Evaluation of Xylene-free Tissue Processing on the LOGOS all-in-one Hybrid Tissue Processor

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Introduction

The Pathology department at Aberdeen Royal Infirmary was in a position to replace one of their tissue processors. As part of this process, we considered same-day processing and also the Health & Safety issues concerning xylene. We investigated several of the processors on the market, Milestone LOGOS tissue processor fulfilled our requirements:

- Xylene-free processing
- Microwave technology for same-day processing

Two members of staff were invited to a demonstration in the Milestone factory near Milan and were impressed by the LOGOS, therefore an on-site demonstration was arranged. The LOGOS was on trial in the department for 2 weeks over which time various tissue blocks were processed on 3 different protocols.
H&E, Special stains and Immunohistochemistry were carried out on the sections.

http://www.milestonemedsrl.com/histopathology/

Comparison of Conventional & Xylene-free Tissue Processing

Conventional Tissue Processing - Peloris
Fixation – 10% Neutral Buffered Formalin
Dehydration – Graded Alcohols
Clearing – Xylene
Paraffin Wax Infiltration

Xylene-free Tissue Processing - LOGOS
Fixation - 10% Neutral Buffered Formalin
Dehydration – Alcohol
Clearing – Isopropanol
Paraffin Wax Infiltration

Evaluation

1. Various biopsy size tissues were processed on the LOGOS 2mm thick programme – processing time 2hours 5 minutes
2. Various large tissue blocks were processed in parallel:
   - Peloris conventional overnight processing (13hours)
   - LOGOS 5mm programme (5 hours 56 minutes)
3. H&E and Special Staining were compared from the sections produced after the Peloris processing and the sections produced after the LOGOS processing
4. Immunohistochemistry using several different antibodies was carried out on the Peloris and LOGOS sections and comparisons were made

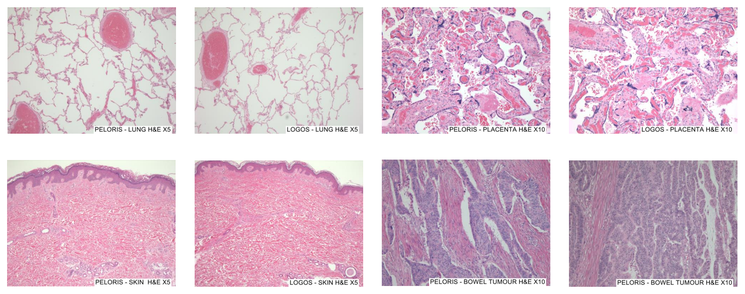
Processing Results

Programme	Outcome	Proposal
2 mm thick programme (2 hrs 56 minutes) 2mm thick tissue from prostate, colonic polyp, thyroid, small skins, kidney, placenta, lipoma and breast	All processed well except for the lipoma and breast	To process small GI biopsies on a 2mm programme and to process fatty tissue on a 5mm programme
2 mm thick programme (2 hrs 56 minutes) Small GI biopsies	All processed well	Continue to process small biopsies on this programme
5mm thick programme (5 hours 56 minutes) 2mm thick fatty tissue	All processed well	Continue to process 2mm thick fatty tissue on this programme
5mm thick programme (5 hours 56 minutes) 4mm thick tissue blocks from bowel, prostate chips, skin, lung, breast and lipoma	All processed well except breast and lipoma which appeared processed but were difficult to section	Extend the 5mm fatty programme to overnight fatty programme. Breast and lipoma blocks to be processed on this programme
Overnight fatty programme (12 hours) Breast and lipoma	All processed well	Continue to process 4mm thick breast and lipoma tissue on this programme
5mm thick programme (5 hours 56 minutes) Numerous non-urgent surgical cases of various thickness – mostly skins, cysts, gall bladder and appendix	All processed well	Continue to process non-urgent surgical cases until end of 2 week trial

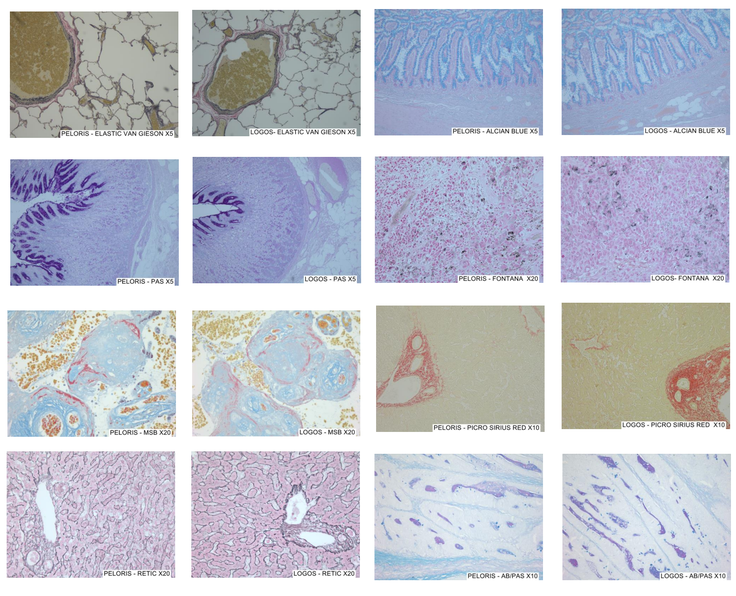
Staining Results

H&E
Several Pathologists assessed the H&E staining and listed below are some of their comments:

