

# SpinDx: A New Medical Diagnostic Tool

Maraquia Atwood, *Biomedical Engineering, University of Rhode Island*  
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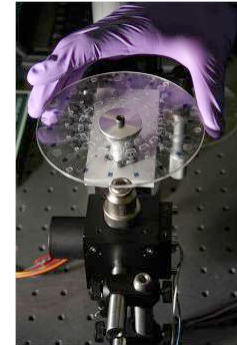
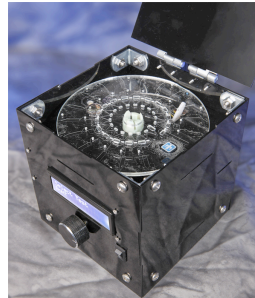
**Abstract**—Sandia National Labs has developed a new medical diagnostic tool called “SpinDx.” The SpinDx was developed for conducting simultaneous multiplexed immunoassays and white blood cell counts in less than 15 minutes. The technique is based on centrifugal microfluidics, or “lab-on-a-disk” technology, which uses centrifugal forces to manipulate samples and reagents through microfluidic channels on the disk.

## I. INTRODUCTION

RESEARCHES at Sandia National Laboratories in Livermore, California have developed a diagnosis disk that spins blood samples, believed to be faster, less expensive, and more versatile than similar medical diagnostic tools. It is believed to be a routine piece of equipment in a doctor’s office. The device can determine a patient’s white blood cell count, analyze important protein markers, and process up to 64 assays from a single sample in a matter of minutes. Heart attacks, strokes, infections, certain cancers, and other maladies could be detected days or weeks sooner than when using today’s processes. The device is extremely portable, and the assay discs can be manufactured for very cheap, making the device extremely affordable for small and large practices. This benefit has the potential to decrease the costs of testing, visits, and shortens the time between testing and treatment. Additionally, the device can be broadly applied across food safety, bio-terrorism detections, and commercial drug testing markets.

## II. METHODS

The system uses a touch screen control pad for assay operation and result dissemination. Miniaturized fluorescence optics are used for detection. Samples are self-collected and loaded onto the device using standard capillary collection tubes. Detection is achieved with a novel bead sedimentation immunoassay scheme. The sample is mixed on-disk with a detection cocktail consisting of capture beads coated with antibodies specific for the targets of interest, and detection antibodies labeled with a fluorescent tag. Following incubation the beads are removed from the sample via sedimentation by washing the beads to remove any interferences as the beads stack at the end of the channel. The fluorescent signal of the resulting bead pellet is used to quantify the analyte present.



To obtain blood cell counts, blood samples are mixed on the disk with labeling agents to label leukocytes prior to the centrifugation. The cells then separate along a pre-loaded density media based on their size and their density differences. The integrated fluorescent signal of each cell band is used to quantify individual cell population counts.

## III. RESULTS

The results of the device have been tested to an accuracy of above 99%. Further data has yet to be released by the company.

## IV. DISCUSSION

The SpinDx has many advantages. Patients have to provide a significantly less amount of blood for the test sample, the device is easy to use, the disks are inexpensive, and above all, results can be delivered within 15 minutes. Additionally the device is portable, and multiplexing, as a single disk can load as many as 64 assays. It can be applied to human and animal diagnostics, food and environmental monitoring, and biological defense. The SpinDx can analyze bodily fluids such as blood, saliva, and urine, environmental fluids like water, and food samples like soup, milk and various solids like vegetables and fruits.

The break-through technology of the SpinDx will revolutionize the way test results are received by doctors, and thus patients. If test results get to doctors faster, treatments can begin faster, and thus fewer fatalities occur.

## REFERENCES

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