

# Comparison of Copan WASP® versus BD Kiestra Inoqula® in Isolating Colonies from Positive Urine Culture Specimens

Mir H. Noorbakhsh<sup>1</sup>, Susan Novak-Weekley<sup>2</sup>

1- Sutter Health Shared Laboratory, Livermore, CA 2- Copan Diagnostics, Murrieta, CA

## ABSTRACT (revised):

Laboratory automation in microbiology has evolved over the last decade to include sophisticated plating instruments, which improves the quality of plating and reduces the associated labor. Positive patient identification is also another added quality feature non-existent in the plating process prior to automation. There have been no publications comparing the Copan WASP® (Copan Diagnostics, Murrieta, CA) plating instrument to the Becton Dickinson Kiestra™ Inoqula™ (BD, Sparks, MD). In this study a total of 294 turbid urine specimens were plated using both instruments. The ability of each instrument to produce enough isolated colonies for immediate culture work up and the time it took to read a subset of cultures were analyzed. Results show that though isolation is equivalent with both systems, cultures containing  $\geq 100,000$  CFU/mL were better isolated with the WASP® (1  $\mu$ l whole plate) versus the Kiestra (10  $\mu$ l whole plate). In addition, a subset of images screened by technologists and their reading time was recorded. Reading times were less for both the whole and bi-plate inoculated on the WASP®. The ability of the WASP® to inoculate a smaller volume of urine provides more isolated colonies resulting in less time needed for examination and fewer subcultures.

## Method:

Routinely collected (non-invasive) turbid urine specimens received at Sutter Health Shared Laboratory (SHSL) were used to ensure we achieve the objectives of the study, and higher chance for significant growth. The two instruments were located at two different affiliates 45 miles apart, SHSL and CPMC (California Pacific Medical Center). To eliminate the effect of transport time between plating and incubation, specimens were divided in two batches and each batch received the same amount wait time to incubation equally.

**Specimen Processing:** At Sutter Health System urine samples are collected remotely in a sterile cup and immediately transferred to a boric acid (BD Vacutainer Gray-top) tube for transport to SHSL. After receipt 294 turbid specimens were chosen and inoculated by the WASP® onto a Blood-Agar/MacConkey (BAP/MAC) bi-plate using a dual 1 $\mu$ l loop and Copan VST2 streaking pattern (**WB1**), and by the WASP® on BAP and MAC whole plates using a 1 $\mu$ l loop and Copan SST6 streaking pattern (**WW1**). The identical samples were plated using the Kiestra™ Inoqula™ (Becton Dickinson) by pipetting 10  $\mu$ l onto BAP and MAC whole plates using Kiestra™ streaking Pattern 5 (**KW10**). It is important to note that the Kiestra™ Inoqula™ is not able to provide 1  $\mu$ l volumes for plating, hence only 10  $\mu$ l volume was used. All plates were incubated in the WASP Lab™ (Copan Diagnostics, Murrieta, CA) in CO<sub>2</sub> for 18 hours. After incubation for 18 hours images were taken by the WASP Lab™ and stored for future analysis.

**Reading time:** To record the difference in average read times a set of 150 plates was analyzed. The average technologist salary at SHSL (excluding benefits) is \$58.59/hr and was used to calculate the cost of labor needed to examine 100 urine cultures.


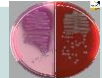
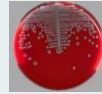

## Results:

**Colony Quantitation:** Total of 211, 213, and 207 urine cultures had growth using plate and streaking combinations WB1, WW1 and KW10, respectively. WB1 positive samples had a total of 272 isolates present of which 234 isolates had enough colonies for work-up (**86%**). WW1 positive samples had a total of 282 isolates present of which 250 had enough colonies for work-up (**89%**). KW10 positive samples had a total of 270 isolates present of which 224 had enough colonies for work-up (**83%**). To estimate the difference in colony isolation ability, a score was given (1 colony= 1 score, >6 colony= 7 score): no difference was found between WW1 vs KW10 ( $p= 0.404$ ) and in analyzing WB1 vs KW10 a  $p$  value of 0.402 was observed for isolates with colony counts between  $\geq 10,000$  CFU/mL and  $< 100,000$  CFU/mL. A significant difference was found in samples with a concentration of  $\geq 100,000$  CFU/mL: the number of isolated colonies was higher in WW1 in comparison with KW10 ( $p= 0.001$ ). No statistical difference was found between KW10 and WB1 ( $p= 0.921$ ).

**Reading time:** Average technologist read times for each inoculated set of 150 plates was 17.47 minutes (**WB1**), 19.04 minutes (**WW1**), and 28.78 minutes (**KW10**). When compared to the **KW10** set, **WB1** set was read 11.31 minutes faster and the **WW1** set 9.74 minutes faster.

## Conclusions:

- There is no statistical difference between the two systems when the colony count is light ( $< 100K$  CFU/mL), and they both provide acceptable isolated colonies for culture workup.
- Sample inoculation via the WASP® produced better isolation when the colony count was heavy ( $> 100K$  CFU/mL). This may result in better urine culture turn-around-time, which could have a positive impact on patient care. We believe the higher inoculation volume (10 $\mu$ l) of Inoqula® is the main reason for lower yield of isolated colonies.
- Based on our data WASP® 1 $\mu$ l inoculation volume also provides easier and faster reading time per positive plates. This may have a major impact on high volume laboratories such as SHSL with averaging about 700 urine cultures per day. At SHSL the impact will be an added \$22.09 per 100 positive urine samples. If considering only one-fifth of total cultures are positive this will amount to annual savings of about \$11,000 per year.

Instrument	Vol.	Streak Pattern	Description	Enough Colonies	WASP vs Inoqula Light growth ( $< 100K$ CFU/mL)	WASP vs Inoqula Heavy growth ( $> 100K$ CFU/mL)	50 plates Ave. reading time	$\Delta$ in minutes	Cost savings/ 100 Urine Cult.	
 Copan WASP®	1 $\mu$ l	WB1	Bi-plate BAP/MAC	86%	No difference ( $p= 0.402$ )	No difference ( $p= 0.921$ )	17.47 min	Fastest	\$22.09	
	1 $\mu$ l	WW1	Whole plates BAP + MAC	89%	No difference ( $p= 0.404$ )	Significant difference ( $p= 0.001$ )	19.04 min	+1.57	\$19.02	
 BD Kiestra® Inoqula	10 $\mu$ l	KW10	Whole Plates (BAP + MAC)	83%	--	--	28.78 min	+11.31	--	