Comparison Study of Traditional Cytology Non-Gyn Processing Techniques to Specimens Processed with the CellSolutions Method

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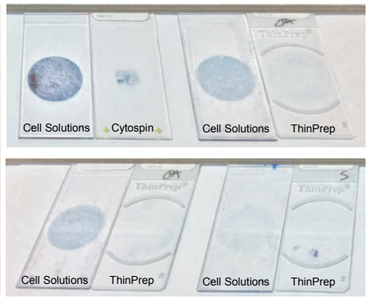
INTRODUCTION

In a field like cytopathology, it is vital to keep current with new technologies and methods developed to simplify and even improve upon current procedures used daily in labs across the world. While these technologies may cut cost, decrease human error, and reduce processing time, they are not always the better choice for all lab settings. This study compares the CellSolutions F50 (CS-F50) and The Methodist Hospital's current methodology for non-gynecological specimens, ThinPrep (TP2000) and cytospin (CytoSpin 4).

MATERIALS & METHODS

The instruments compared are the CS-F50 and the currently used methods such as the TP2000 and CytoSpin 4. For each individual specimen, the TP2000 uses an electrochemically charged glass slide, TransCyt single membrane filter, and a PreservCyt vial in which the pre-processed specimen is introduced in. The CS-F50 uses an electrochemically charged glass slide, a dual membrane filter, and a preservative vial in which the pre-processed specimen is introduced in. The CS-F50 method begins with the concentration of cells collected in a preservative, such as Cytolyt or RPMI, by centrifugation. The cell pellet is assessed and the adequate amount is transferred to a 10mL vial of CellSolutions General Cytology Preservative. The CS-F50 filter is loaded into the processor and a properly labeled slide is inserted frosted side down. The vial with the patient sample is poured into the filter. At the end of a very quick cycle, the slide will be ejected at the slide receptacle to be fixed and then stained. The TP2000 method begins with the insertion and dispersion of the specimen in the PreservCyt vial. The TransCyt filter mixes the specimen and uses a gentle vacuum to collect the cells on the filter membrane. The cells are then transferred onto a previously loaded electrochemically charged glass slide. After the cell transfer, the slide is deposited into an 95% alcohol bath for fixation prior to staining. A mixture of 100 non-gynecological specimen sources were used to make a total of 200 monolayer liquid based preparation slides. Each specimen produced 1 ThinPrep slide and 1 CS-F50 monolayer liquid based slide for comparison. In this study specimens were made from residual cellular material from the initial cytology preparation. A variety of cytology non-gynecologic specimens were selected including fluids, fine needle aspirates, urines, and washings/lavages. The specimens were evaluated on cellularity, preservation, and stain quality using a score of 1-poor/low cellularity, 2-average/moderate cellularity, and 3-good/high cellularity.

RESULTS

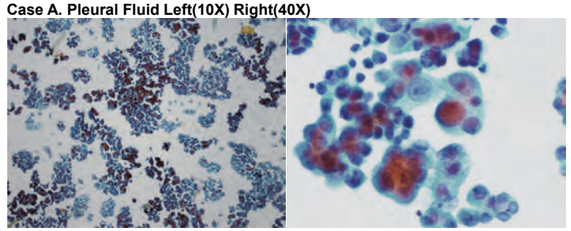


Type of Specimen	Current preparation method* average score	CellSolution preparation method average score
Body fluids	6.3	6.5
Urines	7.4	7.4
Pulmonary	7	8
FNA thyroid needle rinses	6.1	6.9
Miscellaneous **	5.6	6.6

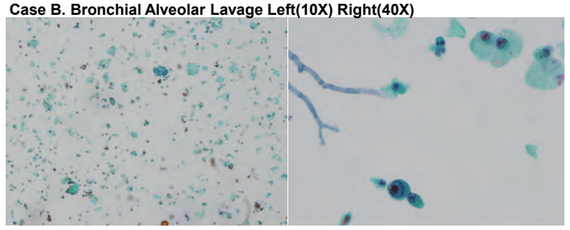
Table 1
* ThinPrep or Cytospins

CellSolutions F50 Prepared Slides

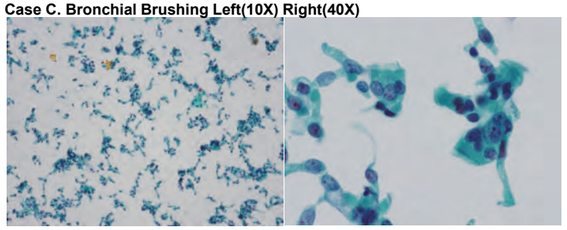
Case A. Pleural Fluid Left(10X) Right(40X)



