The Effects of Linking Multi Drugs with Silica Nanoparticles Coated with Silver Nanoparticles to Effectively Treat Tuberculosis

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Tuberculosis (TB) is an infectious disease caused by the Mycobacterium tuberculosis. Approximately 5000 people die each day from TB and it is the greatest infectious killer of young people in the world. This research aims to produce a novel compound of medication using silica nanoparticles coated silver nanoparticles to effectively treat TB in an expedient timeframe using less dosage amounts. The procedures start with producing silica nanoparticles. The surface of silica nanoparticles was functionalized using Di-amine as a coupling agent to attract silver ions. This was converted to silver nanoparticles by reduction to obtain 5 nanometer silver nanoparticles coating the silica nanoparticles. Subsequently, they were linked with di and tri purified TB drugs that included Ethambutol, Isoniazid, Pyrazinamide, and Rifampicin. The functionalization of the new compounds on nanoparticles was confirmed by infrared spectroscopy. Finally, the efficiency of the new compounds were tested seven times by comparing with the drugs alone on resistant-TB. When applied to the resistant-TB, it was confirmed that the compounds showed effectiveness of elimination time 8 times more than the drugs alone. The most effective combination was amine silica nanoparticles coated with silver linked with Isoniazid, Pyrazinamide and Rifampicin. The reason why it gave this high efficiency was silver nanoparticles effects the bacteria plus the combination between the nanoparticles and the antibiotics. This research provides promising inroads to future nano-drug implementation methods for TB patients and giving them a better chance of surviving due to a more efficient treatment by less dose and a shorter treatment time.

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