**Capabilities**

The Rheonix Encompass Optimun™ Workstation automatically processes 3 or 6 Rheonix CARD® cartridges during each run. Each CARD cartridge processes four individual samples, therefore, a total of up to 24 individual specimens can be automatically processed at one time.

Under the control of software the system automatically performs cell lysis, DNA (or RNA) extraction, multiplex PCR amplification and detection of the amplicons on an integrated DNA array.

A variety of raw specimens can be placed into the system which will then automatically introduce them to the CARD cartridges. The types of specimens that can be processed include:

- Cell culture fluids
- Saliva
- Serum
- Plasma
- Tissue – fresh and FFPE
- Urine
- Food and Beverages

A broad array of assays have been reduced to practice, including:

- Detection of DNA or RNA Targets
- SNP Detection
- Infectious Disease (ID) targets
- User-defined assays
- “Dual assays” that simultaneously detect ID nucleic acids and host antibodies.
- Foodborne pathogens
- Beer spoilage organisms

1Additional products in the pipeline:

1. STi TriPlex Assay undergoing clinical studies for 510(k) clearance
2. Listeria Pattern Recognition Assay

**User-defined Assays**

The Rheonix Universal CARD® cartridge allows end users to automatically functionalize the integrated DNA array to permit multiplex PCR assays to be easily designed. Moreover, under the control of the Encompass Optimun’s software, the functionalization of the DNA arrays occurs automatically and simultaneously while the samples are prepared and subjected to PCR. Therefore, when the amplicons have been generated, the integrated DNA array is ready and available for hybridization and detection.

The Universal CARD array has a lawn of 20 unique oligonucleotides (16 mers) that are spotted at defined locations. The user designs “Reporter” probes that are complementary at their 3’ termini to the membrane bound “Universal” probes and complementary at their 5’ termini to the amplicons of interest (Figure 1). A number of assays, including detection of up to 20 targets, as well as SNPs and sexually transmitted infections have been reported1 (Figure 2).

**Automated NGS Library Prep**

In order to simplify and reduce the cost and labor of NGS library preparation, the Rheonix Encompass Optimun was programmed to perform the Nextera DNA Preparation NGS library preparation. Starting with buccal swabs obtained from volunteers (IRB approved), DNA was isolated and NGS libraries prepared. As compared to benchtop prepared libraries, the automated prepared libraries gave indistinguishable quality metrics when analyzed on Illumina HiSeq instruments. The size distribution (Figure 3), Quality scores (Figure 4) as well as Size distribution of inserts (Figure 5) and coverage (Figure 6) were excellent. Other library prep kits are currently being implemented.