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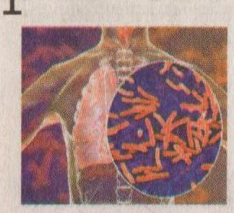
drug discovery

IIT-I develops powerful weapon against TB

Our Staff Reporter
INDORE

Indian Institute of Technology Indore has developed new compounds that could help combat drug-resistant tuberculosis (TB), a major health issue in India and globally. Researchers led by Prof VenkateshChelvam from the Department of Chemistry and Prof Avinash-Sonawane from the Department of Biosciences and Biomedical Engineering created over 150 new antibacterial compounds designed to treat TB as part of their drug discovery program.

These compounds belong to the pyridine ring fused heterocyclic family, including pyrrollopyridines, indolopyridines, and others.



TB, caused by the bacteria Mycobacterium tuberculosis (Mtb), is one of the leading causes of death worldwide, claiming about 1.5 million lives annually.

According to WHO, there were around 4.8 lakhs new MDR-TB cases and an additional 1 lakh cases of rifampicin-resistant TB (RR-TB) worldwide, with half of these occurring in China and India

The situation is worsening due to the emergence of multidrug-resistant (MDR) and extremely drug-resistant (XDR) TB strains, which render most existing anti-TB drugs ineffective.

Current TB treatments require six to nine months of antibiotics, but for MDR and XDR-TB, treatment can take several months to years with toxic drugs, often leading to high failure and mortality rates.

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"One major challenge in treating TB is that the bacteria can form a protective coating called 'biofilms', which increases drug tolerance and makes the disease harder to treat.

There's a critical need for new drugs that can effectively treat MDR-TB. The technology developed at IIT Indore addresses this need by targeting a key component in the bacteria's protective layer—mycolic acid (MA). MA is vital for the bacteria's cell wall integrity and survival," saidChelvam.

The team focused on an enzyme called polyketide-synthetase 13 (Pks 13), which is involved in the final step of MA synthesis. The new compounds developed by the researchers prevent MA formation by binding to the Pks 13 protein, which leads to the death of the TB-causing bacteria.

India, which accounts for nearly half of the world's TB cases, spends thousands of crores every year to provide subsidized anti-TB drugs, and these new compounds could help reduce long-term healthcare costs while supporting indigenous drug development. The technology developed at IIT Indore is a significant step forward in addressing the challenges of TB and drug resistance.

"The compounds have been tested in bacterial cultures and have shown promising results. They were effective in low concentrations without harming immune cells like macrophages. These compounds also killed TB bacteria isolated from patients, including strains resistant to standard drugs like isoniazid. The promising results bring hope in the long and expensive process of drug development," said Sonawane.

"Currently, the most potent of these anti-TB compounds are undergoing testing in small animals like mice, aiming to improve therapies for MDR and XDR-TB. The ultimate goal of this research is to provide new tools for treating TB and drug-resistant TB, which remains a significant challenge for both developing and developed countries," he added.

The method used to develop these compounds has been granted patents in both India and USA for treating various diseases.

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