

## A Next-Generation, Multiplexed System for Rapid, High-Throughput Infectious Disease Screening

### THE PROBLEM

Highly communicable infectious diseases such as tuberculosis, HIV, hepatitis, influenza, SARS, etc. are leading causes of human suffering, disability and death worldwide, resulting in more than 1.8 million fatalities for TB alone in 2008. This number can easily grow to more than 100 million deaths in years of global pandemic, such as during a major influenza outbreak. Clearly, the economic impact of such diseases is tremendous; for example, the estimated cost of the recent SARS epidemic to Asian countries was \$20 billion in 2003 (or \$2 million per case). In order to mitigate such large-scale human and economic impact, health authorities are moving quickly to deploy rapid, high-throughput disease surveillance and reporting programs, which are at the forefront and crucial for the identification, management and containment of disease.



*Figure 1: High population concentrations during periods of pilgrimage greatly increase the risk of rapid and uncontrolled transmission of highly dangerous infectious diseases.*

### THE TRUSENTRY ADVANTAGE

In TruSentry, Akonni Biosystems has developed a diagnostic system that can rapidly extract DNA and/or RNA directly from clinical samples and then subject these samples to testing for multiple diseases at the same time on a microarray (see Figure 3). This process, which is called *multiplexing*, is rapid, highly reliable, fully automated and very cost effective. In the case of multiple infectious diseases, an applicant's sample could be a tiny spot of dried blood or whole blood taken either at, or prior to, application for a visa. The analysis process is rapid enough (i.e., under 4 hours from sample to result on a TruSentry system capable of processing from 100's to 1000's of samples per day) that delays would not be encountered in issuing visas (Figure 2) for healthy individuals; yet the system is also effective enough to identify candidates that should not be allowed to travel until they had received proper medical attention in their home country.



*Figure 2: Screen temporary workers and immigrants as part of their visa application*

### BENEFITS

- Excellent solution for diseases like tuberculosis, HIV, hepatitis, influenza and STD's
- Identify multiple pathogens from a single patient sample; nasal swab, sputum or blood
- Delivers results in 2 to 4 hours, from sample preparation to final result
- Scalable from 100's to 1000's of samples per day
- Rapidly add new tests to the test matrix – scalable to 10's of diseases per patient sample

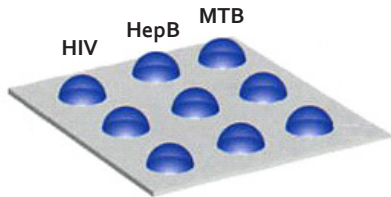


Figure 3a: Each gel-drop acts as a nano-scale biosensor, capable of identifying infectious diseases or drug resistance markers, such as for HIV, HepB and/or MTB.



Figure 3b: With a gel-drop microarray printed at the bottom of each well in 96-well plates, 10's of diseases markers can be tested from a single patient sample, 96 patient samples at a time.



Figure 3c: Leveraging industry standard robotic systems, TruSentry delivers fully automated sample prep to final result for 100's to 1000's of samples per day.

## FLEXIBLE CONFIGURATION

The TruSentry diagnostic system can be deployed in multiple configurations depending on the throughput required; for example in a single national reference lab processing millions of samples per year and/or as part of a larger network of separate satellite facilities located at, or closer to, the point where samples are collected (where potentially several hundred thousand samples are processed each).

The TruSentry System completely automates the diagnostic process, from sample preparation to results and analysis:

- Read 2D barcodes on tube racks
- Automatically de-cap tubes
- Transfer and process nasal swab, sputum and blood samples
- Use Akonni TruTip DNA extraction pipette tips
- Thermocycler PCR plates
- Transfer sample to TruArray microarray plate
- User laser scanner to scan TruArray microarray plate
- Automatically process and analyze results

## MORE INFORMATION

For more information on the Akonni TruSentry System, call Akonni Biosystems at (301) 698-0101 or end email to [info@akonni.com](mailto:info@akonni.com).

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Protected by 1 or more U.S. Pat: 6,460,094; 6,442,734; 6,795,949; 7,096,435. Other patents issued and pending.

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