

# Survival of the fattest: TB accumulates fat to survive -- and spread

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Medical scientists from the University of Leicester, together with colleagues from St Georges, University of London, funded principally by the Medical Research Council (MRC) and The Wellcome Trust, have published details of a new breakthrough discovery on TB.

They have identified for the first time that the TB bug lays down body fat that may help it survive passing from one person to another and, in the process, the bacteria increase their resistance to the action of anti-TB drugs.

This finding challenges the established view that the TB bacteria coughed up in sputum by infected individuals are rapidly multiplying.

Lead investigator Professor Mike Barer, Professor of Clinical Microbiology in the Department of Infection, Immunity and Inflammation at the University of Leicester said: “Strenuous efforts are being made to reduce the global burden of tuberculosis, a disease which kills four people every minute. Our success so far has been limited for many reasons; one of these is our failure to control the spread of TB from one person to another. Very little is known about this vital part of the bacterium’s life cycle.

“If scientists could understand more about the transmission of TB between people, they might identify new therapeutic and preventative targets.”

The Leicester team discovered that, unlike TB bacteria growing in test tubes, many of the bugs in sputum are loaded with fat droplets. They went on to show with their colleagues in London that these ‘fat bacilli’ were in an inert non-growing state, a condition in which they are more likely to survive the process of passing from one person to another.

The findings are published today (April 1st) in the freely available Journal, Public Library of Science Medicine ([www.plosmedicine.org](http://www.plosmedicine.org)). Additional funding for the study was provided by the British Lung Foundation and the Henry Smith Charity.

The discovery sheds light on the story of “persister bacteria” in TB - a mysterious population believed by many to be the reason why TB patients have to be treated for at least six months.

Professor Barer said: “These surprising findings have opened the door for us to develop new ways to stop TB from spreading and to treat it more effectively. We hope that our new ability to monitor these sleepy and resistant bacteria in sputum will enable us to treat the disease more quickly.

“This work has taken more than ten years to come to fruition and has taken dedicated work from the teams in Leicester and London. I am particularly delighted for my team in Leicester who fought long and hard to bring this story together.”

Professor Philip Butcher and his team at St George’s, University of London have exploited the genome sequence information of the TB bacteria generated by the Pathogen Sequencing Unit at the Wellcome Trust Sanger Institute. They studied all the genes that are expressed by the bacteria in sputum having being coughed up from the lungs of TB patients using microarrays or gene-chips, made available through the Wellcome Trust funded Bacterial Microarray Group at St George’s.

Importantly the St George's team have developed a novel way to study the small numbers of bacteria present in sputum and this discovery will open the way to investigate why bacteria in TB lungs are so hard to kill with antibiotics. "This work forms the foundation to develop a new drug that works effectively against these fat and lazy bacteria" said Professor Butcher.

Professor Barer added: "In the University of Leicester study we examined TB in sputum samples from infected patients to get a snapshot of the disease at the point of its transmission to a new person and ask how the characteristics of these bacilli compare with those of TB growing in the laboratory."

The researchers found the presence of a fat deposits and related gene expression patterns which may help the TB bacterium to survive during transmission and establish a new infection.

Source: University of Leicester

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