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RAPID DIFFERENTIATION OF G(-) BACTERIA AND G(+) BACTERIA/MIXED GROWTH BACTERIAL UNCOMPLICATED URINARY TRACT INFECTION IN WOMEN WITH UF 1000I

Hypothesis / aims of study

In managing women with lower urinary tract symptoms suggestive of urinary tract infections, urine culture offered information with regard to bacteria species and susceptibility to antibiotics. Gram positive cocci/Mixed growth accounted for a significant proportion (up to 40%) of voided urine culture results. Because growth of mixed flora or gram positive cocci in voided urine of women were regarded as contaminated, the reults led to loss of waiting time and medical costs. Therefore, predicting gram positive cocci/mixed growth in the pre-analytical phase of urine specimen is essential.

Study design, materials and methods

We retrospectively reviewed 1687 women with lower urinary tract symptoms suggestive of urinary tract infections visiting urologic clinics for study. Exclusion criteria were those with fever >38°C, pregnancy, genitourinary tract anomaly, underwent immunocompressive therapy, recent antibiotics use (within one week), chronic kidney disease under dialysis, chronic urine retention under urethral catheterization or bladder cancer, infections other than bacteria and bacteria count <=367BACT×106/L. Urine analysis were performed with laser flow cytometry (UF1000i, Sysmex, Kobe, Japan) and then generating scatter diagrams related to bacteria morphology (forward scatter; B-FSC and fluorescent light scatter; B-FLH). Then, the diagrams of each specimen could be interpreted and classified as either gram(-) bacteria (<30◦, Figure 1A) or gram(+) bacteria/mixed growth (>30 ◦, Figure 1B). Standard biochemical identification of urine cultures were performed by using commercial microbial identification system (VITEK® 2, Biomerieux, Inc. Durham, North Carolina, USA). The agreement between urine culture and laser flow cytometry interpretation were analyzed using kappa statistics.

Results

Finally, 491 specimen with bacteria count >367BACT×106/L were included for analysis. Among 376 specimen with single bacteria growth, there were 27 gram positive (13 streptococci, 7 staphylococci, 6 enterococci, 1 corynebacterium) and 349 gram negative bacteria (272 E coli, 33 Klebsiella, 29 Proteus mirabilis, 6 citrobacter, 4 enterobacter, 3 pseudomonas, and 2 Providencia). There were 10 and 105 specimens with 2 bacteria species and mixed growth, respectively. Agreement of gram(-) bacteria or gram(+) bacteria/mixed growth between the laser flow cytometry and urine cultures were listed in the Table 1 with a kappa value of 0.57. With laser flow cytometry, the positive and negative predictive rate for Gram (+) bacteria /mixed growth in voided urine was 81.8% and 84.4%, respectively.

Interpretation of results

Urine specimens can easily become contaminated with periurethral, epidermal, perianal, and vaginal flora. Laser flow cytometry could predict gram(+) bacteria/mixed growth in the urine specimen within 1 hour. Then, asking the patients to have another urine test with proper attention to techniques for urine collection could reduce rate of useless urine culture.

Concluding message

Through laser flow cytometry, we can predict growth of Gram (+) bacteria /mixed growth in the pre-analytical phase of urine culture and therefore avoiding unnecessary urine culture and waiting time.

Figure 1 gram (-) bacteria (<30◦, Figure 1A) or gram(+) bacteria/mixed growth (>30◦, Figure 1B)

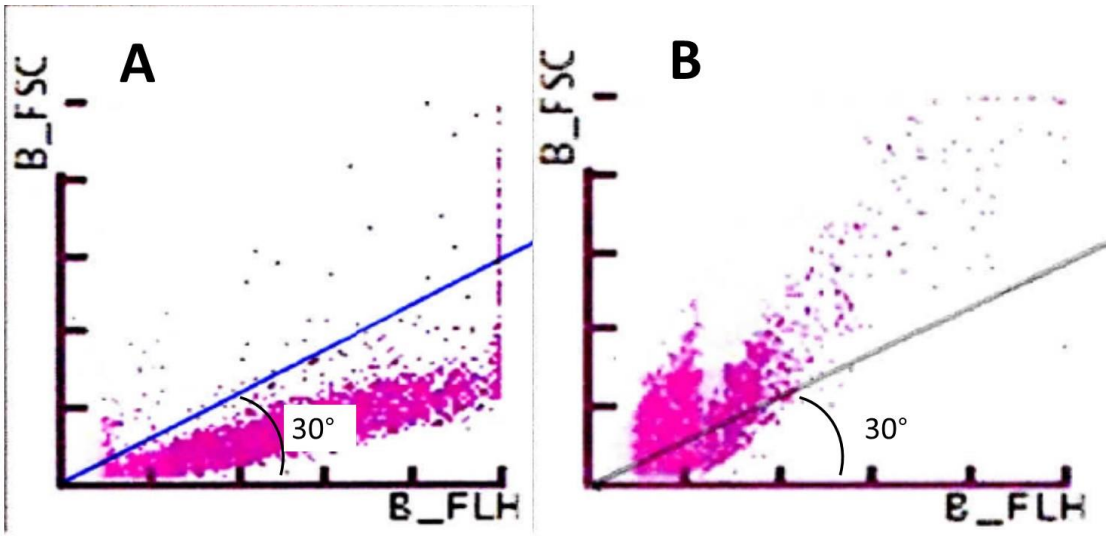

Table 1 Agreement between the interpretation and the results of urine culture

	Urine culture		
Interpretation of scatter diagrams	Gram (-) bacteria	Gram (+) bacteria /mixed growth	
Gram (-) bacteria	331	61	392
Gram (+) bacteria /mixed growth	18	81	99
	349	142	Total(n) = 491

References
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