

# Revolutionizing clinical trials: Unlocking peak efficiency with total laboratory automation in bioanalysis



With clinical trials becoming more complex, finding ways to streamline and automate laboratory processes is vital when analyzing bioanalytical samples.

As the chief scientific officer of large-molecule bioanalysis, Dr. Tom Zhang leverages his expertise to promote ever-evolving automation technologies. He also maintains Worldwide's knowledge of large-molecule bioanalytical methodologies.

He explains that today's bioanalytical labs are moving towards integrating automation to enhance accuracy and efficiency:

"Senior scientists don't have to physically work in the laboratory – they can fully control instruments remotely. We can remotely control the automation to shift the data by accessing the monitor theater, where we already mounted a camera. We can log in and see what happened if we want to check progress. We can also perform troubleshooting or override and move forward," Zhang said.

## **Total Lab Automation (TLA): Revolutionizing large-scale projects**

At the forefront of automation innovation, the adoption of Total Lab Automation (TLA) means the ability to handle large-scale projects in a timely manner. His team of scientists at Worldwide can now process an impressive 480 samples daily. TLA is a technological advancement of great importance in bioanalytical testing.

This system, meticulously integrated into Worldwide's operations under the leadership of Zhang, embodies his visionary thinking and technical prowess. The effect of TLA extends far beyond numerical figures and will undoubtedly reshape the traditional mode of bioanalytical research.

"Total Lab Automation is an essential component of assay automation within clinical trials. Worldwide is expanding automation to include biobanking, bioanalytical report generation and project management systems. By pinpointing and integrating key elements, we aim to develop a comprehensive automation ecosystem for operational application, solidifying its leading position in automation innovation," Zhang said.

### **Tom Zhang**

Chief Scientific Officer, Large Molecule  
Bioanalysis

Meet Tom



TLA is an innovative tool that will set the stage for accelerated decision-making and improved data quality. The success of TLA underscores the importance of early adoption and emphasizes the pivotal role scientists like Zhang play in developing the full potential of automation.

Realizing the promise of automation in large-scale projects, adopting TLA is a commitment to efficiency, accuracy and precision in bioanalytical testing. The lessons learned from pioneers and early adopters of transformative technologies like TLA will lead to a new era of excellence in clinical studies.

An exemplary application of predictive analytics emerges in clinical study timelines. Through integrating bioanalytical hardware and software automation, Zhang's team has established data standardization and reproducibility, allowing for the precise forecasting of a study's progression, particularly when managing large batches of clinical trial samples.

The application of binary tech automation enables precise management of timelines and diminishes data discrepancies, streamlining the decision-making process. Such advancements substantially benefit clinical research by boosting operational efficiency and fostering more informed, strategic decision-making throughout the research lifecycle.

## Quantifying efficiency and precision: The effect of TLA on bioanalytical research

Traditional bioanalytical processing faces the challenges of labor-intensive processes and prolonged timelines. Particularly in PK, immunogenicity and biomarker testing, where various analytical platforms are employed based on trial-specific criteria, the demands on bioanalytical scientists are substantial.

When you consider a scientist handling 60 samples daily, the analysis of 5,000 samples extends over three months, exemplifying the inherent constraints of manual processes.

"Automation facilitates rapid data capture, accelerating decision-making. It enables the efficient handling of extensive datasets, indispensable for large-scale clinical trials and diminishes human error in data generation and processing, enhancing data precision," Zhang said.

Worldwide's approach integrates diverse bioanalytical equipment into a TLA system. The comprehensive system encompasses a liquid handling mechanism for STD/QC/sample preparation, dilution and transfer; a temperature-controlled incubation system for microwell plate activities; a plate-washing system; and a plate reader for signal analysis such as OD and ECL.

The transformative power of TLA lies in its ability to process up to 480 samples daily, a stark contrast to the week(s) required in traditional methods. With the capacity to run at least eight microwell plates per cycle and a potential second shift doubling the plate count, TLA enables a single scientist to analyze 5,000 samples in two weeks.

Beyond the accelerated pace, TLA ensures low bioanalytical variation, boasting less than 10% %CV and %RE. It enhances analytical capacity and elevates the overall quality of bioanalytical testing. The integration of TLA showcases a paradigm shift for a new era of efficiency and precision in bioanalytical research.

The future of clinical studies and bioanalytical laboratories holds tremendous promise – automation allows for accelerated decision-making, improved data quality and streamlined processes. With a commitment to progress and growth in clinical trials, Worldwide will continue to bring much-needed innovation to regulatory changes.

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Clinical Trials**

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