Questions & Answers



Improving Point-of-Need Detection with LAMP: From SNP Analysis to Sensitive Pathogen Detection Webinar – Q&A

Improving Point-of-Need Detection with LAMP: From SNP Analysis to Sensitive Pathogen Detection webinar was held on October 29, 2024 together with experts from IIT, Italian Institute of Technology. Here is a comprehensive compilation of all the questions raised during the webinar, along with their detailed answers.

1. How does the operator's ability to interpret Lyo-LAMP results impact the overall effectiveness of the test?

The test has been designed to be user-friendly in every aspect, including the interpretation of results. Thanks to its design, interpreting the results is made as simple and intuitive as possible. For example, in microorganism detection, the results are binary (on-off), indicating the presence or absence of a curve. This means that if the microorganism is present, a curve will be visible; if not, there will be no curve. It's as clear as a yes or no answer. In SNPs, interpretation involves simply observing which curve is faster, making the interpretation quick and easy. This design ensures that even those with minimal technical expertise can accurately interpret the results, enhancing the test's overall usability and effectiveness.

2. After COVID-19, the use of LAMP has increased, but why are there not many commercial kits available?

The difficulty in integrating LAMP techniques into standard routines fundamentally depends on two factors. The first one is the acceptance of a different technique than the PCR, widely regarded as the gold standard in molecular diagnostics. There is a significant challenge in getting the scientific and medical communities to accept a different technique like LAMP, which, despite its advantages, is still seen as a less performant alternative. The second factor is that developing LAMP assays that can truly compete with PCR is challenging. These factors contribute to the slower adoption of LAMP techniques in routine diagnostic practices.

3. Can the Lyo-LAMP beads be applied to a 96 well-plate or to other formats?

The design of Lyo-LAMP beads is tailored for versatility, making them ideal for both point-of-care (POC) testing and high-throughput applications. The beads can be easily sorted directly into 96-well plates, streamlining the workflow. To further enhance flexibility, we offer a 96-well plate format with breakaway capabilities, allowing users to customize their setup based on specific needs. Additionally, the Lyo-LAMP beads can be used with various tube sizes and formats, such as PCR strips or individual tubes. For even greater customization, we can adjust the bead size upon request.

4. To what extent can colorimetric detection be effectively utilized in your applications, and what are the potential benefits and limitations associated with its use?

Colorimetric detection can be effectively used in LAMP applications, offering both benefits and limitations. We have also developed LAMP-based tests with a colorimetric readout. This type of detection involves reading

a color change by the naked eye. In certain applications, this detection method can be advantageous as it further simplifies the necessary instrumentation, making it ideal for low resource settings, for example.

However, compared to a fluorescence-based reading, colorimetric detection is less sensitive, takes more time, and requires very precise optimization of the color shift, to ensure the color change is objective, with a user-independent test readout.

5. How stable and resistant to humidity is a Lyo-LAMP?

The current Lyo-LAMP prototype is still under evaluation, but it has already demonstrated good stability in preliminary tests conducted by IIT. Typically, our off-the-shelf Lyobeads, which include a master mix in a 96-well plate format, maintain stability for up to 2 years when properly sealed. To further improve their performance, we are developing a protocol to enhance their humidity resistance, aiming to minimize risks related to improper transportation or storage. This advancement will also simplify handling for end-users, particularly when transferring lyobeads received in bulk into new tubes or devices like microchips. Humidity-resistant lyobeads will reduce the need for a humidity-controlled environment, making the workflow more cost-effective and efficient.

6. I guess this technology is not suitable for home testing. Will it be one day?

In the future, Lyo-LAMP could be adapted for home testing in a further simplified format, as it is not bound to a specific platform. If we collaborate with companies developing compact, home-use devices, this technology could easily integrate with such devices for user-friendly, at-home applications. Currently, our tests are designed to be performed outside of a laboratory setting, making them suitable for use in places like pharmacies or doctor's offices. This is made possible by Lyo-LAMP's simplified procedures and the availability of portable, affordable instruments for running the tests.

7. What is the frequency of its qualification?

We apologies but we did not fully understand your question. Please feel free to contact us directly at mdx@medixbiochemica.com to get an answer.

8. Could you provide more details on the DNA extraction step? Can it work at temps below 95 ° C?

Currently, we use a 5-minute thermochemical extraction at 95°C to minimize time-to-result and reduce sample matrix interferences. However, we can also develop a custom room-temperature extraction step if needed, as we have successfully implemented room-temperature protocols in the past.

9. How do you get around the non-specific amplification - we have found this to be the most problematic. I know that primer design is key but we are using published primer LAMP sets that we have shown the non-specific binding to be an issue - how are others getting around this?

Our experience has shown that replicating published LAMP protocols and using pre-existing LAMP primers often yields results that differ significantly from those reported in the original studies. In 99% of cases, false positives—aside from those due to cross-contamination—result from primer non-specificity, and it is typically impossible to improve the specificity of a reaction using non-specific primers. However, thanks to our extensive expertise in reaction design, we have optimized our LAMP reactions to avoid non-specific amplification entirely. Therefore, we have never encountered this issue in our work.

10. What will be the cost compare to qPCR?

The overall cost of Lyo-LAMP is generally lower than that of PCR-based tests. While lyophilized Lyo-LAMP beads may be more expensive than liquid PCR reagents, they are still more affordable than lyophilized PCR reagents. Additionally, LAMP requires less costly equipment—often a fraction of the price of a thermal cycler—and can be operated by less specialized staff, reducing costs associated with training and minimizing the risk of cross-contamination. Furthermore, the faster turnaround time of LAMP increases the number of reactions that can be performed daily, boosting throughput and revenue potential compared to PCR.

11. Can you inform us for pharma applications?

The pharmaceutical field offers exciting opportunities for innovation, and LAMP technology can play a significant role in advancing diagnostic and therapeutic solutions. For instance, we have already developed specialized tests for pharmacogenetic applications, enabling more personalized approaches to drug therapy by analyzing genetic factors that influence individual responses to medications.

However, the potential applications extend far beyond pharmacogenetics. We can collaborate to explore new targets aligned with your specific goals—whether that means developing rapid, point-of-care diagnostic tools, optimizing drug development pipelines, or identifying biomarkers for novel therapies. With LAMP's flexibility, affordability, and rapid turnaround, it can be a powerful tool in expanding precision medicine and enhancing the efficiency of pharmaceutical research and development.

Should you have any additional inquiries or need further clarification, please feel free to contact us at mdx@medixbiochemica.com

View the webinar on demand at:
medixbiochemica.com/improving-point-of-need-detection-with-lamp-webinar

Medix Biochemica

Copyright © 11/2024 Medix Biochemica. All rights reserved. Medix Biochemica reserves the right to make changes and improvements to any of the products described in this document without prior notice.

Medix Biochemica
Klovinpellontie 3, FI-02180 Espoo, Finland
medix@medixbiochemica.com • www.medixbiochemica.com