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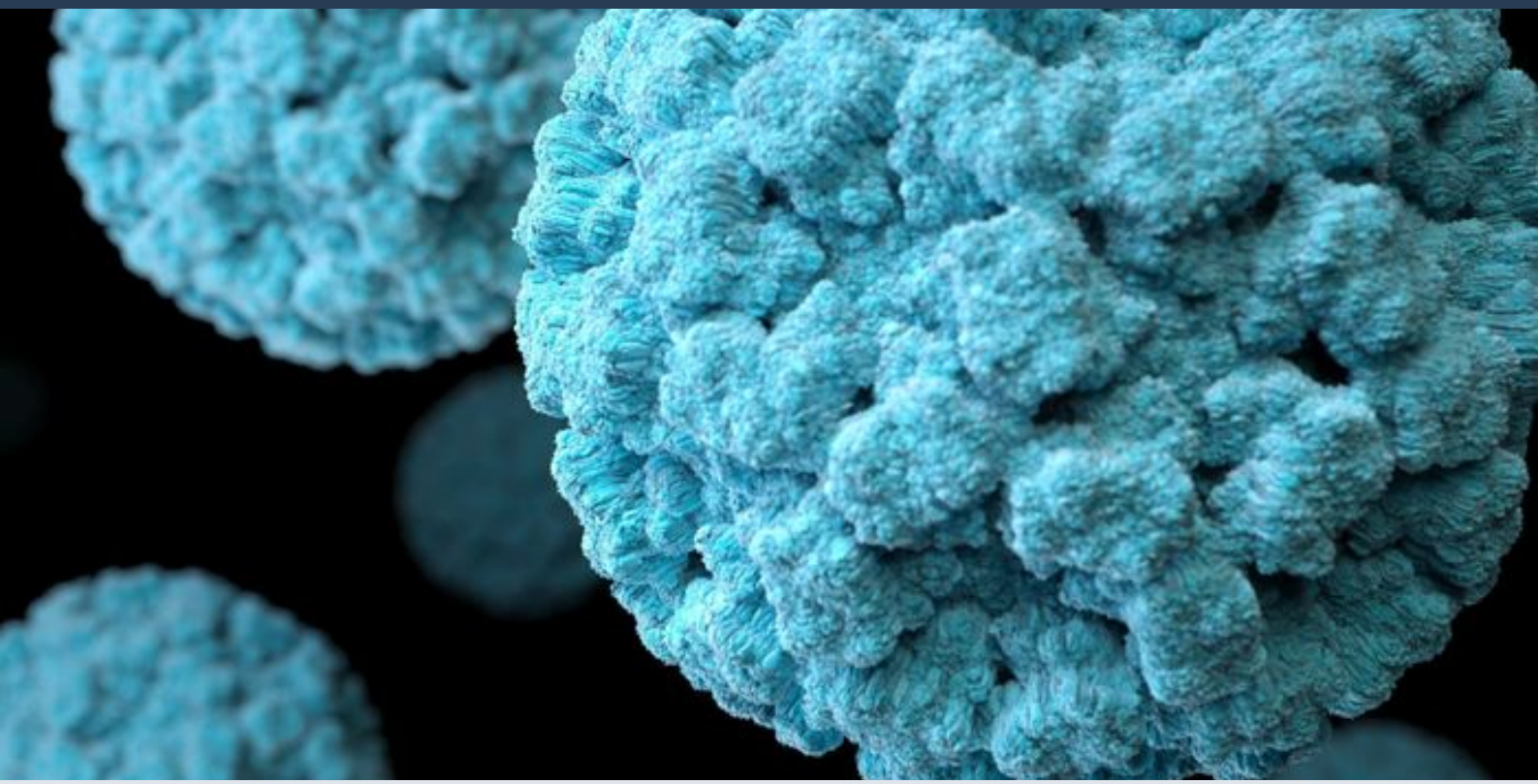
Towards PBR (Polymerase Blockage Release) for Pathogens Detection

Instrument-free and easy to perform test for pathogens detection based on a new biotechnological approach

Reference: PBR Pathogen Detection



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IP Status

Patent application submitted

Seeking

Development partner, Commercial partner

About **LMU Munich**

Ludwig-Maximilians-Universität München is the University in the heart of Munich. LMU is recognized as one of Europe's premier academic and research institutions. The LMU Munich community is engaged in generating new knowledge for the benefit of society at large.

Background

Among the currently available diagnostic tests for pathogens, PCR and reverse transcription-PCR (RT-PCR) are the most specific and sensitive, and are considered the gold standard. However, the requisite of sophisticated and expensive thermal cyclers and of trained personal for the interpretation of results, hamper its implementation in low resources regions and its implementation in a point of care format. Moreover, the current COVID-19 pandemic has proven that even wealthy countries could not respond to the need of diagnostic tests in the peak of a severe outbreak for the very same reasons.

The development of rapid field-tests for pathogens diagnostics with similar sensitivity and specificity as PCR methods, but not requiring of specialized equipment or personnel, will have a strong positive impact in poor areas, but also in general point of care applications. Easy and fast in-field detection will therefore help to achieve timely clinical interventions to prevent severe morbidity and mortality, and to improve disease control, factors of the utmost importance in epidemic scenarios.

Tech Overview

The highly processive isothermal Phi 29 DNA polymerase has been broadly used for biotechnological applications and Rolling Circle Amplification (RCA)-Based Biomedical sensing. The latter is based on the capacity of the enzyme to continuously produce thousands of copies of a primed small circular single-stranded DNA (ssDNA), which can be coupled to a readout mechanism and ultimately produce signal amplification.

Recently, the researchers have developed a new technology to reversibly block the activity of the Phi29 polymerase and coupled its re-activation to the recognition of a specific DNA sequence. Combined with an RCA assay, and including a copy of the target DNA sequence in the circular ssDNA, DNA synthesis could lead to an enzymatic activation feedback loop. When further combined with an additional signal amplification mechanism this technology can potentially detect minute amounts of the target DNA in a very short time. Opposed to PCR-based methods, the whole reaction can take place at constant temperature (30°) and no thermal cycling is needed. Besides, the team anticipates that the digital nature of the activation of the enzyme (on/off state) would allow instrumentation-free read-out, as lateral-flow strip format or fluorescent detection with a LED light pad. The team aims to implement this approach for the diagnostic detection of pathogens.

Stage of Development

Proof of concept.

Benefits

- Instrumentation free read-out
- Does not require specialized personnel
- Fast and sensitive detection

Applications

- Sensitive detection of pathogens
- Point of care detection of pathogens
- Pathogen detection in water

Opportunity

LMU Munich are eager to find a development partner who will provide them with the funding to develop applications for the new technology (PBR), which they are confident will have final commercial applications in diagnostics. The team is not only seeking the funding provided by a sponsor, but also experience in the development of biotechnological products that will eventually reach the market.

Patents

- Patent application submitted. Please contact TTO for further details.