Study of BIOMIC® V3 (Giles Scientific Inc) Automated Well Reading versus Manual Reading of Sensititre® YeastOne YO-9 Panel Results

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Abstract

This study compared the BIOMIC V3 Microbiology System (Giles Scientific Inc, Santa Barbara, CA, USA) automated results to manually read results for Sensititre YeastOne YO-9 (TREK Diagnostic Systems Inc, Cleveland, OH) panels. Overall, BIOMIC V3 readings showed 98.1% agreement with +/- one dilution of the manually read results. BIOMIC V3 provides microbiologists with a faster and more standardized alternative for reading these panels.

Background

Sensititre YeastOne YO-9 well reactions are colorimetric (blue = no growth, pink = growth). The package insert (1) recommends that all antifungal agents (except Amphotericin B) be read as the first well showing a less intense color change compared to the positive growth well. MICs of Amphotericin B are to be read as the lowest drug concentration that prevents any discernible color change, and are typically more easily defined. This manual reading subjectivity presents microbiologists with unique reading challenges including the ability to distinguish subtle color changes and complex reading instructions. Additionally, color blindness and varying skill levels of microbiologists may contribute to incorrect results.

BIOMIC V3 utilizes digital image analysis to instantly read, interpret, and display the panel image on-screen in high resolution. Users may adjust well reactions and save the panel images for future review.

Methods and Materials

A commercially available BIOMIC V3 Microbiology System was provided to ARUP Laboratories (Salt Lake City, UT, USA) by Giles Scientific. The system included a reader cabinet, internal LED lighting, a high resolution color digital camera, 21-inch touchscreen monitor, computer, and BIOMIC 2010 software. Sensititre YeastOne YO-9 panels were automatically read with BIOMIC V3 following manually reading by two experienced ARUP microbiologists. Relative to this new application: For Research Use Only. Not for use in diagnostic procedures.

Table 1: Summary of BIOMIC V3 Reading Trek Sensititre YO-9 Yeast Panel

- This panel is marketed by Trek Diagnostics as research use only.
- # is the number of drug/organism combinations.

Drug	#	# with Exact MIC Match	# within +/- 1 Dilutions	> +/- 1 Dilutions	% within +/- 1 Dilutions	% Exact MIC Match	
Fluconazole	136	123	135	1	99.3%	90.4%	
Voriconazole	136	116	133	3	97.8%	85.3%	
Micafungin	136	83	132	4	97.1%	61.0%	*
Posaconazole	136	90	133	3	97.8%	66.2%	*
Caspofungin	136	132	135	1	99.3%	97.1%	
Amphotericin B	136	88	134	2	98.5%	64.7%	*
Flucytosine	136	125	132	4	97.1%	91.9%	
Itraconazole	136	129	135	1	99.3%	94.9%	
Anidulafungin	136	105	132	4	97.1%	77.2%	*
Total	**1224**	**991**	**1201**	**23**	**98.1%**	**81.0%**	

*Users tend to read all drug endpoints using the same visual criteria. However, BIOMIC V3 followed strict Trek Sensititre YO-9 package insert guidelines, where non-azole drugs are to be read differently, with a total inhibition endpoint.

Table 2: Number of Isolates of Each Yeast Species

C. Albicans	34
C. krusei	1
C. lusitaniae	2
C. parapsilosis	12
Candida sp.	49
C. tropicalis	5
C. glabrata	31
C. famata	2
Total	**136**

BIOMIC V3 Microbiology System.
For more information visit www.biomic.com

Data Analysis

This study was started in January 2011 and completed in February 2011. All testing was performed at ARUP. One hundred thirty six (136) routine fresh clinical yeast isolates were tested. (Table 2) 1224 drug yeast organism combinations were read. (Table 1)

All test results were automatically read and recorded in BIOMIC V3, including minimum inhibitory concentration (MIC) results and panel images. This information was transferred to Giles Scientific for analysis by secure internet upload. Printed paper copies of manually read test results were provided to Giles Scientific and were manually entered into a master database. All test results were divided into two groups: one containing exact MIC matches, the other containing MIC discrepancies. For test results with MIC discrepancies, each test result was verified independently by two persons to check for possible transcription errors. For test results with exact MIC match, Giles Scientific adopted ANSI/ASQC Z1.4 sampling plans (2) for quality control.

Results

ARUP tested 136 Sensititre YeastOne YO-9 panels with 136 different strains of clinical yeast isolates in antifungal agent susceptibility tests. All clinical isolate test panels were read as part of the normal laboratory routine with fresh sequential unselected organisms to eliminate a selection bias.

Overall, BIOMIC V3 automated well reading showed 98.1% agreement with +/- one dilution with the manual reading results. BIOMIC V3 showed an exact MIC match in 81.0% of reading and only 1.9% (23/1224) test wells were read with greater than a one dilution difference. Additionally, BIOMIC V3 reading of Caspofungin, Posaconazole, Voriconazole, Fluconazole and Amphotericin B was excellent at 98.5%.

Conclusion

This study has shown BIOMIC V3 provides a highly accurate and reproducible means to read, interpret and record Sensititre YeastOne YO-9 panels. BIOMIC V3 also offers a significantly faster and more standardized reading versus manual reading, eliminating variation inherent between different microbiologists. All enlarged high resolution panel images are saved for future review.

References

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