules. The biomedical field is becoming increasingly interested in these novel targeted compounds. Aptamers have various benefits over typical protein antibodies, including small size, high binding affinity, specificity, good biocompatibility, high stability, and low immunogenicity, all of which lead to their widespread use in the biomedical area. Aptamers can attach to cell membrane receptors and mediate the entry of themselves or associated nanoparticles into cells. As a result, aptamers can be used as effective drug delivery targeting ligands. Different aptamer-mediated drug delivery systems have been developed for cancer therapy due to their great features [1].

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DESCRIPTION

Aptamers are a type of medicinal oligonucleotide whose sequences dictate the formation of specific three-dimensional structures. They're usually created by an iterative screening procedure of complicated nucleic acid libraries called Systemic Evolution of Ligands by Exponential Enrichment (SELEX). Purified proteins have historically been used in SELEX, however cell surface receptors can be difficult to purify in their properly folded and modified conformations. As a result, only a few aptamers that bind cell surface receptors have been developed [3].

However, advances in recombinant fusion protein technology have improved the availability of receptor extracellular domains as pure protein targets, and cell-based selection approaches have enabled selection against surface proteins in their native configuration on the cell surface. A specific protein target is not always chosen with cell-based selection; instead, selection is done against a target cell type with the purpose of allowing the aptamer choose the target. Aptamers that bind cell surface receptors have been shown in several investigations to have roles other than inhibiting receptor-ligand interactions. Many surface receptors are actively internalised in response to ligand engagement, and all cell surface proteins cycle intracellularly to some extent. Aptamers that bind cell surface receptors have thus been used to convey a wide range of payloads into cells [2].

The SELEX method entails iterative rounds of affinity purification and amplification, with the pool becoming increasingly enriched for ligands that bind the target protein with high affinity and specificity as the process progresses. Aptamers have a number of unique features that make them appealing instruments for usage in a variety of molecular biology applications as well as possible medicinal medicines. To begin with, most aptamers have a high affinity for their targets, with typical dissociation constants in the pico- to nanomolar range. Aptamers bind to the clefts and grooves of target molecules (including enzymes), producing antagonistic activity that is

comparable to that of several currently available pharmacological drugs. Second, aptamers maintain their structural stability across a wide range of temperature and storage conditions, allowing them to generate their distinctive tertiary structures. Third, unlike the expensive and labor-intensive biological systems required to generate monoclonal antibodies, aptamers can be chemically produced [1].

CONCLUSION

Although both RNA and DNA aptamers have theoretical benefits and supporters, aptamers with equivalent affinity and specificity may be made from either. Because aptamer stability in biological fluids is dependent on nuclease resistance, the RNA libraries used in SELEX are front-loaded with 2'-modified nucleotides, most often 2'-fluoro- or 2'-O-methyl pyrimidines. The cost of chemical synthesis for unmodified DNA oligonucleotides is probably the largest present benefit of DNA over RNA aptamers. Many organisations, however, favour RNA over DNA because RNA aptamers have a potentially better affinity for their target proteins and modified RNA has a higher plasma stability than unmodified DNA. The ideal target for aptamer-mediated delivery is one that is strongly expressed on all target cells, easily internalised, and does not express on non-target cells' surfaces. Several aptamers against great targets have been found, despite the fact that a perfect target may not exist. These aptamers have been used in studies to show that they can facilitate cell type-specific transport.

REFERENCES

1. Tan W, Wang H, Chen Y, Liu C (2011) Molecular aptamers for drug delivery. ***Trends Biotech*** 29:634-640.
2. Kruspe S, Mittelberger F, Szameit K, Hahn U (2011) Aptamers as drug delivery vehicles. ***Chem Med Chem*** 9:1998-2011.
3. Levy-Nissenbaum E, Radovic-Moreno AF, Wang AZ, Langer R, Farokhzad OC (2008). Nanotechnology and aptamers: Applications in drug delivery. ***Trends Biotech*** 26:442-449.

4. Zhang Y, Hong H, Cai W (2011). Tumor-targeted drug delivery with aptamers. ***Curr Med Chem*** 18:4185-4194.
5. Ray P, White RR (2010). Aptamers for targeted drug delivery. ***Pharmaceuticals*** 3:1761-1778.

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Received: 04 April 2022, Manuscript No. IJDRT-22-65979; **Editor Assigned:** 06 April 2022, PreQC No. P-65979; **Reviewed:** 19 April 2022, QC No. Q-65979; **Revised:** 23 April 2022, Manuscript No. R-65979; **Published:** 30 April 2022, DOI: 10.37421/2277-1506.22.11.347

Cite This Article: Azhar S (2022) "Aptamers in Drug Delivery" ***International Journal of Drug Research and Technology*** Vol. 11 (4), 1-4.

INTERNATIONAL JOURNAL OF DRUG RESEARCH AND TECHNOLOGY