BECKMAN
COULTER
Life Sciences

Biomek Automated Genomic Sample Prep Accelerates Research

Biomek i-Series Automated FormaPure DNA Extraction kit for FFPE Samples

Introduction

Extraction of high quality DNA from formalin fixed paraffin embedded (FFPE) tissue is essential for many cancer research applications. The FormaPure DNA extraction kit from Beckman Coulter, Inc. provides a convenient extraction process utilizing Beckman Coulter's proprietary solid phase reversible immobilization (SPRI) chemistry to extract DNA from FFPE curls. Beckman has demonstrated that extracted DNA can be used to generate NGS libraries that deliver quality results. The kit comes in 50, 96 and 384 preps. The process can be laborious and error-proned and therefore is ideal for Biomek automation. Choose from low to high throughput Biomek liquid handling workstations to automate all steps of the workflow, including deparaffinization to enable a complete walk-away solution.

The FormaPure DNA Extraction kit is automated on all Biomek workstations and provides:

- Standardized workflow for improved results
- Reduction in costly errors
- Reduced hands-on-time and increased throughput
- Quick implementation with ready-to-implement methods
- Knowledgeable support for reagents, automation and methods all from single vendor

Spotlight: Biomek i7 Hybrid Genomics Workstation

System features provide highest throughput and flexibility of all Biomek Genomics workstations for maximized efficiency and reliability to increase user confidence and walk-away time

- 300uL or 1200uL Multichannel head with 1-300uL and 1-1200uL pipetting capability
- Span-8 with 1-1000uL pipetting capability
- Enhanced Selective Tip pipetting to transfer custom array of samples
- Two Independent 360° rotating gripper with offset fingers
- 45 positions
- Orbital Shakers, Peltiers and Tip washing for controlling sample processing
- Optional Enclosure

Figure 1. Biomek i7 Hybrid Genomics Workstation with optional enclosure on a Biomek Cart. 45 position deck capacity maximizes efficiency and increases walk away time

Demonstrated Method Interface (DMI):

Three simple modules that provide the user full instructions to better ensure error-free method setup and provides users maximum flexibility for scheduling their day

1. **Biomek Method Launcher (BML) —** secure interface for selecting methods without affecting method integrity and manual control
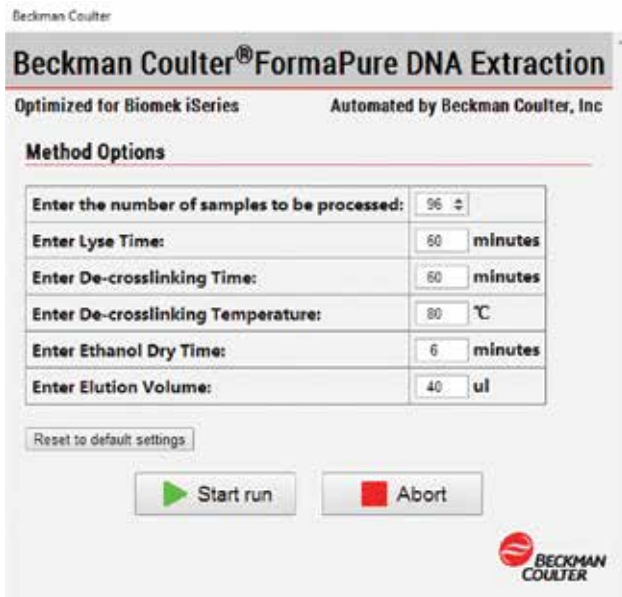

**Figure 2.** Biomek Method Launcher provided an easy interface to start the method

Figure 3. Manual Control can be run through the launcher interface

2. **Method Options Selector (MOS) —** Select run-time options and maximize flexibility in daily scheduling and method execution
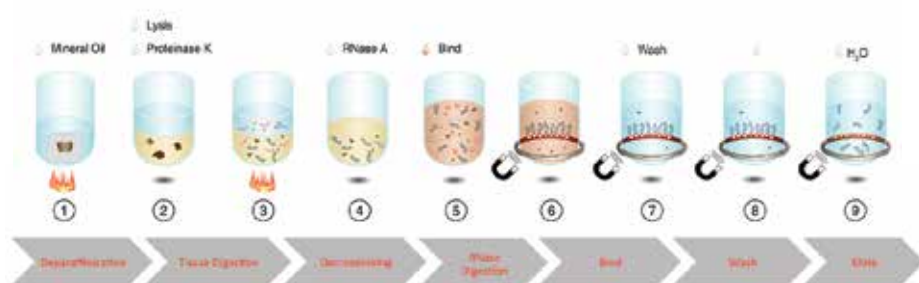

Figure 4. Beckman Coulter FormaPure DNA Extraction Method Options Selector showing the different features and run options.

