Materials and Methods

Specimen Information

— Specimen 1: Human breast cancer; HER-2 positive, ER/PR negative
— Specimen 2: Animal kidney (Macaca mulatta)

Two types of specimens were procured, fixed, stained, tissue processed, and embedded. Slides were created using SmartSection and were H&E-stained using Tissue-Tek Prima® (Ref.1) (Sakura Finetek, Torrance, CA), then covered with Tissue-Tek Prisma® (Ref.1) (Sakura Finetek, Torrance, CA). The human tissue slides were further IHC-stained with antibodies against ER, PR, HER-2, Ki-67 and Pan-Keratin. Slides were then mounted in a VisionTek® Digital Scanner (Hamamatsu, Japan) then evaluated by scientists and image analysis software Definiens XD and Definiens Image Miner (Definiens AG, Munich, Germany).

For this study, SmartSection was programmed to:
— Face each block to expose the tissue
— Separate block sections into 5 magazines
— Serial section blocks at 4µm with Accu-Edge® Low Profile Blades
— Mount one section per slide in user-defined location
— Sort slides into Prisma baskets by staining protocol in the output area
— Hands-free sectioning; eliminating RMD
— Precisely mounts tissue in the desired location on slides
— Provides safety features to prevent cross-contamination and labeling errors
— Fully automates sectioning
— S orts slides by staining application into designated slide baskets
— Programs the method of sorting and drying slides
— Provides reproducible, predictable performance
— Continuously load up to 20 blocks in 5 magazines (100 blocks)
— Automatically deposits into an on-board sharps container
— Easy to operate: input magazines, and blank slides; replace blade cartridge; remove slide baskets

Results

Image Analysis

Animal kidney (Macaca mulatta)

The 10 H&E-stained kidney sections were scanned at 200X, then analyzed using the VisionTek® Digital Scanner (Hamamatsu, Japan) then evaluated by scientists and image analysis software Definiens XD and Definiens Image Miner (Definiens AG, Munich, Germany).

To assess tissue cross-contamination typical of the manual microtomy process (Ref.2), a vacuum removed paraffin debris from the block and blade surfaces and a circulating water bath kept specimen heating paraffin debris. Additionally, slides were scanned using the VisionTek® Digital Scanner (Hamamatsu, Japan) then evaluated by scientists and image analysis software Definiens XD and Definiens Image Miner (Definiens AG, Munich, Germany).

Presented below are 10 H&E-stained serial sections showing consistent placement of sections on the slides and even staining on a macrosopic level (Figure 2).

Figure 2

SmartSection performs QC on every slide based on user-defined acceptance criteria for wrinkles, tears, folds and number of tissues. Figure 3 shows 10 serial sections with co-localized area of interest, with microscopically ideal H&E-staining.

Figure 3

Conclusions

SmartSection provides the following benefits for the histology laboratory:
— Fully automates sectioning
— Consistently produces high quality sections
— Safely removes the designated location on slides
— Provides safety features to prevent cross-contamination and labeling errors
— Performs molecular cross-contamination, by replacing blades automatically between blocks
— Sorts slides by staining application into designated slide baskets
— Labels slide with legible text and readable 2D barcodes
— Performs QC inspection at block, section and slide levels
— Easy to operate: input magazines, and blank slides; replace blade cartridge; remove slide baskets
— Eliminates operator risk of developing RMD
— Provides reproducible, predictable performance
— Provides continuous innovation for Pathology

References

Ref. 1

H&E for specimen 1: Protocol for modified Harris

Ref. 2

Tissue-Tek® and Prisma® Provide Means for Diagnosing Errors in Surgical Pathology

Acknowledgments

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Tissue-Tek SmartSection®
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