

Influence of non-refrigerated urine storage time on stability of urine particles

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Background

The EFLM European Urinalysis Guidelines provide clear instructions for urinalysis. Regarding time for particle examination it is recommended that the specimen for particle counting should be refrigerated if not examined within 2–6 h and noted, that WBC counts may be questionable after 2–4 hours, even with sample refrigeration [1].

Labs can reliably follow recommendation for the *first morning urine examination* only for in-patient samples and with limitations for out-patient samples, only when patient lives close to the laboratory. Individual portative refrigerators for urine transportation are not available for patients in Estonia. Thus recommended *first morning urine analysis* is not possible for majority of out-patients as samples are discarded at preanalytical department or quality of analysis is not assured because labs analyze “delayed” samples.

We investigated the effect of urine storage time on the stability of urine particles.

Materials and Methods:

Urine samples were collected using BD Vacutainer® Urinalysis Tube (BD Vacutainer Urinalysis Tube, Becton Dickinson Biosciences).

The 63 urine samples from different hospital departments were analyzed immediately and within 6 hours (+/- 15 min) after arrival at the laboratory by image-based analysis systems: Atellica UAS 800 (Siemens Healthcare Diagnostics) or Cobas 6500 (u601+u701) (Roche Diagnostics). All samples were stored at room temperature. Both analytical platforms obtained 15 images of each sample using an integrated microscope and digital image processing software detected and classified urine particles. The results were expressed as average of formed elements/particles per HPF.

Table 1. Semi-quantitative values for urine particle analysis.

Parameters	Ranges			
	Negative	Positive		
		Few	Moderate	High
WBC (cells/ HPF)	0-2	3-10	11-25	>25
RBC (cells/ HPF)	0-2	3-10	11-25	>25
SEC (cells / HPF)	Negative	Positive		
NEC (cells / HPF)	Negative	Positive		
HYA (particle/ HPF)	Negative	Positive		
PAT (particle/ HPF)	Negative	Positive		
Crystals (particle / HPF)	Negative	Positive		
YEA (particle/ HPF)	Negative	Positive		
BAC (particle/ HPF)	Negative	Positive		

WBC – white blood cells, RBC – red blood cells, HYA - hyaline casts, PAT - pathological casts, SEC- squamous epithelial cells, NEC - non-squamous epithelial cells, YEA – yeasts, BAC – bacteria, CRY – crystals, HPF- high power field.

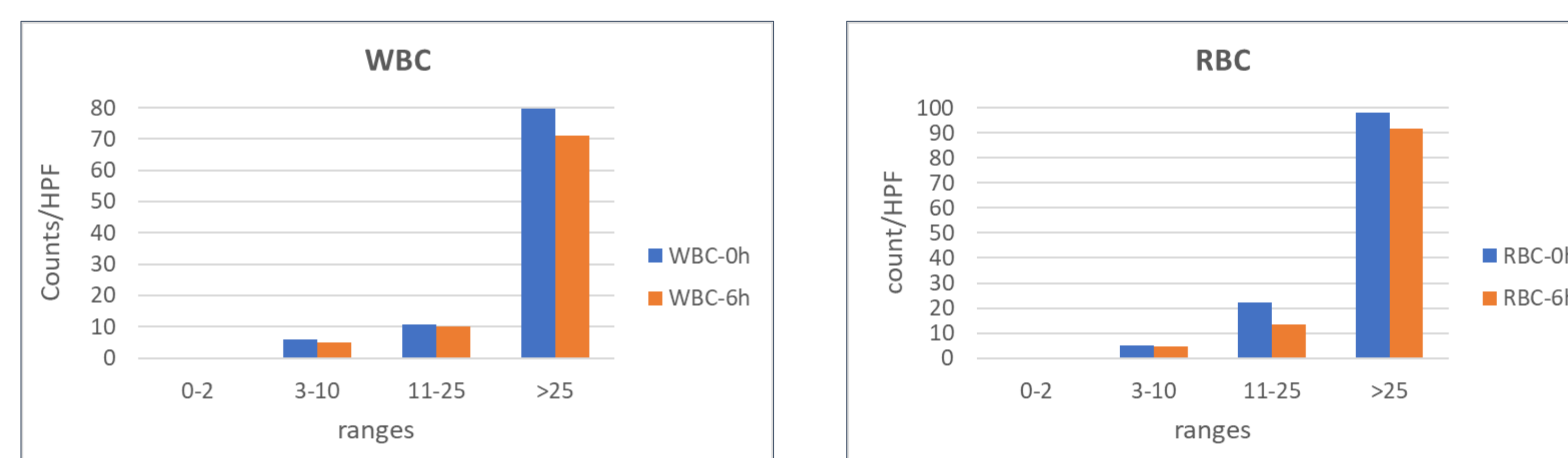


Figure 1. Comparison of WBC and RBC counts measured immediately vs post 6 hours after arrival to the laboratory.

Table 2. Agreement of results for urine cells/particles stored 0h vs 6h at room temperature.

Digital microscopy n=63									
WBC	RBC	HYA	PAT	SEC	NEC	YEA	BAC	CRY	
100%	100%	97%	100%	97%	97%	100%	95%	98%	

Results:

All results were categorized according to relevant clinical decision (Table 1):

- According to the AUA/SUFU guidelines [2], the number of RBCs in urine sample plays crucial role in determining the genitourinary malignancy risk category: 3–10 RBC/HPF for low-risk, 11–25 RBC/HPF for intermediate-risk, and >25 RBC/HPF for high-risk classification.

- Urine specimen with evidence of pyuria were defined as at least 10 WBC/μL (2.27 WBC/HPF) [3,4]. However, ≥10 WBC/μL in urine suggests the presence of UTI, but is not a diagnostic criterium [5].

No clinically significant changes in results interpretation for RBC, WBC, HYA, PAT, NEC, EPI/SEC, YEA, BAC and CRY were observed after 6 h of storage (Figure 1 and Table 2). All negative results remained negative and positive (hematuria, pyuria) remained positive. No lysis of casts, epithelial cells or crystals was present for 6 hours.

Conclusions:

Results of our study demonstrate there are no clinically significant changes of urine particles in non-refrigerated urine samples for up to 6 hours.

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Conflicts of Interest

The authors declare no conflict of interest.

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