

ELITechGroup Aerospray® Cytology Stainer: A Promising Advancement in Reliable and Standardized Cytological Staining

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Object : Papanicolaou (Pap) is valuable for nuclear analysis and cancer diagnosis but is burdened by time-consuming procedures and issues such as detachment of cytological material and inconsistent staining results.

To address these challenges, we conducted a comprehensive evaluation of the ELITechGroup Aerospray® Cytology Stainer. A total of 167 slides from 130 samples were stained with Aerospray and compared to conventional Papanicolaou (convPap)



Materials and methods

- Studied samples included various specimen types : serous or cyst fluids (n slides / n patients= 70/52), bronchoalveolar lavages (43/30), FNA, mainly pancreas, thyroid and lung (25/20), urines (18/18), biliary brushes (6/5) and sputums (5/5).
- An optimization phase was carried out on the first 85 slides. When possible, two pre-analytic conditions were tested : (T0) directly fixed in alcohol and stained alongside routine slides (n=78), and (RH) air-dried for 12 hours to 8 days, rehydrated for 10 minutes in physiological saline, fixed with alcohol (ETOH 95%, 15-30 min), and subsequently stained (n=89). In addition, 8 slides from 6 patients underwent a hemolytic phase before staining.
- For each condition, the results of the comparative analysis were scored from 0 to 4, where 0 = non-interpretable, 1 = slightly below but still diagnostic, 2 = identical staining, 3 = better outcome, and 4 = much better outcome compared to convPap.

Results

- Following a laboratory-specific development phase, our study demonstrated that 83% (139/167) of the slides stained with Aerospray exhibited identical or better staining quality compared to convPap. See photographs and resumed results below.
- Additionally, Aerospray showed notable benefits, including reduced staining time (5 to 7 minutes), decreased material loss, improved stain stability, and better visualization of thick cell clusters.

	Score 1 (≤)	Score 2 (=)	Score 3 (≥)	Score 4 (>)
Conventional Papanicolaou				
Aerospray				
Legends	Pleural fluid : mesothelial hyperplasia in a context of metastatic esophageal adenocarcinoma (obj x40)	Thyroid goiter apposition (obj x10)	Hemorrhagic pleural fluid+ hemolysis (obj x60)	Pancreas FNA : primitive adenocarcinoma (obj x20) : better visualization of necrosis
				Hemorrhagic pericardic fluid : metastatic lung adenocarcinoma (obj x4 & x60 + RH/A): less retraction and better visualization of tumor cells in clusters

Score	0	1	2	3	4	Total
T0	0	4	34	32	5	70
RH	0	19	32	38	21	89
Hemolysis	2	3	2	1	0	8
Total	2	26	68	71	26	167

Comments :

- Hemolysis condition should be improved as 5/8 specimens were non interpretable (cells diffusely orange with gummed chromatin)
- RH conditions always gave better results for hemorrhagic specimens and should be preferred to instant staining

In conclusion, although improvements are still needed after hemolysis, Aerospray staining appears to be a reliable and effective standardized alternative to conventional Papanicolaou staining in routine cytology.