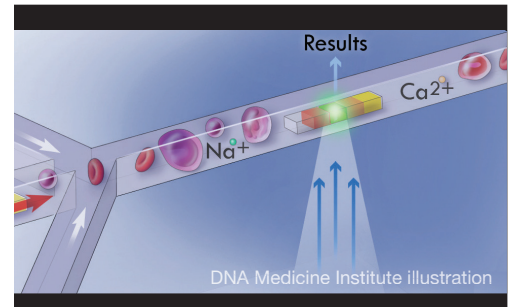


# Nanoscale Test Strips for Multiplexed Blood Analysis

## *Enables real-time, comprehensive health monitoring*

A critical component of the DNA Medicine Institute's Reusable Handheld Electrolyte and Lab Technology for Humans (rHEALTH) sensor are nanoscale test strips, or nanostrips, that enable multiplexed blood analysis. Nanostrips are conceptually similar to the standard urinalysis test strip, but the strips are shrunk down a billionfold to the microscale. Each nanostrip can have several sensor pads that fluoresce in response to different targets in a sample. The strips carry identification tags that permit differentiation of a specific panel from hundreds of other nanostrip panels during a single measurement session.

In Phase I of the project, the company fabricated, tested, and demonstrated functional parathyroid hormone and vitamin D nanostrips for bone metabolism, and thrombin aptamer and immunoglobulin G antibody nanostrips. In Phase II, numerous nanostrips were developed to address key space flight-based medical needs: assessment of bone metabolism, immune response, cardiac status, liver metabolism, and lipid profiles. This unique approach holds genuine promise for space-based portable biodiagnostics and for point-of-care (POC) health monitoring and diagnostics here on Earth.



## Applications

### NASA

- ▶ Routine assessment of bone biomarkers
- ▶ Rapid assessment of altered immune response biomarkers
- ▶ Detection of infection, immunocompromised states, and hematological malignancies
- ▶ Measurement of cardiac biomarkers
- ▶ Liver function assessment
- ▶ Lipid measurements

### Commercial

- ▶ Detection of acute myocardial damage
- ▶ POC monitoring of bisphosphonate therapy for patients with osteoporosis
- ▶ Diagnoses of acute cholecystitis
- ▶ Daily assessment of immune functions for patients with autoimmune disorders
- ▶ Study of bone remodeling for patients with Paget's disease
- ▶ Evaluation of effects of drugs and diet on liver function

## Phase II Objectives

- ▶ Implement rapid nanostrip assay capability
- ▶ Develop mix-and-run assays
- ▶ Establish in-house aptamer production
- ▶ Develop lyophilized nanostrip technology with lyoprotectant:
  - Perform accelerated stability tests on lyophilized reagents
  - Perform extended testing on antibody and aptamer nanostrips
- ▶ Develop bone antibody, bone aptamer, immune antibody, and immune aptamer nanostrip panel
- ▶ Develop cardiac, liver, and lipid assay nanostrip panels

## Benefits

- ▶ Enables massive multiplexing that has the potential to allow hundreds of measurements from a single session
- ▶ Facilitates home-based tests and measurements
- ▶ Contributes significantly to the evolving needs of space medicine, biomedical research, and POC diagnostics

## Firm Contact

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