

Conventional versus Tissue-Tek Xpress® x120 Rapid Tissue Processing: A blind comparison study using large surgical tissue

Introduction

Conventional tissue processing instruments have traditionally been the primary option to effectively process large surgical tissue samples. Under a traditional conventional process, tissues are grossed during the day, then held and processed in large batches overnight on long tissue processing protocols. These protocols can typically exceed 8 hours for tissues of 3 mm or greater thickness. The time spent waiting to batch, in addition to the long processing protocols of a conventional tissue processing instrument, delays cassettes from being embedded, creating one of the primary obstacles in reducing specimen turnaround time (TAT) in the histology laboratory.

Materials & Methods

The diagnostic quality of tissue was compared between the Leica PELORIS II[™] (Leica Biosystems), a conventional processor claiming rapid processing capabilities, and the Tissue-Tek Xpress[®] x120 Rapid Tissue Processor (Sakura Finetek USA).

Nine (9) common large tissue specimens were selected by the hospital laboratory for evaluation. These tissues included stomach, lung, kidney (tumor), kidney (normal), uterus, colon, small bowel, breast, and tonsil. Tissues were grossed into 3 pieces, with 2 of equal thickness, which ranged from 3-5 mm, and 1 sectioned specifically to 3 mm in thickness. All pieces were submitted in cassettes with a random number identifier.

One of the equal thickness specimen pieces was recorded and submitted for "Conventional" processing on the laboratory's current 8-hour validated protocol. The other was recorded and submitted for "Xpress" processing using the 2-hour Extended Program and 30 minutes in Tissue-Tek® Pre-Processing Solution timed in the instrument loading station (2.5 hours total).

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Materials & Methods Cont.

The third specimen piece of 3 mm thickness was recorded and submitted as "Xpress 3 mm" for a comparison using the same Extended Program and Pre-Processing Solution and method.

Since each specimen piece came from a large specimen, the left/center/right locations were recorded and rotationally assigned to the three processing methods.

Fixation time from grossing to processing was recorded for each specimen, including the additional onboard fixation time set on the "Conventional" processor. The "Xpress" and "Xpress 3 mm" specimens were held in formalin offline to achieve equal fixation

After processing, all tissues were automatically embedded on the Tissue-Tek AutoTEC[®] a120 Automated Embedder (Sakura Finetek USA). One microtomist cut all the blocks and labeled each slide with the corresponding cassette identifier. Slides were stained together for H&E and IHC using the laboratory's validated protocols.

The slides were scored for quality staining for H&E and IHC by 6 pathologists to provide a score-based comparison between the two processing methods. A separate analysis was performed to determine if there was an effect on fixation between the left/center/right locations.

Conclusions

No difference in quality between the conventional method performed on a PELORIS II tissue processor and the rapid method on the Xpress x120 was found, yet the Xpress x120 provided a significant time advantage by delivering cassettes for embedding 5.5 hours faster.

Results

All processed tissue types scored above the acceptable diagnostic score of 3 for H&E (score scale: 0-5), and in 6 of the 9 large tissue types, the average score for the "Xpress" processed specimens was equal to or higher than the "Conventional" processed specimens of the same thickness (Figure 1A). Average scores between the "Conventional" and "Xpress" showed no significant difference (p=0.39). Overall, the only tissue type with an "Xpress" average score between 3 and 4 was the small bowel tissue, which coincidentally had the shortest fixation time from grossing to processing of only 5 hours 15 minutes. Analysis using the Scheirer-Ray-Hare nonparametric ANOVA showed no significant difference (p=0.68) between the left/center/right locations (Figure 1B). The "Xpress" and "Conventional" processed specimens were found to have comparable scores for IHC stain specificity (p=0.18) and background (p=0.47) as well (Figure 1C).