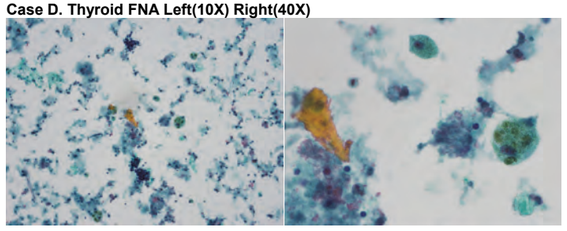
Case B. Bronchial Alveolar Lavage Left(10X) Right(40X)



Case C. Bronchial Brushing Left(10X) Right(40X)

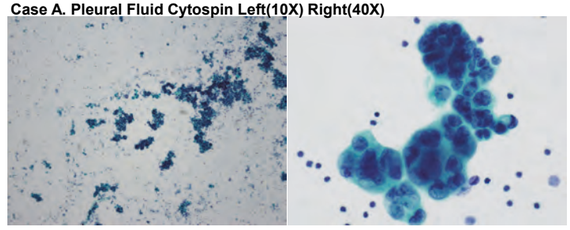


Case D. Thyroid FNA Left(10X) Right(40X)

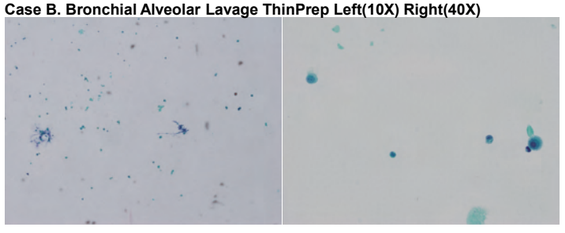


ThinPrep/Cytospin Prepared Slides

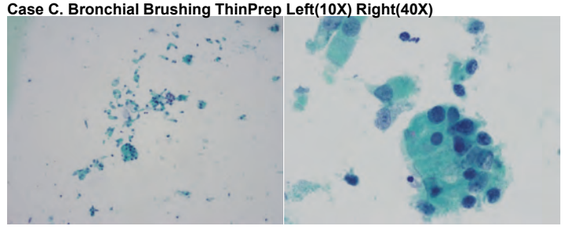
Case A. Pleural Fluid Cytospin Left(10X) Right(40X)



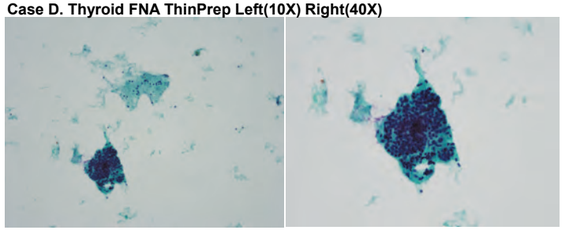
Case B. Bronchial Alveolar Lavage ThinPrep Left(10X) Right(40X)



Case C. Bronchial Brushing ThinPrep Left(10X) Right(40X)



Case D. Thyroid FNA ThinPrep Left(10X) Right(40X)



Results

Statistical analysis was performed on the 100 patient samples to obtain cellularity, preservation and stain quality scores. The scores comparing the current methods to the CellSolutions method are presented in Table 1. The CellSolutions score was higher in 4 out of the five categories. This evaluation demonstrated that in the majority of cases, CellSolutions produced a better quality in graded criteria on paired slides from the patient sample. In specimen types such as bronchial (Case B and C), FNA needle rinses (Case D), and miscellaneous types; the CellSolutions preparations demonstrated increased cellularity and better preservation.

DISCUSSION

This study compares the CellSolutions F50 (CS-F50) and The Methodist Hospital's current methodology for processing non-gynecological specimens, ThinPrep (TP2000) and cytospins. For the purpose of this study the ThinPrep and cytospin liquid based cytology processing technique was used as a quality control. This ensured that all testing methods were evaluated equally with specificity to quality already established by liquid based preparations. This study suggests that potential problems exist among the control group, such as low cellularity, is at times improved with the CellSolutions preparation. This suggest that CellSolutions double membrane filter technology yields cellular preparations with increased cellularity, preservation and stain quality on 93.75% of specimens tested in comparison to ThinPrep and cytospins with the remaining 6.25% where it averaged equally. A disadvantage that exists among CellSolutions, is that the CS-F50 ejects the slide into a dry environment, leaving the specimen to be air-dried. This requires the technician to stay in close proximity to the instrument in order to retrieve and fix each slide immediately. . A potential problem the CS-F50 presents is that it uses up the complete sample, not allowing for a second slide nor a follow-up cell block to be made. Meanwhile, the ThinPrep and cytospin methods save any excess residue.

CONCLUSION

Conclusions that can be drawn from the results are that The CellSolutions F50 offers a practical and less expensive alternative for thin-layer, liquid-preserved cytology that would be most beneficial in a smaller output scenario.

References

- Smith DA: Chapter V-1-2:Diagnostic Pathology:CytoPathology, 1st ed. Canada: Amirsys, 2014
- Smith DA: Chapter 33: Cytopreparatory Techniques. In Ramzy I:Clinical Cytopathology and Aspiration Biopsy. 2nd ed. New York: Mc Graw-Hill, 2001