Iron compounds synthesized to combat tuberculosis

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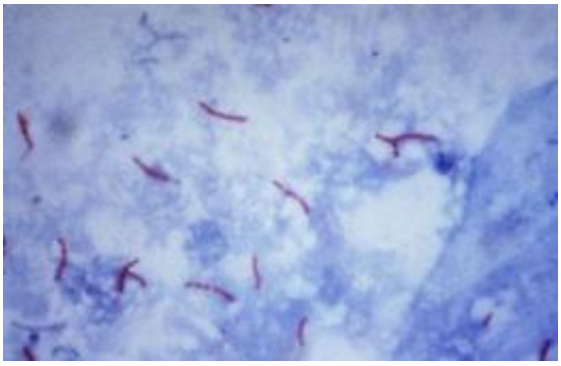

The new compounds have demonstrated good in vitro activity against *Mycobacterium tuberculosis* (pictured, with the Ziehl-Neelsen). Credit: CDC/George P. Kubica.

A team of researchers from Spain and Latin America have synthesized two iron compounds that inhibit the in vitro growth of *Mycobacterium tuberculosis*, the bacteria that causes tuberculosis. Due their low level of toxicity in mammel cells, the compounds could be used in the future as therapeutic agents and hospital disinfectants.

A group of researchers from the Universidad de Navarra (Spain), the Universidad de la República (Uruguay), the Universidad de Sao Paulo (Brazil) and the Universidad Nacional de La Plata (Argentina) have synthesized two iron complexes "that showed in vitro growth inhibitory activity on *Mycobacterium* tuberculosis", Dinorah Gambino and María

Torre, authors of the study and researchers at the Universidad de la República explained to SINC.

The study, published this month by the *Journal of Inorganic Biochemistry* uses iron atoms to join organic molecules (derived from quinoxaline), forming compounds that act as bactericides (killing bacteria) or bacteriostatic agents (preventing bacteria from reproducing). The organic molecules were synthesized at the Universidad de Navarra.

"One of the greatest problems in relation to the pharmacotherapy for treating tuberculosis is the appearance of bacteria resistant to current medicines, which is why it is important to develop new active ingredients", the researchers indicate.

In order to treat tuberculosis, initially "first-line" antibiotics are used (such as isoniacide or estreptomicine), but when side effects appear, or in cases of stronger resistance, "second-line" antibiotics are resorted to (such as cicloserine or ciprofloxacine). The new compounds inhibit *M. tuberculosis* better than the "second-line" medicines.

Low Toxicity

Another advantage of the iron compounds is that they show low toxicity in mammel cells, as demonstrated by the experiments performed with mice cells. "That is why these compounds are useful as hospital disinfectants or therapeutic agents," the Uruguayan researchers highlight, albeit recalling that, at present, they in vitro trials "and the line of research remains open to learn more about how they act."

Antonio Monge, co-author of the study and a researcher at the Universidad de Navarra, underlines the importance of cooperating with research centres in Latin America, where there are many cases of tuberculosis and other diseases such as malaria or chagas disease. "This

type of cooperation always benefits the person who is suffering".

Tuberculosis kills more than one million people a year worldwide (1.3 million in 2008). Various Mycobacterium species - particularly *M. tuberculosis*- are the cause.

At present, tuberculosis is considered a re-emerging disease due to the increase in the number of people with HIV and other viruses that attack the immune system, as well as to the increasing consumption of immunosuppressive and recreational drugs. The World Health Organization (WHO) estimates that 30 million people will be infected by tuberculosis over the next 20 years.

More information: Tarallo M.B., Urquiola C., Monge A., Costa B.P., Ribeiro R.R., Costa-Filho A.J., Mercader R.C., Pavan F.R., Leite C.Q., Torre M.H. y Gambino D. "Design of novel iron compounds as potential therapeutic agents against tuberculosis". *Journal of Inorganic Biochemistry* 104 (11): 1164-1170, Nov 2010.

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