3. **Guided Labware Setup (GLS) —** Generated based on options selected in the MOS, and provides the user specific text and graphical setup instructions with reagent calculation
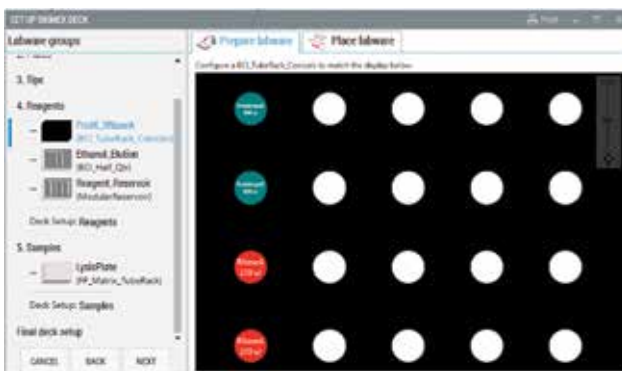
Figure 5. Guided Labware Setup guides the user for correct deck setup and reagent volumes needed as per the options selected.

Fast and efficient automated process with scalable throughput delivers a high yield of quality DNA ready for input into downstream processes like Next Generation Sequencing.

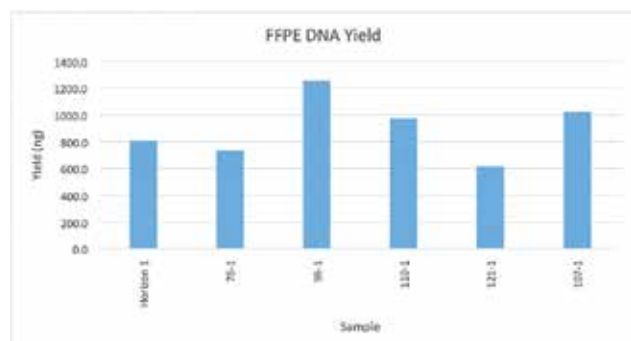**Figure 6.** Beckman Coulter FormaPure DNA Extraction automation workflow.

| Major Process Description	24 samples	48 samples	96 samples
FormaPure DNA FFPE Extraction	4 hrs 42 mins	4 hrs 53 mins	5 hrs 9 min
Hands On Time	15 mins	15 mins	15 mins
Total Time	4 hrs 57 mins	5 hrs 8 mins	5 hrs 24 mins
**Timing does not include thawing of reagents. Time estimates include 1 hour of digestion and decrosslinking.			

Table 1. Scalable throughput and timings for automated Beckman Coulter FormaPure DNA Extraction Kit workflow.

Experimental Design and Results

10 microns FFPE curls from Horizon HD200, breast (FFPE 76 and FFPE 96), lung (FFPE 110 and FFPE 121) and liver (FFPE 107) and were used to extract DNA using FormaPure DNA extraction kit. The extracted DNA was run through library construction with Illumina TruSeq Exome Kit.

Figure 7. Yield as measured by PicoGreen for DNA extracted from FFPE curls using FormaPure DNA Kit. NGS libraries were prepared with extracted DNA using Illumina TruSeq Exome Library Preparation Kit and sequenced on NextSeq.Coulter FormaPure DNA Extraction Kit workflow.
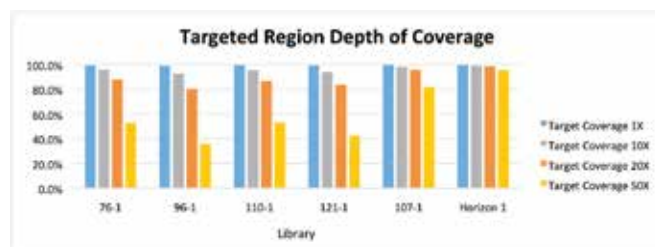
Figure 8. Sequencing data from Illumina NextSeq showing depth of coverage for DNA extracted from FormaPure DNA Extraction Kit. 80% of the targeted regions were covered to a depth of atleast 20X for FFPE samples and 95% of the targeted regions for the Horizon samples.

Summary

We have demonstrated that the i7 hybrid automation method for extracting DNA from FFPE curls utilizing the FormaPure DNA Extraction Kit results in high quality DNA with expected yields from FFPE slices. Furthermore, sequence-ready libraries can be generated when using these samples as input for NGS processes like Illumina's TruSeq Exome Kit.