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| **Scientists have identified a key enzyme responsible for destroying lung tissue in tuberculosis (TB), they report today in the** [***Journal of Clinical Investigation***](http://www.jci.org/articles/view/45666)**.**  **Drugs that inhibit this enzyme are already available, meaning that the finding could lead quickly to new treatments.**  TB is caused by the bacterium *Mycobacterium tuberculosis*.  The infection destroys patients’ lung tissue, causing them to cough up the bacteria, which then spread through the air and can be inhaled by others.  The mechanism behind this lung damage is poorly understood, and no treatments currently used prevent it from occurring.  Patients require at least six months of antibiotic treatment, but drug-resistant strains of the bacterium are becoming increasingly common.  The new research shows that in patients with TB, there is an increase in levels of an enzyme called MMP-1 in their lungs.  When the researchers infected human immune cells with TB in the lab, they found that the cells greatly increased production of this enzyme.  Since the mouse version of MMP-1 is not expressed in the lung, the researchers developed a transgenic mouse with human MMP-1 to investigate whether the enzyme causes lung damage in TB.  When these mice were infected with TB, MMP-1 levels increased significantly and the infection led to lung damage similar to that seen in humans with TB.  The scientists also found that a drug proven to be safe in humans was effective at suppressing MMP-1 activity driven by TB infection in human cells.  The findings suggest that similar drugs might prevent lung damage in TB patients and help limit the spread of the disease.  The study was done by researchers at Imperial College London with collaborators at [Columbia University](http://www.columbia.edu) in New York and the [University of East Anglia](http://www.uea.ac.uk), and it was supported by the [National Institute for Health Research](http://www.nihr.ac.uk) (who funded the work on human cells), the Scadding Morriston Davies Travel Fellowship and the US [National Institutes of Health](http://www.nih.gov).  [Dr Paul Elkington](http://www1.imperial.ac.uk/medicine/people/p.elkington/), from the [Department of Infectious Diseases and Immunity](http://www1.imperial.ac.uk/departmentofmedicine/divisions/infectiousdiseases/idi/) at Imperial College London, said: “A third of the world’s population is infected with tuberculosis, and almost 2 million people die from the disease every year.  “Standard TB treatment has remained unchanged for 35 years, and no current treatments prevent the lung destruction that TB causes.  These findings suggest that drugs available now might be able to reduce deaths from TB.”  Many MMP inhibitor drugs were developed in the 1990s because they showed initial promise for treating cancer.  The researchers now plan to carry out further studies to see whether these drugs can prevent lung destruction in patients with TB.  [Professor Jon Friedland](http://www1.imperial.ac.uk/medicine/people/j.friedland/), senior author of the study from the [Department of Infectious Diseases and Immunity](http://www1.imperial.ac.uk/departmentofmedicine/divisions/infectiousdiseases/idi/) at Imperial College London, said: “Until now, we haven’t had a convincing explanation of how lung destruction is caused by TB.  We hypothesised that protease enzymes must be involved, since nothing else could break down the strong collagen fibres that make up the scaffold of the lung.  The results of this study provide strong evidence to support that idea.”  Dr Elkington and his colleagues first put forward their hypothesis that MMP enzymes play a key role in TB in a [review article](http://stm.sciencemag.org/content/3/71/71ps6.abstract) published earlier this year in the journal Science Translational Medicine.  **See also:**   * [*Journal of Clinical Investigation*](http://www.jci.org) * [National Institute for Health Research](http://www.nihr.ac.uk/) * [University of East Anglia](http://www.uea.ac.uk/) * [Columbia University](http://www.columbia.edu/)   **For further information please contact:**  Sam Wong  Research Media Officer  Imperial College London  Email: [sam.wong@imperial.ac.uk](mailto:sam.wong@imperial.ac.uk)  Tel: +44(0)20 7594 2198  Out of hours duty press officer: +44(0)7803 886 248  **Notes to editors:**  1. Journal reference:  P. Elkington et al. “[MMP-1 drives immunopathology in human tuberculosis and transgenic mice](http://www.jci.org/articles/view/45666)” *Journal of Clinical Investigation*, published online 25 April 2011  P. Elkington et al. “[Tuberculosis Immunopathology: The Neglected Role of Extracellular Matrix Destruction](http://stm.sciencemag.org/content/3/71/71ps6.abstract)” *Sci Transl Med*, 23 February 2011: Vol. 3, Issue 71, p. 71ps6 DOI: 10.1126/scitranslmed.3001847  2. About Imperial College London  Consistently rated amongst the world's best universities, Imperial College London is a science-based institution with a reputation for excellence in teaching and research that attracts 14,000 students and 6,000 staff of the highest international quality. Innovative research at the College explores the interface between science, medicine, engineering and business, delivering practical solutions that improve quality of life and the environment - underpinned by a dynamic enterprise culture.  Since its foundation in 1907, Imperial's contributions to society have included the discovery of penicillin, the development of holography and the foundations of fibre optics. This commitment to the application of research for the benefit of all continues today, with current focuses including interdisciplinary collaborations to improve global health, tackle climate change, develop sustainable sources of energy and address security challenges.  In 2007, Imperial College London and I mperial College Healthcare NHS Trust formed the UK's first Academic Health Science Centre. This unique partnership aims to improve the quality of life of patients and populations by taking new discoveries and translating them into new therapies as quickly as possible.  Website: [www.imperial.ac.uk](http://www.imperial.ac.uk)  3. About the University of East Anglia  The University of East Anglia is a research-intensive University with particular strengths in medical, biological and environmental research. The University is a partner in the Norwich Research Park – one of Europe’s leading concentrations of researchers in plant, food, health and environmental sciences. Norwich has the fourth largest concentration of ‘most highly cited researchers’ in the UK, after London, Oxford and Cambridge (according to Thomson Reuters).  The University’s School of Biological Sciences is a dynamic academic community, rated one of the best in the UK. Its alumni include Nobel Prize-winner and President of the Royal Society Prof Sir Paul Nurse, who gained his PhD at UEA.  4. The National Institute for Health Research (NIHR) provides the framework through which the research staff and research infrastructure of the NHS in England is positioned, maintained and managed as a national research facility. The NIHR provides the NHS with the support and infrastructure it needs to conduct first-class research funded by the Government and its partners alongside high-quality patient care, education and training. Its aim is to support outstanding individuals (both leaders and collaborators), working in world-class facilities (both NHS and university), conducting leading-edge research focused on the needs of patients. [www.nihr.ac.uk](http://www.nihr.ac.uk) |