



Validation of Histology Tissue Processing and Stain Quality of Logos Rapid-Cycle Microwave Processor in Lean Continuous Flow Operations

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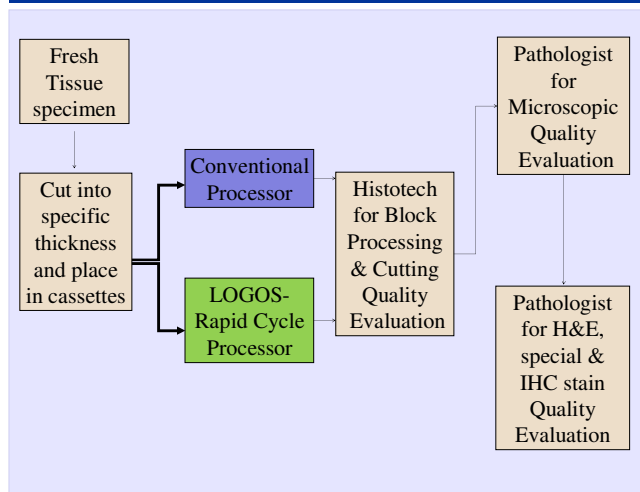
Background

Pathology report timeliness can be enhanced by technology that reduces time waste in histology. The largest delay is overnight fixation and prolonged processor times. These throughput bottlenecks can be targeted by integrating tissue processors capable of rapid-cycle times especially when aligned with continuous flow Lean work design.

Design

Design: Evaluation of a rapid-cycle microwave processor (Logos, Milestone Medical, Kalamazoo, MI) was performed at Henry Ford Hospital Histology Core Laboratory with aims to 1) integration of processor into continuous flow work process; 2) compare specimen quality in split samples processed by conventional overnight processors and the rapid-cycle instrument. We assessed technical quality of block processing, slide cutting and H+E staining by histotechnologists and quality of H+E, special and immunohistochemical stains by pathologists with a standard input form. 238 specimens were dissected fresh and split by 2 PAs. 3 part scheme with free text comments was used for histology assessment (High, Average, Low Quality) and pathologists' microscopic evaluation (Acceptable, Inferior, Unacceptable for Diagnosis). Analysis was stratified by tissue type and processed thickness.

Technical Comparison



Validation & Quality Assessment Input Form

Grosser's Evaluation:
Date: _____ Case Number: _____ Tissue Type: _____ Case Block No: _____
Tissue Thickness: 1mm _____ 2mm _____ 3mm _____

Histology Evaluation: Scale: High Quality = 1 Average Quality = 2 Low Quality = 3
Conventional Processor - Block processing & cutting Quality: _____
LOGOS Processor -Block processing & cutting Quality : _____

Pathologist's Microscopic Evaluation for Diagnosis:
ACCEPTABLE Quality: = 1 INFERIOR Quality: = 2 UNACCEPTABLE for DIAGNOSIS: = 3
Conventional H&E Stain Quality: _____ LOGOS H&E Stain Quality _____
Conventional Special Stain Quality: _____ LOGOS Special Stain Quality: _____
Conventional IHC Quality: _____ LOGOS IHC Quality: _____
Comments: _____

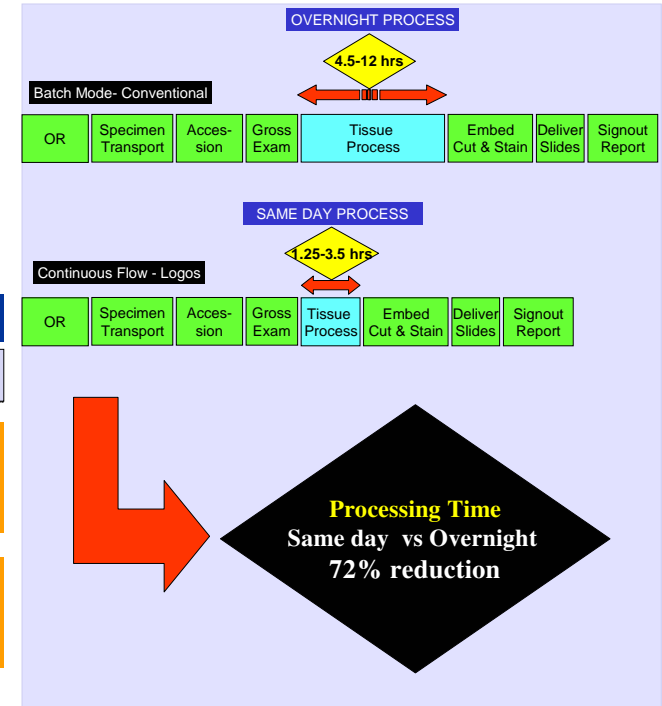
Results

Fresh tissue specimens	Tissue Thickness Gross Dissection	Processor	Histology cutting quality	Stain quality	Microscopic quality
49 Needle Bx	1mm	conventional overnight	High Quality no difference	H&E	Excellent Quality, No difference
	1mm	LOGOS Rapid Cycle		SS	
28 Small Bx	2mm	conventional overnight	Average Quality with Logos & Conventional 2 cases of higher quality with Logos	H&E	Excellent Quality, No difference
	2mm	LOGOS Rapid Cycle		SS	
161 Large specimens	3mm	conventional overnight	Higher Quality with Logos (9 cases), Less dry or brittle (prostate, LN, fibroid, placenta)	H&E	Excellent Quality, No difference
	3mm	LOGOS Rapid Cycle		SS	

Results

Results: In 238 tissues (fat, liver, placenta, ovary, colon, stomach, endometrium, cervix, ovary, uterus, prostate, testis, skin, thyroid, gallbladder, soft tissue, heart, POC, lymph node, salivary gland, thrombus, esophagus, lung, larynx), no significant quality differences were noted between rapid-cycle and conventional processors in any parameter assessed in 49 needle biopsies (1mm), 28 small biopsies (2mm) and 161 large specimens (3mm). Technical cutting quality was at variance in a minority, better in 9 cases from the rapid-cycle processor with embedded tissue being less dry or brittle whereas only 3 of the conventionally processed tissues were noted of better cutting quality. Pathologists detected no difference between the 2 types of processed specimens in any H+E stain, 10 special stains and 30 immunostains. None were of inferior technical quality for diagnosis.

Processing Time Savings in Validation Study



Validated Special Stains & Immunostains

Iron, trichrome, reticulin, Grocott, calretinin, PAS, AFB, CK 5/6, 7, 19, CD10, 20, 34, 163, AE1/AE3, p63, H. pylori, TTF-1, CMV, HSV, Melan-A, S-100, Napsin-A, BCL 6

Conclusions

Conclusion: This study validates the technical, H+E and immunohistochemical stain quality obtained with a new rapid-cycle microwave processor over a range of tissue types and processed thicknesses. The abbreviated cycle time including fixation (1.25-3 hours) facilitates the Lean approach to continuous flow processing with continuous slide production. Used in this fashion, the instrument facilitates potentially shorter report turnaround times compared to conventional overnight processing