

# Scientists gain new understanding of latent tuberculosis

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Scientists at the Forsyth have gained new insight on how Tuberculosis (TB) remains a global epidemic. Although drugs have been available to fight TB for 50 years, the disease still infects nearly 2.2 billion people worldwide and causes 1.7 million annual deaths. This is largely attributed to the bacteria's ability to stay dormant in the human body and later resurface as active disease. The Forsyth team, and its collaborators from Stanford University, has recently discovered that *Mycobacterium tuberculosis*, the bacteria that causes TB, can lay dormant and thrive within bone marrow stem cells.

The microbe *Mycobacterium tuberculosis* (Mtb) causes deadly disease in millions of humans and infects and persists in billions of others without causing apparent harm, yet maintaining the potential to "re-activate" and cause active tuberculosis (TB). This form of silent microbe/host interaction is known as latent or dormant [TB infection](#). During this phase, Mtb escapes the host immune responses and survives for decades in protected niches not yet well identified. This study describes a previously unsuspected [target cell](#) used by Mtb to shield itself from the host immune system. These new findings have direct [clinical implications](#) in that they explain the reason why TB treated patients remain sensitive to TB tests for life and importantly, why [TB treatment](#) is so difficult and requires long periods of drug treatment. Moreover, these findings raise an alert for possible transmission of TB to patients undergoing [bone marrow transplants](#) with cells obtained from donors who may have [latent TB](#).

This study, which will be published in *Science Translational Medicine* on January 30, 2013, was led at Forsyth by Dr. Antonio Campos-Neto, Director of Forsyth's Center for Global Infectious Diseases. The work was done in collaboration with Drs. Bikul Das and Dean Flesher from Stanford University, School of Medicine; Dr. Suely S. Kashino from Forsyth Institute, Drs. Ista Pulu and Vijay Swami, Research Institute of World's Ancient Traditions, Cultures and Heritages; Dr. Deepjyoti Kalita, KaviKrishna Foundation and Guwahati Medical College; and Dr. Hermen Yeger, the Hospital for Sick Children in Toronto. "Tuberculosis has remained a terrible health threat despite the proliferation of knowledge, diagnostics and treatment," said Dr. Campos-Neto. "By gaining a greater understanding of latent TB, we can potentially save hundreds of thousands of lives each year."

Dr. Campos-Neto and his team conducted in vitro experiments, as well as in vivo using a well-defined animal model of latent TB, and from data collected from human patients treated for TB. From these studies they concluded that Mtb infects and persists in a dormant state for long periods of time within bone marrow (BM) [stem cells](#). These cells constitute a unique niche or a sanctuary that provides the pathogen both immune privilege and protection from drug attack. Stem cells, like those infected by Mtb, are long living cells and possess a special machinery to exclude external molecules such as anti-TB drugs to enter their cytoplasm. Therefore, once inside these cells, Mtb benefits from this mechanism for its survival in a quiescent manner.

Provided by Forsyth Institute

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