Analytical Cellular Pathology

Hindawi

Special Issue on

Aptamers for Targeting Molecules in Human Diseases

CALL FOR PAPERS

Precision detection is one of the main cornerstones in the era of precision medicine. For precision-detecting molecules, aptamers that are RNA or DNA nucleic acid ligands and bind to their targets with high affinity and specificity have quickly emerged as alternatives to antibodies in all variety of applications such as targeted drug delivery vehicles, biosensors, clinical diagnosis (such as IHC staining and ELISA), or research tools (western blotting and flow cytometry). Aptamers hold their three-dimensional structures by defined complementary nucleic acid sequences, so they can maintain their structural conformation even in physiologically harsh reducing conditions. The structural stability of aptamers allows them to be used as detecting or staining probes on clinical specimens. In addition, compared with antibodies, aptamers have compelling biochemical features such as smaller size for easy tissue penetration, fine targeting, high reproducibility, structural flexibility, and prolonged stability at room temperature. In the past two decades, aptamers have been successfully developed for use against targets such as small molecules, intact cells, and *ex vivo* organs that antibodies cannot recognize. Their biological applications are versatile and offer significant advantages over antibodies. This means that aptamers are preferred for targeting molecules in human pathophysiological conditions and may substitute the role of antibodies in the field of molecular and cellular pathology.

Aptamers are structured single-stranded oligonucleotides. Therefore, they have some limitations in practice, including a short half-life, rapid degradation by nucleases, misfolded structures, and structure-dependence on concentration of divalent cations. Methods of increasing an aptamer's half-life and resistance to nucleases and optimization with chemically modified nucleotides after selection or incorporation of chemical modified nucleotides during SELEX are actively under investigation. Currently, there are no reported solutions to improve aptamers' structure-dependence on concentrations of divalent cations. G-quadruplexes contribute to the structural stability of aptamers but are also a significant cause of cross-reactivity of aptamers. As the structural changes of aptamers are closely related to functional changes, it is necessary to investigate the effects of chemical modifications of aptamers on structural changes and structure-dependence to divalent cations.

This special issue aims to collect submissions covering both the pros and the cons of using aptamers as precision-detecting molecules. Studies exploring the strengths of aptamers for targeting molecules in human pathological diseases and their biological applications are welcomed, in order to demonstrate their clinical applicability. Submissions that discuss the limitations of aptamers, such as cases where they are not functional or perform poorly, are also welcomed. In addition to submissions demonstrating clinical uses, the issue will cover molecular analytics, bioimaging, and chemical modifications associated with structure and function of aptamers. The special issue invites original research papers, review papers, and clinical studies that describe the current potential, challenges, limitations, possible solutions, and future prospects for targeting molecules in development of therapeutics, diagnostic, and research tools to a wide variety of biological applications in human pathological diseases.

Potential topics include but are not limited to the following:

- Aptamer-mediated targeted delivery of therapeutics or imaging modalities to human diseases
- Aptamer-based histopathology and cytopathology screening methods
- Aptamer-based molecular and cellular biology tools; aptasensors, apta-PCR, enzyme-linked oligonucleotide assays (ELONA), flow cytometry, aptablot, apta-FRET, and aptamer-affinity chromatography
- Aptamer-based proteomics tools, biomarker discovery, and recognition of posttranslational modification
- Aptamer-based analytics; fluorogenic/colorimetric detection of targets
- Aptamer-guided theragnostics/diagnostics
- Aptamer-guided bioimaging
- *In-silico* approaches of aptamer design and functional assays
- The effects of chemical modification of aptamers on structures and biological functions
- Toxicity of chemical modifications in aptamers
- Challenges and opportunities in the biological applications of aptamers
- Future prospects for improving the drawbacks of aptamers including SELEX methodology

Authors can submit their manuscripts through the Manuscript Tracking System at https://mts.hindawi.com/submit/journals/acp/satmd/.

Papers are published upon acceptance, regardless of the Special Issue publication date.

Lead Guest Editor
Sorah Yoon, City of Hope, Los Angeles, USA
syoon@coh.org

Guest Editors
Laurent Azéma, University of Bordeaux, Bordeaux, France
laurent.azema@u-bordeaux.fr

Carla L. Esposito, Istituto di Endocrinologia ed Oncologia Sperimentale, Naples, Italy
c.esposito@ieos.cnr.it

Submission Deadline
Friday, 13 September 2019

Publication Date
January 2020