- No issues, impossible to tell the difference
- No issues, generally looks good
- All seem fine
- No difference seen – quality is the same
- No noticeable difference

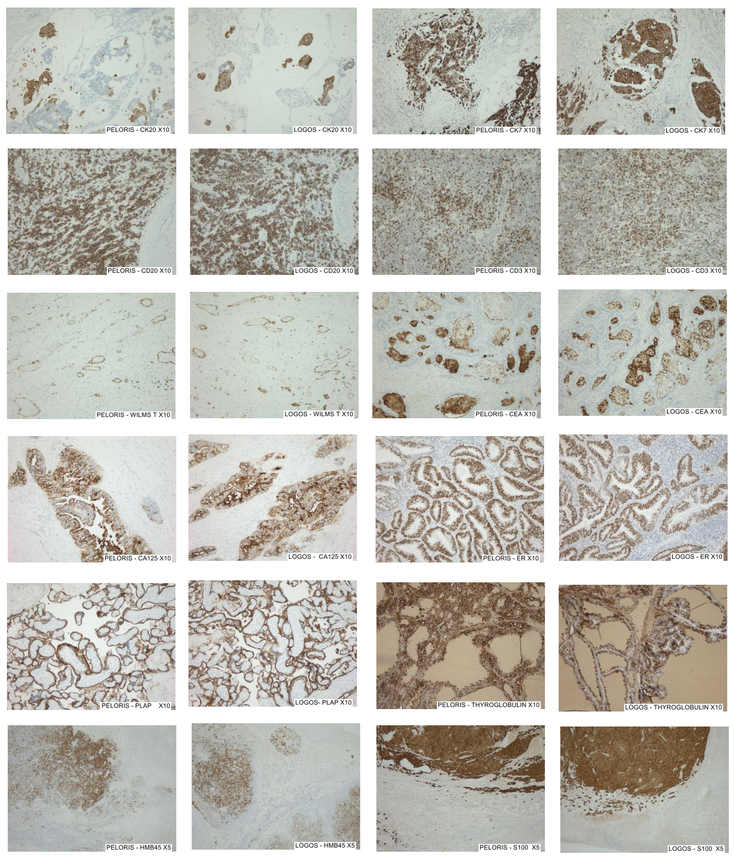


Special Stains
The following special stains were carried out and assessed on both sets of sections:
Lung – Elastic Van Gieson; Large Bowel – Alcian Blue; Stomach – PAS; Skin melanoma – Masson's Fontana; Placenta – MSB; Liver – PAS +/- diastase, Perl's, Picro Sirius Red & Reticulin; Bowel Tumour - AB/PAS.
There was no noticeable difference with any of the stains



Immunohistochemistry
Antibodies were used on the following tissues and the staining assessed by various Pathologists:

Tissue	Antibodies	Pathologists' Comments
Bowel Tumour and Normal Stomach	CK20, CK7, CDX2	No difference
Ovarian Serous Cystadenocarcinoma	CA125, ER, WilmsT	Same pattern, intensity and specificity of staining
Ovarian Mucinious Adenocarcinoma	CK20, CK7, CEA	No difference in staining/histological appearance
Endometrial Carcinoma	ER, CK7, Vimentin	Same pattern and intensity of staining
Normal Breast	ER, PR, E-Cadherin	Appearances are equivalent, no appreciable difference
Breast Ductal Carcinoma	ER, PR, Her2, GCDFP-15, E-Cadherin	Equivalent staining - no appreciable difference
Leiomyoma	Actin, Desmin, CD10, AE1/AE3, Caldesmon	No difference
Lymphoma	CD3, CD10, CD20, Bcl-2, Ki-67	All similar except CD20 which appears slightly better on Peloris sections
Lung	CK7, MNF-116, TTF-1	Staining similiar
Placenta	PLAP	Both look the same
Thyroid	Thyroglobulin	Both good epithelial staining
Kidney	CK MNF-116	Both fine
Prostate	PSA, CK HMW	Both good
Lipoma	Vimentin, S100	Both good
Skin - Melanoma	Melanin A, S100, HMB45	Generally find the LOGOS sections stained slightly weaker



Conclusion

After trialling the LOGOS tissue processor, it was concluded that the xylene-free processing had no adverse effects on tissue processing or staining, while improving safety.
The processing times were greatly reduced which could allow same-day processing, thus enabling the introduction of LEAN working in the department.

Acknowledgements

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