Automation in Microbiology Laboratory

There is a need for automation in clinical microbiology today with the increased testing volumes, growing shortages of trained personnel, declining reimbursement, a growing demand for improved quality and two very important technological innovations: the introduction of liquid-based swab transport devices and the emergence of MALDI-TOF technology. BD Kiestra™ solutions are designed to help address these challenges today, while also preparing your lab for the future.\(^1,2,3\)

The Kiestra TLA (Total Lab Automation) system was first installed in a clinical microbiology laboratory in 2006 and there have been a total of 38 installations to date (Fig. 1).\(^1\) Bently and colleagues accessed the impact of Kiestra TLA in their laboratory and reported a reduced culture turnaround time and an increase in the laboratory production index (LPI) (number of samples/staff member/day) from 37.35 prior to Kiestra implementation to 75.90 after Kiestra implementation (2.03-fold increase).\(^1\) In another laboratory, Humphrey and co-workers also reported a 2.6-fold increase in their LPI following the installation of the Kiestra TLA system.\(^1\) Besides that, Mutters et al. evaluated the performance of Kiestra TLA combined with mass spectrometry (MS) in clinical microbiology practice. They reported that the requisite 24 hours incubation time for microbial pathogens to reach sufficient growth for susceptibility testing and identification was shortened compared to the use of conventional method. The combination method optimized the laboratory workflow, reduced costs and identified pathogens faster, which can lead to earlier potentially life-saving switches in antibiotic regimens for patients.\(^3\)

Fig. 1 Kiestra TLA system
The BD Kiestra™ TLA (Total Lab Automation) solution provides a flexible, customizable and high performance system to meet unique needs of each laboratory.4

Many labs have implemented the BD Kiestra™ TLA as it is unique to all other automated solutions for microbiology, by offering the highest capacity, flexibility, connectivity and integration. The BD Kiestra™ TLA system optimizes workflow as workbenches are connected to the system and will offer integration of a growing family of scalable BD automation modules such as the BD Bruker™ MALDI Biotyper™ automated ID and the BD Phoenix™ automated AST instruments.4

BD has installed a base of BD Kiestra TLA instruments at public hospitals, universities, and privately owned laboratories in more than 14 countries worldwide since their introduction in 2006. The BD Kiestra TLA system was launched in North America in 2013.
The BD Kiestra TLA system automates the manual processes associated with inoculating and incubating microbiology specimens. The system generates digital images to help shorten the time to identify bacterial growth. The opportunities for increased efficiency and quality improvements associated with automation aid in faster delivery of more accurate results to provide optimal patient care. In addition, laboratory staff is able to devote more time to analytical and value-added tasks.

**INOCULATION**
- Automated processing of both liquid and non-liquid bacteriology specimens using the BD Kiestra™ InoqulA™ system
- Liquid samples, such as urines, eSwab® and Σ-Transwab® are processed automatically, including decapping and recapping of specimen containers
- Non-liquid samples can be processed using the Manual Interactive module for additional productivity improvements
- Plates, slides and broth tubes are inoculated according to the appropriate protocol as defined by the LIS
- Customized media plate storage system to accommodate your workflow by determining the appropriate capacity and number of different media types
- All plates are automatically barcoded on the side of the dish to enable digital plate reading

**MAGNETIC ROLLING BEAD TECHNOLOGY**
- A patent-pending magnetic rolling bead is used to streak all media plates using customizable patterns
- This method has been demonstrated to generate up to three to five times more single colonies compared to manual streaking methods*

* High amount of separated bacterial colonies with InoqulA. Jenny Rydback, Ingela Tjernberg and Mats Walder. 2010.

**DESIGNED FOR SPEED**
- Each BD Kiestra InoqulA system can inoculate and streak up to 5 plates at the same time, enabling high throughput
- Total system throughput depends on the mode of operation, specimen protocol and number of inoculation systems
- High throughput supports increased capacity and accommodates high volume workloads

**INCUBATION**
- An integrated track system transports plates to and from the incubators
- To create a 24/7 laboratory, plate incubation and digital imaging is performed continuously
- Each plate is given its own unique location for rapid plate imaging, delivery and traceability
- Laminar flow technology ensures optimal incubation conditions

**PLATE READING**
- Technologists review high quality digital images on high resolution monitors
- The BD Kiestra Reading Room enables plates to be read in a separate room, which provides ideal working conditions and maximizes productivity
- E-Learning and continuous staff training is possible with plate images that can be saved and reviewed at a later date
- TeleBacteriology™ enables work to be done remotely, including in a manager’s office, satellite lab or even at home
References: