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Clinical
Case Study

Reflections Upon Urinalysis Automation

The Search for a True Walkaway Urinalysis System

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“The goal of urinalysis testing is to provide automated workflow that ensures the highest levels of accuracy by reducing user subjectivity to a bare minimum. The CLINITEK AUWi analyzer satisfies these demands. Its methodology is objective, its workflow is streamlined, and it is easily maintained.”

Nikka Haston-Smith
Core Lab Manager, Med Fusion

With over 14 years of experience in lab diagnostics, Nikka Haston-Smith knows a true walkaway automated UA system when she sees one. Haston started her career at Parkland Memorial Hospital in Dallas in 1999, a 1,000-bed trauma center with over 500 urine samples analyzed per day and 150 samples per shift. Nearly 15 years later, she is now Core Lab Manager at Clearpoint

Diagnostics Laboratories, a 300,000 square foot facility that functions as the primary outreach lab for Med Fusion in Lewisville, Texas.

Over the past two decades, Haston-Smith has personally experienced the differences between two competing UA testing methodologies: digital imaging technology and flow cytometry.

Automated UA Testing Methodology: Overall Comparison

	Digital Imaging Technology	Flow Cytometry
Highly Accurate Methodology	–	•
Streamlined Workflow	–	•
Minimal Maintenance, Maximum Reliability	–	•

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Methodology Matters: Increasing Accuracy by Reducing Subjectivity

“With the CLINITEK AUWi analyzer, consistent algorithms replace subjective interpretation of morphology, helping clinicians more accurately evaluate samples.”

Nikka Haston-Smith

“In my experience with digital imaging technology, nearly 25% of samples needed to be reclassified. With the CLINITEK AUWi analyzer, that dropped to only 10%.”

Nikka Haston-Smith

“Using the CLINITEK AUWi analyzer helped my lab eliminate one FTE’s worth of work.”

Nikka Haston-Smith

Methodology Comparison

Haston’s experience with automated digital imaging urinalysis systems can be described as mixed at best. “There are two limitations of digital imaging technology,” says Haston-Smith. “The robustness of the image database—which is very rudimentary—and the fact that those images are not dynamic but static.” By contrast, microscopic evaluation allows users to see dynamic movement, revealing details that help distinguish cells from certain organisms, like trichomonas. Trichomonas—the parasite at the root of the STD trichomoniasis—is difficult to distinguish from white blood cells when using only static images as reference. “It’s critical to see if the organism is moving or not,” Haston-Smith says—a parameter digital imagery databases cannot provide.

Similarly, transitional cells and pathological casts may also become subject to misidentification. “Transitional cells are smaller, more round,” explains Haston-Smith, “features that may not be distinctive enough to identify via an image database.” The same applies to pathological casts, elongated protein matrices that can trap a variety of cellular or acellular material, certain types of which may indicate serious disease. “Digital imaging technology lumps all casts together,” indicates Haston-Smith. “If anything is trapped inside, the image will be denser, but a tech still has to go to a scope for proper identification.”

Automated Urinalysis Testing Methodology: Parameters Comparison

	Digital Imaging Technology	Flow Cytometry
Helps Analyze Morphology	●	–
Decreases User Interpretation	–	●
Quantifies Chemical Properties	–	●
Sensitive to Bacteria	–	●
Robust Cell Counting Capabilities	–	●

The CLINITEK AUWi and Flow Cytometry

At the heart of these challenges is the role user subjectivity plays in sample evaluation. Digital imaging technology places greater emphasis on the subjectivity of user interpretation, which may increase the risk for error.

Reducing operator subjectivity is one critical benefit offered by the CLINITEK AUWi® analyzer, Haston-Smith’s automated urinalysis system of choice. The CLINITEK AUWi analyzer uses flow cytometry—a time-tested methodology that autoverifies as much as 90% of samples while delivering standardized, reproducible results.

Flow cytometry analyzes certain molecules and cellular structures present in urine, classifying particles not only by their physical properties but by chemical ones, too. This becomes feasible after fluorescent dyes have labeled different cellular constituents, which are then translated by laser technology into a variety of optical signals. The result: sample evaluation that is more objective.

In addition to measuring red and white blood cells, epithelial cells, casts, crystals, yeasts, and spermatozoa, the AUWi analyzer is particularly sensitive to bacteria detection. The UF1000i was designed with two separate analytical channels, one of which is dedicated solely to the detection of bacteria. This dedicated channel allows for increased sensitivity.

Streamlining Workflow With Flow Cytometry

Workflow Comparison

Not surprisingly, measurement methodology impacts laboratory workflow.

