

HORIZON
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Point-of-Care implementation of TB testing with ultra-fast Local Heating PCR

Results in Brief

Zaps of electricity create a lightning-fast TB test


Driving polymerase chain reaction thermal cycles with electrical pulses cuts the time to diagnose tuberculosis from hours to minutes.



HEALTH






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One quarter of the world population is infected with the pathogen [Mycobacterium tuberculosis](#)  (TB). About 10 % of infected people will go on to develop active TB in their lifetime, half of whom will die if left untreated.

Eastern Europe and the Baltic regions have the highest rates of TB in the EU, though cases are rising in other nations such as Germany. At the same time, drug-resistant strains are becoming epidemic, leading to surging treatment costs and higher impact on


human lives.

As such, there is an unmet healthcare need for quick scanning technology to detect carriers of the TB pathogen. The goal of the EU-funded [PITBUL](#)  project was to clinically demonstrate a rapid version of polymerase chain reaction (PCR) testing that uses [pulse-controlled amplification](#)  (PCA).

“Only the quick detection of TB will help to prevent the spread by infectious persons, and contribute to the [End TB Strategy](#)  of the World Health Organization,” says PITBUL project coordinator Joachim Stehr.

Rapid PCR

PCR-based tests are widely used around the world to identify the presence of specific pathogens, and have come to the fore during the COVID-19 pandemic. The technique works by amplifying selected regions of the genetic material (RNA or DNA) of pathogens using repetitive temperature cycles, typically between 55 °C and 95 °C.

[GNA Biosolutions](#)  developed a new technique to shorten these cycles. Rather than heating and cooling the entire reaction solution, only a very small part is heated – less than 1 % – using short but intense electrical pulses.

“Combining this approach of localised heating with localised reaction allows us to reduce the energy input needed to cycle the temperatures, therefore reducing the time for a successful PCR test,” explains Stehr, co-founder of GNA Biosolutions in Germany.

Stehr and his team were able to successfully demonstrate a reliable point-of-care test with over 95 % sensitivity and over 95 % specificity. With a 25-minute turnaround time, the new test allows for accurate, reliable same-day results. Conventional TB testing can take several hours. “Our solution can show positive results after only 3 minutes of amplification,” notes Stehr.

Improved testing to fight the COVID-19 pandemic

While the PITBUL project was primarily focused on testing patients suspected of having an active TB infection, the technology could also be used to dramatically increase the testing speed for the superbug MRSA, or SARS-CoV-2, the virus behind COVID-19. GNA Biosolutions has already developed a manual PCA test for COVID-19, based on results and insights from the PITBUL project.

Keywords

PITBUL, tuberculosis, TB, COVID-19, PCR, PCA, pulse, amplification, testing, rapid, coronavirus

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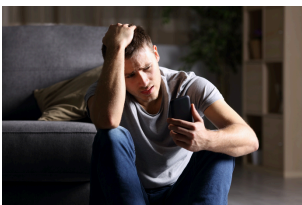
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Project Information

PITBUL

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[Project website](#) 

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