Application Note

Xylene-Free Tissue Processing on the Shandon Excelsior™ ES Tissue Processor

Part Number M312304

Introduction

Xylene has been traditionally used as a clearing agent in tissue processing for many years, primarily because it is miscible with both alcohol and wax while doing an excellent job of clearing the tissue of alcohol (Carson, 1997). By using isopropyl alcohol (IPA), the use of xylene in tissue processing can be eliminated. IPA is an excellent dehydrant for tissue processing and is miscible with wax (Sheehan & Hrapchak, 1980).

The benefits of removing xylene from tissue processing are:

1) Health and Safety compliance
2) Limiting the exposure of a hazardous chemical, thereby reducing the cumulative effects of exposure to toxic chemicals for your laboratory staff (Dapson & Dapson, 2005)
3) Lowering the high disposal costs associated with xylene

This Application Note describes two xylene-free tissue processing programs, a routine overnight program and a rapid biopsy program for the Shandon Excelsior™ ES tissue Processor.

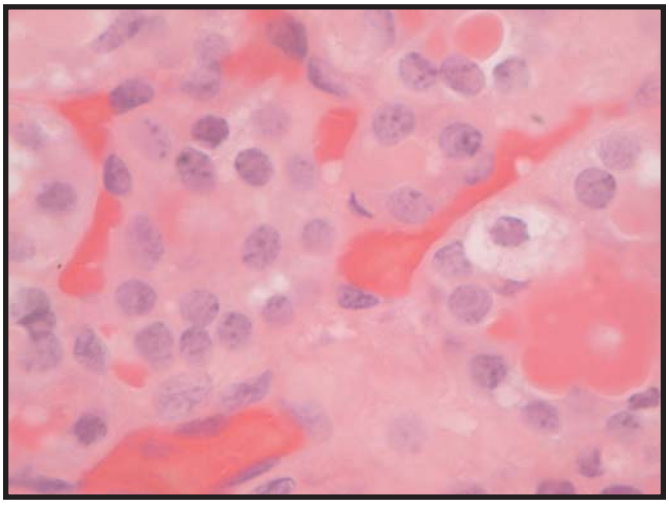
Materials and Methods

Rigorous testing of these xylene-free protocols was achieved at the Thermo Application Laboratory and at three independent validation sites to develop and validate these protocols. Testing involved using two Shandon Excelsior Tissue Processors; one processor with xylene as a clearing reagent (the control unit) and one processor without xylene and using IPA for dehydration (the test unit). A wide variety of tissue types were used during this process (several hundred paraffin blocks were prepared) and microscopic evaluation was performed by an independent consultant.

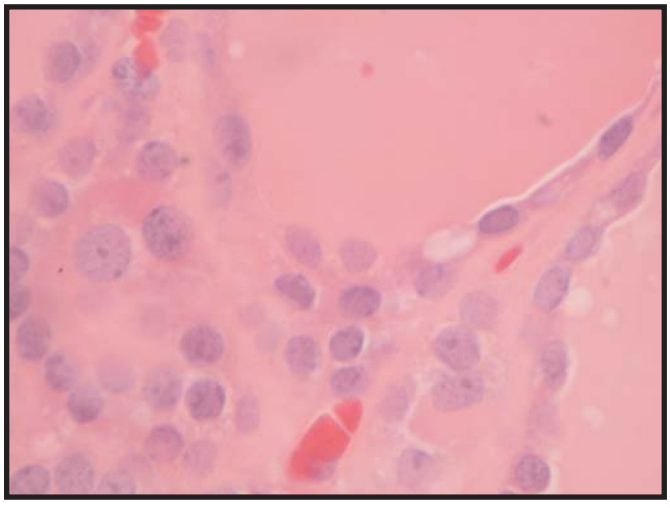
There were three validation sites involved: Jameson Memorial Hospital in New Castle, Pennsylvania, USA, Erasmus Medical Center in Rotterdam, The Netherlands and Mid-Stafford General Hospital in Stafford, UK. These sites used a variety of tissue, both pathologic and normal, including heart, liver, breast, colon, and placenta.

