New antibody treatments help tackle tuberculosis

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Researchers from the University of Dundee, King's College London and St George's, University of London have identified potential new means to treat tuberculosis (TB).

In a study, published in the most recent edition of Journal of Immunology, researchers led by Professor Juraj Ivanyi at King's, Dr. Jenny Woof at Dundee, and Dr. Rajko Reljic from St George's, have developed a monoclonal antibody which was found to offer protection against tuberculosis infection in experimental models when combined with interferon, a modulator of the immune system.

TB remains a recognized global emergency, claiming around two million lives across the world each year, and 2010 saw the largest number of new cases of TB in the UK for over a decade.

Approximately one-third of the world's population is infected with Mycobacterium tuberculosis, the bacterium responsible for this huge public health problem. Unfortunately, the BCG vaccine used in some countries does not protect against disease in all adults, and drugs need to be delivered for several months.

The problem has been compounded by a dramatic rise in TB strains displaying multiple drug resistance. As a result, new ways to prevent and control tuberculosis are urgently required, and the strategy developed by the London/Dundee teams paves the way toward a previously unexplored form of treatment.

The human monoclonal antibody produced by the team is of the IgA type and can specifically recognise Mycobacterium tuberculosis. IgA antibodies are proteins normally used by the immune system to identify and neutralise foreign microbes like bacteria and viruses within the lungs and intestinal tract.

The human monoclonal antibody generated in the research is a homogeneous antibody preparation with the capability to specifically attach to the Mycobacterium tuberculosis bacterium and trigger immune processes that prevent bacterial growth. Although human monoclonal antibodies are widely used to treat various forms of cancer and inflammatory disorders, this is the first demonstration that they might have applicability against tuberculosis.

Dr. Woof explained the need to develop new treatments and vaccines for TB, and the potential to develop this research further. "The number of cases of TB remains very high, and so this is clearly a major problem," she said. "Across the world, there are millions of people falling victim to infectious diseases such as TB, so the implications of this research could be considerable."

"Antibodies exist as five different types in humans, with those of the IgG type already being used in some clinical treatments. Antibodies of the IgA type are slightly different. They possess properties that we believe may be important in governing how this IgA antibody works against TB infection."

The study, funded in part by the Wellcome Trust and the Dunhill Medical Trust, was the result of a productive collaboration with each team bringing a different sphere of expertise. Professor Juraj Ivanyi at King's is an international expert in tuberculosis research, while Dr. Woof's team in Dundee brought experience in human IgA antibodies. Dr. Reljic at St George's has expertise and special facilities for

experimental models of TB infection.

Several years of previous research by Professor Ivanyi, Dr. Reljic and their collaborators at the HPA Salisbury and Palermo, Italy provided general ‘proof of concept’ for this sort of approach, while this study opens the road for translating it toward human application.

Professor Ivanyi is based at the Dental Institute at King’s College London, which has a long history of pioneering research into mucosal immunology and vaccines. He said, "This study brings us much closer to finding new ways to treat tuberculosis, although further research is needed before we can begin to trial this approach in patients.

"I am excited about where this project can lead us in terms of potential new treatments for this devastating disease."

Provided by University of Dundee