According to Haston-Smith: “With digital imaging, I was required to review nearly every sample—even if the result was negative.” In part, this is because digital imagery technology involves a time-consuming process of exclusion, in which techs compare sample images to a database in order to eliminate pictures that do not match. For Haston-Smith, this meant being tied to a digital imagery analyzer for at least six hours per shift.

Haston-Smith’s experience with the CLINITEK AUWi analyzer, however, was markedly different. “I spent no more than two hours of my shift on the CLINITEK,” she says. “The walkaway time I got back could be used to run QC, maintain equipment, pull pending lists, and complete administrative tasks. And I could do it all while I was running samples on the AUWi analyzer.”

Of particular note is the AUWi analyzer’s efficient autoverification process, which classifies and enumerates up to 90% of samples on the first pass, leaving only 10% for microscopic review.

By comparison, Haston was looking at a minimum of 25% of samples under a slide with digital imaging technology. “Out of that 25%,” she says, “10% to 15% of those results would be changed.”

Bacterial identification in particular can take a great deal of time when chemistry and imagery analyzers do not “agree.” “With digital imagery,” according to Haston-Smith, “if you had a positive on chemistry, and a negative on the image, you’d have to spin it and manually review it—a process that would have been more efficient if you had just gone right to slides.” In contrast, the AUWi analyzer procedure is much more straightforward: Haston-Smith pulls flagged samples, looks at them under a microscope, then releases them.

Uptime Considerations

As important as they are, walkaway benefits are the least of a lab’s concerns when its urinalysis system has maintenance or reliability issues. When this occurs, manually reviewing and classifying every sample can be a costly, labor-intensive process.

As observed by Haston-Smith, “Digital imaging technology has too many manual

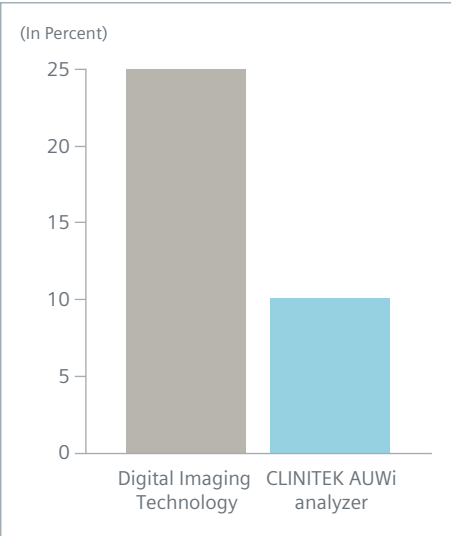
parts, which can impact reliability. Sometimes the stain gets in the microscope, so it needs to be meticulously maintained—like a classic car. Some days I did 100 manual microscopic reviews until the unit was serviced.”

At the opposite end of the spectrum is the CLINITEK AUWi analyzer. “Essentially the device needs no daily maintenance,” says Haston-Smith. “It takes less than a minute to clean, and less than 10 to 15 minutes to start up. On the rare occasions she needs technical support, Haston points out that Siemens techs are extremely proactive in their troubleshooting approach and phone service can usually resolve technical issues.”

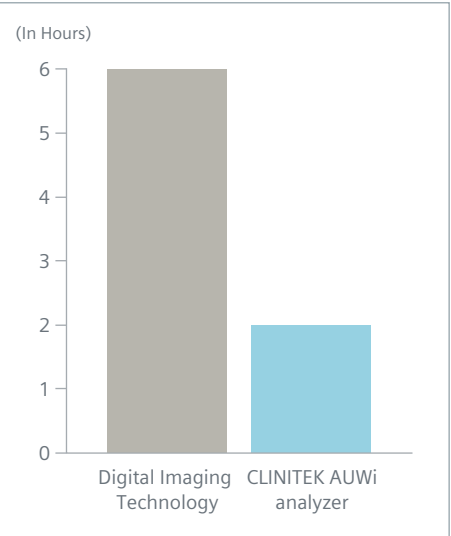
Discovering a True Walkaway UA System

Lab managers who compare the methodology, workflow, and reliability of prospective automated urinalysis systems will find that the CLINITEK AUWi analyzer holds a number of advantages over its digital imaging counterparts. When asked to describe her optimal UA system, Haston-Smith says it best: “With the AUWi analyzer you can literally walk away—and that makes all the difference.”

Manual Microscopic Review Time



Hands-on Equipment Time



Summary of CLINITEK AUWi Analyzer Workflow Benefits

- No batching or presorting of samples
- Automatically transports samples from urine chemistry to automated microscopic analysis
- No pretreatment of samples
- Up to 90% autovalidation of normal results and many pathological samples
- No visual onscreen reviews
- Cell counting capability of up to 80,000 particles
- Integrates patient data in a single patient record for easy review when flagged