

A Strategic and Innovative Bioprocessing Solutions Alliance



BioProcessing Solutions

powered by  **RUCDR**
INFINITE BIOLOGICS

**Sample Preparation
and Extraction**
Capabilities and Technologies

Sample Preparation and Extraction

Bioprocessing Solutions is an integrated, state-of-the-art scientific approach and technology infrastructure for the delivery of advanced sample bioprocessing and biobanking services. These solutions are offered through an innovative, strategic alliance between BioStorage Technologies, Inc. and RUCDR Infinite Biologics.

Sample Preparation (blood fractionation and sample aliquoting)

Processing of blood, tissue and various other sample types to support laboratory and diagnostic analyses are offered through a variety of semi- and fully automated processing technologies and methods tailored to sample type, collection vessels and project criteria. Further, our state-of-the-art automated systems and technologies for sample tracking, as well as, the association of analytical workflows and resulting data ensure the sample lifecycle is fully traceable and that samples are maintained at requisite temperatures throughout the testing process. This process is scalable to provide sample and data integrity, for every sample processed.

Sample Preparation Capabilities:

- Automated sample aliquoting – biofluids such as urine, blood and many others
- Automated blood fractionation – plasma, serum, buffy coat, platelets, PBMC processing
- Normalized biomaterial aliquoting/distribution – customized sample preparation for analysis based on volume, concentration or quantity of nucleic acid in any user-defined vessel format
- Tissue preparation – FFPE processing, tissue sectioning, tissue curls, snap freezing, tissue microarray generation



Liquid Sample Bioprocessing Technologies:

- **Hamilton Microlab STAR(s)** – Precision Automated liquid handling system utilizing superior air displacement pipetting technology to support small and large volume aliquoting. In-line tube and 2D tube rack barcoding for comprehensive aliquot management.



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- **Beckman Biomek FX(s)** – Fully automated liquid handling system configured for both 8 channel and 96 channel pipetting for replicate plating and high volume assay preparation. Environmental sample control in-line with aliquoting as required.
- **Tecan Freedom EVO(s)** – Dedicated precision liquid handling used for sample preparation protocols for sequencing, array and QPCR downstream processing.
- **Caliper Sciclone(s)** – Fully integrated automation for NextGen sequencing library preparation, sequence capture and normalization directly from primary samples.
- **Hamilton Chemagic STAR(s)** – Bead based extraction and aliquoting integrated platform utilizing Chemagen bead-based extraction chemistries for a variety of tissue types and primary sample volumes. In-line primary sample registration with complete end product aliquot sample management and QC preparation.
- **Hamilton EasyBlood STAR(s)** – Completely automated blood fraction system combining precision pipetting, digital blood fraction documentation and state-of-the-art aliquoting protocols for the precise and rapid fractionation of serum, plasma, buffy coat and red cell pellet directly from blood collection tubes.

Tissue Sample Bioprocessing Technologies:

- **VIPS SaKura & Leica Peloris Embedding TissueTEK** – Continuous rapid tissue vacuum infiltration and processing technology.
- **Leica CM 1850** – A versatile cryostat with an optimized cooling system, rapid specimen freezing and smooth specimen orientation for high-quality tissue sectioning.
- **Liquid Nitrogen (-190°C)** – High quality tissues are flash frozen quickly and cleanly so that ischemia and contamination are kept to a minimum to ensure a quality sample from various downstream extraction techniques.



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Sample Extraction (automated nucleic acid extraction and quality control)

Nucleic acid processing and extraction services are offered for whole blood, biofluids and tissue. We offer flexible DNA extraction capabilities consisting of organic, solid-phase, salting out and bead-based extraction chemistries from virtually any tissue source. We process and extract RNA from frozen tissue biopsies, FFPE block/slides, PAXgene™ RNA tubes, PAXgene™ Tissue containers, RNAlater and Genotek Oragene RNA collection tubes. We have extensive experience in protocol development and can provide expertise to ensure the right technique is applied for each requisite tissue and sample type.

Sample Extraction Capabilities:

DNA Extraction (whole blood/biofluids) - Extraction chemistries including organic, solid phase, salting out and bead-based approaches. All fully automated with in-line aliquot management. Primary biosample volumes for extraction ranging from 50 µl – 10 ml in single extractions.

RNA/miRNA Extraction (whole blood/biofluids) - Extraction chemistries including organic, solid phase, and bead based approaches. All fully automated with in-line aliquot management to prevent post extraction freeze-thaw and provide miRNA enrichment in independent aliquots. Primary biosample volumes for extraction ranging from 50 µl – 10 ml in single extractions.

DNA Extraction (tissue) - Extraction chemistries including organic, solid phase, and bead based approaches for both fresh and fixed tissue. All fully automated with in-line sample homogenization and aliquot management. Primary biosample volumes for extraction ranging from single cells to gram quantities of tissue in single extractions.

Comprehensive Nucleic Acid Analytical and Functional Quality Control

Comprehensive analytical and functional quality control testing is available for all nucleic acid samples.

Cuvetteless spectroscopy – Measures the contaminant profiles of nucleic acids and assesses the analytical quality control consisting of the concentration, purity and volume.



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RUID™ quality panel for DNA – A functional quality control panel that rapidly measures 96 SNPs and provides information on sample performance in downstream applications, sample uniqueness, sample contamination, gender and ethnicity. This patent pending technology allows for immediate reconciliation of sample collection and registration errors in addition to qualifying each and every DNA prior to costly downstream analyses. Our quality control provision is state of the art and in place to ensure sample quality and integrity for downstream analysis.

RUIDGx™ quality panel – An RNA quality control approach that analyzes tissue specific transcripts and interrogates the entire length of selected transcripts, as well as, a variety of expression levels. This rapid analysis provides direct assessment of cDNA fidelity and provides a score for each sample which correlates directly with microarray and RNAseq performance for any sample.

Nucleic Acid Automation Technologies:

- **ChemagicSTAR** – A flexible liquid handling platform used with a wide range of samples and supports volumes from 50 µl to 10 ml for fully integrated bead based nucleic acid extraction.
- **Qiagen Autopure** - Automated purification of genomic DNA from large-volume blood and cell pellet samples using proven Puregene® chemistry. For increased convenience and flexibility, samples can be processed in batches of 8 or 16. Yields average of 350 µg DNA per 10 ml blood in healthy subjects.
- **Qiagen Universal** – A fully automated system with medium- to high-throughput applications in 96-well formats. Supports purification of DNA/RNA from cells, solid tissues, blood, swabs, plasmids and forensic samples using solid phase extraction chemistries.
- **Qiagen QiaSymphony** – Enables sample preparation of DNA, RNA, bacterial and viral nucleic acids from a wide range of starting materials in a CLIA certified environment. Moderate to high throughput



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processing (1-96 samples - in batches of 24)- with sample volumes up to 1 ml using Qiagen's bead based chemistries.

- **Qiagen Qiacube** – Enables fully automated, seamless integration of automated, low-throughput sample purification up to 12 samples using Qiagen's bead based chemistries.
- **Qiagen EZ1** – Automated and rapid small scale purification of nucleic acids from clinical or forensic samples.

Nucleic Acid Quality Control Technologies:

- **Fluidigm BioMark (RUID™ and RUIDGx™ Panel Functional QC)** – A rapid high throughput and cost-effective approach for assessing both DNA and RNA quality while capturing critical information on sample performance as well as identity validation via gender and ethnicity measurements. It utilizes patent pending panels validated for the Fluidigm Biomark microfluidic dynamic array platform. Custom applications and assay development is also available for project specific needs.
- **Trinean DropSense (Analytical QC w/cDROP Analysis)** – High throughput, fully automated cuvetteless spectroscopy utilizing cDROP analytical software which specifically quantitates and provides high quality spectral data (based on UV/VIS spectrum) for QC purposes on a variety of molecules, e.g. DNA, RNA, proteins, oligonucleotides and PCR products. Accurate concentration data is provided with specific contaminant profiles for every sample.
- **BioMicrolab VolumeCheck (Analytical QC)** – Utilizes ultrasonic technology to measure sample volume in a 96 well/tube automated format for QC purposes. It provides a cost-effective, non-contact, high throughput alternative to manual QC of sample volumes minimizing opportunities for cross contamination of samples.
- **Caliper LabChipGx (Analytical QC)** – One of the components of RNA analytical QC is the assessment of ribosomal subunits using the Caliper Lab-on-chip technology. This high throughput measurement provides a RIN (RNA Integrity Number) score that can be used as a preliminary assessment of RNA quality.



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Sample Storage Capabilities:

- Mechanical: -70°C, -80°C, -20°C, 5°C
- Automated: -80°C
- Liquid Nitrogen: -190°C (liquid and vapor phase)
- Bulk or non-bulk: 15°C – 27°C



BioStorage Technologies, Inc. is the leading global provider of comprehensive sample management solutions to the bioscience industry and RUCDR Infinite Biologics is a global leader in the bioprocessing, biobanking and testing of samples for genetic, gene and cell-based research.

Through the BioProcessing Solutions Alliance, comprehensive sample management is provided to meet your research needs from study design, implementation to execution. Our sample bioprocessing solutions maximize the discovery process and protect precious biomaterial resources for future analyses allowing stakeholders to optimize the value of biological assets. Innovative workflows, cutting edge analytical approaches, and robust biomaterial storage processes enhance the value of any collection.



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