Gram smears image acquisition and integration within WASPLab™ environment.

Santina Castriciano[1], Cristian Scaratti[1], Joachim Steenbergen [2], Carla Lacchini[3],Alessandra Bielli[3] Cesare Casati[4], Christian Schunck[5], Mark Fiandaca[5]

[1]Copan Italia Spa, Brescia,Italy. [2] A.M.L. bvba Antwerp, Belgium. [3]Microbiology, A.O. Ospedale Niguarda Ca' Granda Milano, Italy. [4]MetaSystems s.r.l., Milano, Italy. [5] MetaSystems, Altlussheim, Germany. [6]AdvanDx Woburn, MA, USA.

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Introduction:

Gram stain results are used by the clinician to enable initiation of antibiotic therapy prior to obtaining culture identifications. WASP™ and WASPLab™ automation systems are supporting the entire clinical specimens testing workflow, from Gram smear preparation to automated imaging of bacterial culture plates. The Metafer™ slide scanning automated platform can generate gram images and *Quick*FISH Gram can allow easy reading..

Objective:

The objective of this study was to evaluate a fully automated Gram testing, (using WASP™ prepared Gram smears, Gram stained with traditional and *Quick*FISH reagents, Metafer™ system digital reading, WASPLab™ interfacing) in order to facilitate Gram smears reading and results interpretation for the microbiology laboratories

Materials:

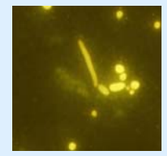
Methods:

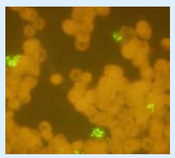
In this study duplicate smears (n=360) were prepared from different specimens types collected in the appropriate LBM collection devices. Clinical specimens and blood cultures were loaded on the WASP™ for smear preparation and culture inoculation. One of each smear was Gram stained and read by the testing laboratory. The duplicate smears, 160 were stained with Gram *Quick*FISH™ (AdvanDx, Woburn, USA) and 200 were methanol fixed and Gram stained with an automated Wescor stainer. Both Gram and QuickFISH™ Gram stained smears were loaded on the automated Metafer™ slide scanning platform (MetaSystems, Germany). Smears were first scanned at 10x followed by 63x under oil. Images were acquired by the Metafer™ digital reading system. Both the Metafer™ and the WASPLab™ software were interfaced and traditional Gram and *Quick*FISH™ Gram images were transferred to the corresponding sample in the WASPLab™ resulting field showing the gram images next to the culture images. All Metafer™ generated gram images were reviewed by the microbiology laboratory staff on the WASPLab™ monitor and results recorded.

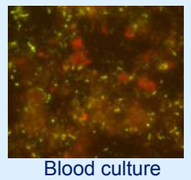
WASP™ Prepared Smears

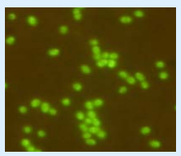
Gram and *Quick*FISH™ stained and digital read by Metafer™	
Blood culture	44
Genital swab	26
Fecal Samples	15
Throat Swab	24
Ear, Eye Swabs	14
Wounds swabs	11
Bronchial aspirate	6
Bacteria culture	20
Total	**160**

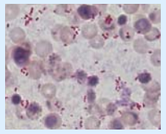
Gram stained and read manual and digitally by Metafer™	
Blood cultures	29
Broncho washes	60
Broncho Aspirates	18
Body fluids	22
Wounds swabs	34
Genital Swabs	16
Urethral Swabs	9
Throat Swabs	12
Total	**200**

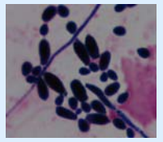

ESwab™ genital swab with yeast


Blood culture positive for *S.epidermidis*

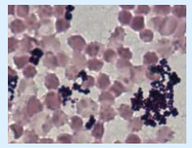

Blood culture with GNR and GPCC


culture positive for GPCC


Blood culture positive for GNR


Br.aspirate positive for yeast


B. aspirate positive for M. tuberculosis


Blood smear positive for GPCC

Results:

Good Gram results correlation was obtained between the manual microscopy results obtained at 100x under oil to the results of the Metafer™ generated images..
The image of the entire smear at 10x was used to assess smear quality and the cellularity differential using the feature
of increasing the magnification up to 30x. The presence of Gram positive and gram negative bacteria was easily seen from the images acquired at 63x with the possibility of increasing the magnification up to 180x. Metafer™ is able to sort and quantify the microorganisms present on the *Quick*FISH™ stained smears into three classes: Gram positive (green), Gram negative (red) and fungi/yeasts (yellow).

Conclusions:

Both the WASPLab™ automation system and the Metafer™ slide scanning automated platform are facilitating Gram testing from smear preparation to reading and reporting of results, allowing reliable results both in term of quality and traceability. Metafer™ and Gram *Quick*FISH™ can provide a quantitative assessment of Gram results. The Gram images can also be accessed remotely for Microbiologist consultation and Gram stain images can also be used for Gram stain competency testing.

Author: Santina Castriciano Email: santina.castriciano@copanitalia.com