

Thioaptamer Diagnostic System (TDS)

Quickly identifies up to 32 biomarkers in a single sample

AM Biotechnologies, LLC, in partnership with Sandia National Laboratories, has developed a diagnostic device that quickly detects sampled biomarkers. The TDS quickly quantifies clinically relevant biomarkers using only microliters of a single sample. The system combines ambient-stable, long shelf-life affinity assays with handheld, microfluidic gel electrophoresis affinity assay quantification technology. The TDS is easy to use, operates in microgravity, and permits simultaneous quantification of 32 biomarkers.

In Phase I of the project, the partners demonstrated that a thioaptamer assay used in the microfluidic instrument could quantify a specific biomarker in serum in the low nanomolar range. The team also identified novel affinity agents to bone-specific alkaline phosphatase (BAP) and demonstrated their ability to detect BAP with the microfluidic instrument. In Phase II, AM Biotech expanded the number of ambient affinity agents and demonstrated a TDS prototype. In the long term, the clinical version of the TDS will provide a robust, flight-tested diagnostic capability for space exploration missions.

Applications

NASA

- ▶ In-flight diagnostics for health research and monitoring
- ▶ Opportunities for novel biomarker discovery
- ▶ Research on the International Space Station (ISS) regarding human adaptation to microgravity

Commercial

- ▶ Clinical research tool for novel biomarker discovery
- ▶ Handheld diagnostic system for remote, resource-poor locations
- ▶ Rapid diagnostic device for use by first responders and physician offices
- ▶ Affordable diagnostic system for university research laboratories and companies with limited budgets



Phase II Objectives

- ▶ Optimize binding agents demonstrated in Phase I of the project
- ▶ Select additional binding agents for next round of biomarkers
- ▶ Improve assay performance in serum
- ▶ Develop stand-alone prototype for NASA demonstrations

Benefits

- ▶ Eliminates the need to freeze samples on the ISS and return them to Earth for ground-based testing
- ▶ Operates in microgravity
- ▶ Is easy to use, self-contained, automated, and lightweight (<10 pounds)
- ▶ Requires minimal sample volumes (microliters)
- ▶ Is sensitive and rapid (<10 minutes)
- ▶ Permits simultaneous quantitation of 8–32 biomarkers
- ▶ Offers long-term reagent stability at ambient temperatures

Firm Contact

AM Biotechnologies, LLC
Xianbin Yang
xianbin.yang@thioaptamer.com
12521 Gulf Freeway
Houston, TX 77034-4509
Phone: 832-379-2175

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