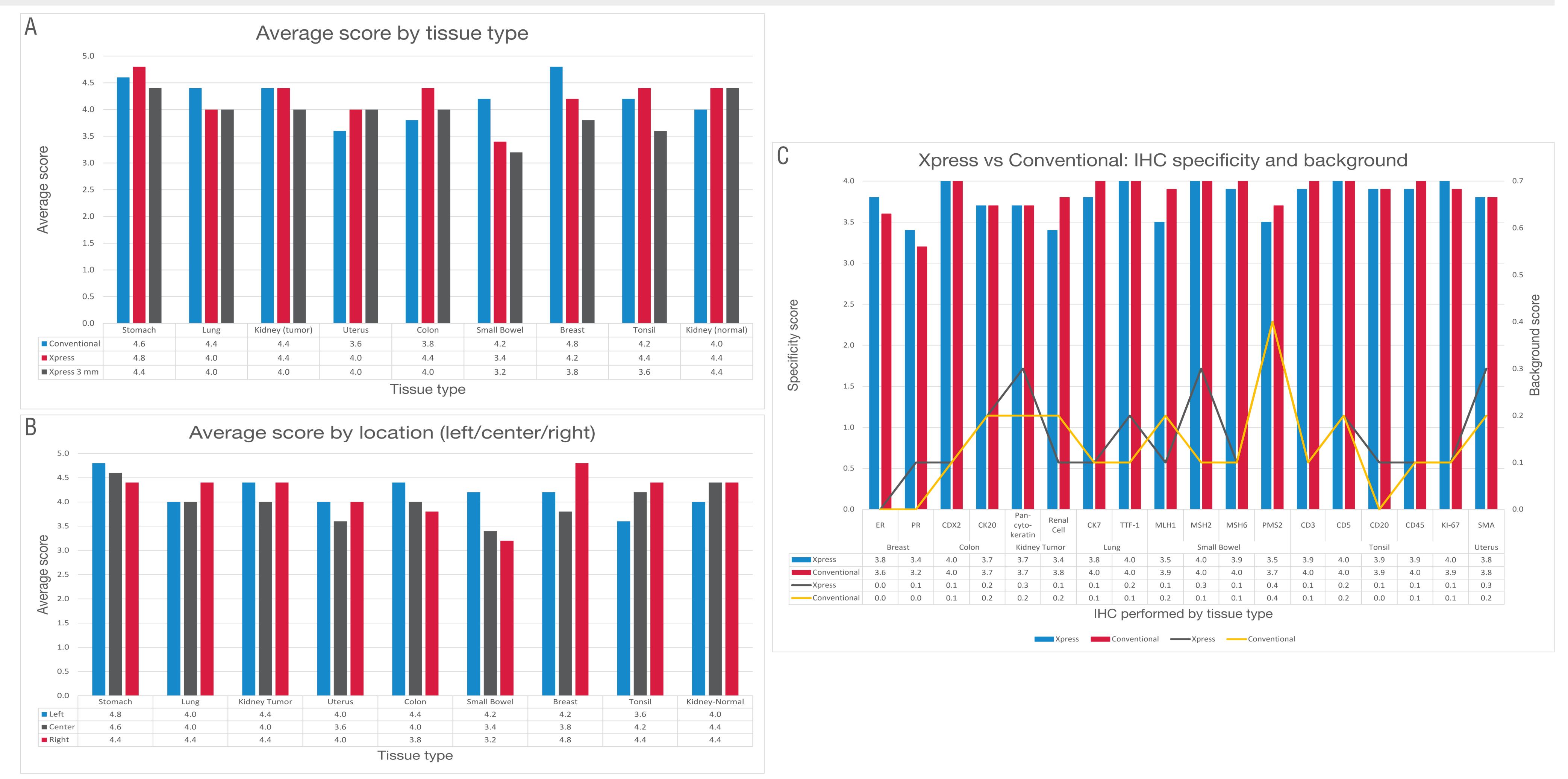


Figure 1: Average H&E stain quality score by tissue type (A), average H&E stain quality score by location (B), and average IHC stain specificity and background score (C). Data presented as average score of the blinded review of 6 pathologists.

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