A Comparative Study of the Antimicrobial Effects of Transition Metal Nanoparticles

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In a time where antibiotics are becoming increasingly ineffective, especially against our most common bacterial infections, the student researchers believe that part of the solution involves preventing these infections from occurring in the first place. Metals are known to exhibit antimicrobial properties, and are used in applications such as microban, and even copper plating on the front of ships as a means to retard barnacle growth. The advantage of nanoparticles is their very high surface area-to-volume ratio, which makes them especially reactive, releasing more ions then would say a sheet of copper. The student researchers synthesized their metal nanoparticles through inert atmosphere techniques, and then characterized them through powder X-ray diffraction (PXRD) and Transmission electron microscopy (TEM). The student researchers then dispersed the nanoparticles in a solvent and diluted them to various concentrations. Following dilution, the student researchers exposed E. Coli bacteria to the various nanoparticle solutions, were serial diluted, and cultured in lysogenic broth and top agar at thirty-seven degrees Celsius overnight. The results were indeterminate, at the lowest concentration of E. Coli each metal almost completely retarded the growth of E. Coli, but at the higher concentration of E. Coli, and as the concentration of the metal decreased, the metal that seemed to perform the best in inhibiting growth changed with the concentration of the metal. The student researchers plan to rerun some of these cultures, increase our sample sizes by running more of the same metals at each concentration, and synthesize more metals for testing.

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