Results

The slides produced in the Thermo Application lab were microscopically evaluated by an independent consultant and it was concluded that the traditionally-processed



Xylene-free Thyroid (X600)



Traditional Processed Thyroid (X600)

tissue samples and the xylene-free-processed tissue samples provided similar quality morphological results. The validation sites as well found the comparison between the traditional versus the xylene-free tissue samples to be morphologically comparable, and superior in a number of cases to the traditionally-processed samples.

While the appearance of the xylene-free samples varied from traditionally-processed tissue samples during embedding and sectioning; no differences or problems were reported by the technicians in these hospitals. In many instances, the samples dehydrated in IPA were superior during microtomy. Isopropyl alcohol causes less shrinkage and hardening of tissue than does ethyl alcohol (Sheehan & Hrapchak, 1980). Two of the three validation sites found it necessary to slightly increase their eosin staining time in order to compensate for the slight decrease in acidophilic staining that was noted in the IPA-processed samples.

Conclusions

The results provided by the Thermo Application Laboratory and the validation site hospitals have provided excellent protocols to run as an alternative to traditional xylene tissue processing. While improving safety with the elimination of xylene for tissue processing, increased processing speed is also achieved with this application. In addition, less cost can be associated with xylene-free processing as there is less xylene in need of disposal.

References

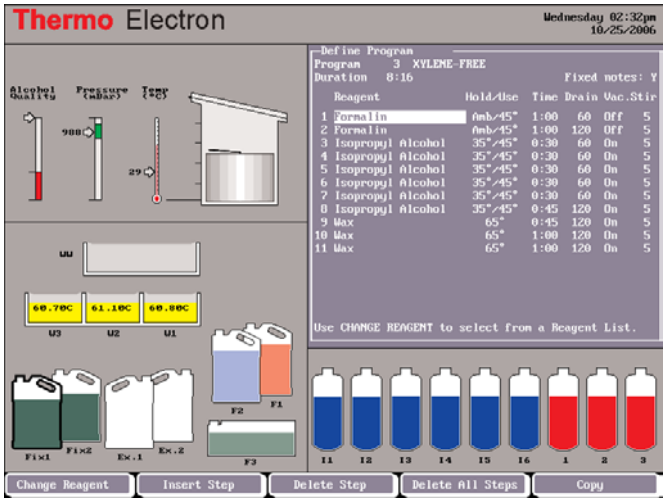
Carson, Freida; Histotechnology-A Self-Instructional Text, second edition, American Society of Clinical Pathologists Publishing, 1997

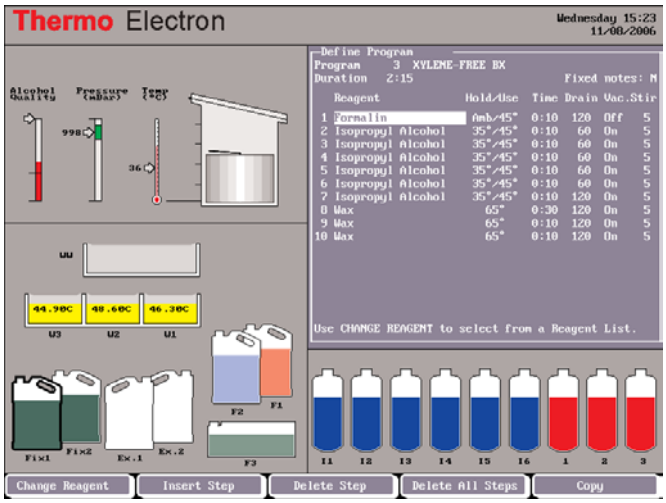
Dapson, Janet and Richard Dapson; Hazardous Materials in the Histopathology Laboratory, fourth edition, Anatech, Ltd. 2005

Sheehan, Dezna and Barbara Hrapchak; Theory and Practice of Histotechnology; Battelle Press, 1980

Protocols

These protocols are designed to be used on appropriately-trimmed tissue samples (2-3mm thickness) and using the reagents listed. For instrument setup and loading instructions, please contact your Thermo Electron Representative for additional information.





Acknowledgements

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