DNA-Encoded Functionalized Aptamers

ONCOLOGY, INFECTIOUS AND IMMUNE DISEASES

McGill

2 Patents
USA & Canada

TRL 4

Pre-clinical stage
Ex vivo validation in oncological models

$500K CAD
Research funds raised (Médicament Québec grant)

Business Opportunity:
Licensing and Co-development

Market Opportunity:
Global market: $342.5 Billion USD (2026) for aptamers
CAGR: 17.7% for aptamers

TIMELINE

~300,000-member libraries synthesized and screened	High-affinity, nuclease-resistant binders identified	Ongoing target validation in cancer cell models

THE PROBLEM

While aptamers offer a promising alternative to antibodies due to their stability and ease of synthesis, their broader impact is limited by the narrow chemical diversity of natural nucleotides.

This restricted chemical space reduces their ability to engage challenging targets such as protein-protein interactions. Existing strategies to chemically modify aptamers are constrained by enzymatic compatibility, limiting the scope and diversity of non-natural building blocks that can be incorporated.

OUR SOLUTION

A novel type of DNA-encoded library (DEL) in which the ligands are aptamer-like molecules (“alenomers”).

Unlike conventional DELs, these alenomers can explore targets that are typically inaccessible and are designed with improved features compared to standard aptamers.

Our technology allows for the augmentation of the ‘alphabet’ of aptamers beyond 4 DNA bases, creating DELs of alenomers with full freedom in their chemical modifications, as each modification is encoded by a DNA code. This approach generates molecules diversity-superior to antibodies, while also improving their selectivity, binding strength, and nuclease resistance all without the enzymatic compatibility limitations of traditional aptamer discovery.

MARKET

DNA-encoded functionalized aptamers are versatile molecular tools with applications in diagnostics, therapeutics, and targeted drug delivery. Their programmable structure and ability to incorporate diverse chemical modifications allow high-specificity binding and screening of vast chemical spaces in a modular and scalable way.

They can be integrated into biosensors (aptasensors) for rapid, sensitive detection of disease biomarkers, pathogens, and toxins, and combined with nanoparticles for enhanced imaging in PET, MRI, and optical techniques. Their flexibility supports point-of-care diagnostics, microfluidic platforms, and multiplexed assays for simultaneous detection of multiple analytes.

The global aptamer market, including DNA-encoded functionalized aptamers, is rapidly expanding.
Valued at USD 2.34–3.27 billion in the early 2020s, it is projected to grow to ~USD 10.9 billion by 2030, ~USD 17.9 billion by 2032, and potentially USD 23–26 billion by 2034–2035, with CAGR ranging from 19 % to 24.6 %.

This growth reflects the increasing adoption of aptamers in various applications, highlighting their high commercial potential and versatility in biotechnology and medicine.

TEAM

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