

Aptamers in Diagnostics: Replacing or Complementing Antibodies?

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Editorial

Although aptamers were described in the literature more than 25 years ago, surprisingly they have not yet reached wide application in the biomedical industry. We here try to outline some issues and prospects with regard to aptamers as antibody replacement, emphasizing their use in microarrays as an example.

In 1990, both Ellington and Turek developed an in-vitro selection and amplification technique, known as systemic evolution of ligands by exponential enrichment (SELEX), to isolate RNA/DNA sequences that bind to target molecules specifically with high affinity [1,2]. These molecular recognition elements named “Aptamers” in principle offer many advantages in comparison to antibodies. They have been selected against various targets regardless of their immunogenicity [3]. Moreover, they can be modified with simple well defined chemical reactions to include a dye, a tag, a functional group, or to attach them to surfaces [4-7]. Unlike antibodies, aptamers have low cost of production, they do not suffer batch to batch variations and can refold to their original conformation when optimal conditions are restored.

In-vitro diagnostic (IVD) assays are medical assays performed extracorporeally to evaluate both the normal and altered physiological functions. They are usually used in combination with physical examination and in-vivo diagnostics (e.g. Nuclear magnetic resonance imaging and computed tomography); to provide valuable information for treatment decisions. Immunoassays represent the most commonly performed IVD format for protein quantification [8]. They are based on antibodies as molecular recognition elements. Enzyme linked immunosorbent assay (ELISA) is a robust and simple immunoassay; hence, ELISA assay format was transferred to microarrays in form of

simple to operate in nature; they require highly trained personnel and bulky machines.

However, we expect aptamers to be of greater value towards filling the gaps where antibodies fail to deliver rather than replacing them. This approach will lead to seeing aptamers used more frequently in commercial applications within the next five years.

References

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