

## PRESS RELEASE

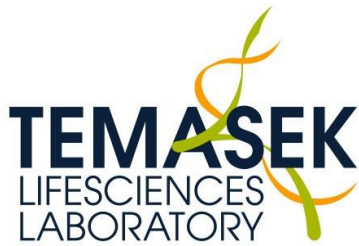
### Rapid Liposomal Assay for Beta-hemolytic Microorganisms

**27 September 2017, Singapore** – A team of researchers led by Dr Ian Cheong from Temasek Life Sciences Laboratory (TLL) has successfully created a miniaturized and cost-effective test kit for bacterial pathogen detection. The new rapid test kit can produce highly accurate results in hours, a remarkable improvement over the current conventional method using red blood agar which could take days, causing delays in diagnosis and treatment. These findings have been published as a research article in the American Chemical Society journal *ACS Sensors*.

Singaporeans who are perhaps the world's most fervent foodies are increasingly spoiled for choice, especially given the proliferation of online ordering and delivery services. Yet, few Singaporeans are aware of the microscopically invisible threats which potentially lurk within their food. For example, a recent Singapore study showed that a significant percentage of tested smoked salmon samples from salad bars (86.7%) and pre-packed supermarket items (21.6%) were contaminated with *Listeria monocytogenes*<sup>1</sup>, a bacterium responsible for 30% of food pathogen-related deaths in the United States. In the same study, a third of pasta, rice & couscous pre-packed salads from supermarkets

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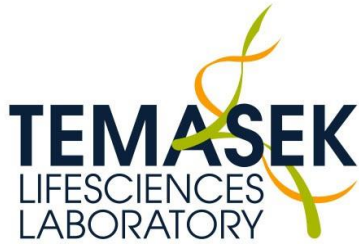
<sup>1</sup> Chau, Man Ling, Kyaw Thu Aung, Hapuarachchige Chanditha Hapuarachchi, Pei Sze Valarie Lee, Pei Ying Lim, Joanne Su Lin Kang, Youming Ng, et al. 2017. "Microbial Survey of Ready-to-Eat Salad Ingredients Sold at Retail Reveals the Occurrence and the Persistence of *Listeria Monocytogenes* Sequence Types 2 and 87 in Pre-Packed Smoked Salmon." *BMC Microbiology* 17 (1): 46.



tested positive for *Bacillus cereus*, a food pathogen which can cause severe nausea, vomiting and diarrhea. One characteristic test for both bacteria is that when grown in a petri dish on red blood agar, the bacterial colonies create a transparent zone through the opaque blood by causing the destruction of red blood cells. Unfortunately, this result takes days, long after the information might have been useful.

In order to provide rapid results, Dr Ian Cheong and his team at TLL have come up with a new approach which is inspired by the original red blood agar test but in miniaturized and accelerated form. This was accomplished by replacing red blood cells with nanoscale lipid containers (liposomes) containing molecules which gain dramatically in fluorescence when the containers are lysed. This new test yields results in hours, an actionable timeframe which allows food preparers and regulatory agencies to react proactively. In contrast, red blood agar plates produce slow results and have up till now only been used only to confirm rather than drive diagnostic decisions.

The test, called BETA, distinguished beta-hemolytic bacteria from control bacteria with 100% accuracy in 6 hours on plates, and with 99% accuracy in liquid broth in an hour. According to Dr Cheong, this approach is applicable not just to the detection of *Listeria monocytogenes* and *Bacillus cereus*, but to any bacterium which destroys red blood cells. Practically all bacteria with this property are known to be pathogens, rendering a positive test highly predictive for harmful bacteria. Examples of diseases caused by such bacteria include food poisoning, sore throat and gas gangrene. There are many benefits to the test beyond speed. Mr. Sum Rongji, the study's lead author, says that "besides enabling rapid diagnosis, the test avoids the need for animal blood products and has a long shelf-life of at least two years."



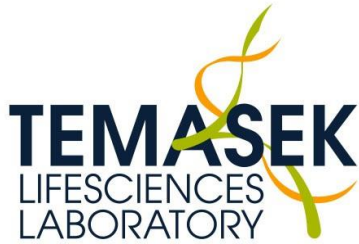
With a patent application filed for this invention and a prototype kit under evaluation by a third party, the team intends to work on further customization of the BETA system, for end-users with specific pathogens in mind. In the realm of food safety, the researchers believe that the development of a single screen for multiple pathogens will allow the rapid identification of high risk food samples by testing labs, giving consumers greater peace of mind. It appears that the red blood agar plate which was first invented in 1903 is finally being brought up to speed<sup>2</sup>.

#### **Citation**

Rongji Sum et al., Beta-Hemolytic Bacteria Selectively Trigger Liposome Lysis, Enabling Rapid and Accurate Pathogen Detection, *American Chemical Society ACS Sens* (2017) <http://pubs.acs.org/doi/abs/10.1021/acssensors.7b00333>

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<sup>2</sup> Schottmuller H. Die Artunterscheidung der für den Menschen pathogenen Streptokokken durch Blutagar. *Münchener med Wochenschrift*. 1903;50:848–853.



### **About Temasek Life Sciences Laboratory (TLL)**

TLL, established in 2002, is a beneficiary of the Temasek Trust and affiliated to the National University of Singapore and Nanyang Technological University. The research institute focuses primarily on understanding the cellular mechanisms that underlie the development and physiology of plants, fungi and animals. Such research provides new understanding of how organisms function, and also provides foundation for biotechnology innovation. For more information, please visit [www.tll.org.sg](http://www.tll.org.sg).

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