DESCRIPTION FOR THE GENERAL PUBLIC

Although nanoparticles are known since may years, this name is used no longer than a dozen years or so. They are solid objects, which size in not bigger than 1/10000 of the millimeter. This is at least 300 times less than a diameter of human hair. Some of them, especially those composed of silver (jewellery metal) are antiseptic. It is worth to mention that bacteria are even 100 times bigger than nanoparticles. At low concentration nanoparticles are not harmful for bacteria, however, at some point of their concentration in bacteria environment, silver nanoparticles inhibit replication of the bacteria, or even are lethal for them. Due to these properties, synthetic silver nanoparticles found many everyday live applications. They are contained in cosmetics, cloths (especially in socks) and cleaning agents. Tremendous amount of nanoparticles lands in waste causing potential risk for the environment, because nanoparticles are harmful not only to those bad microorganisms, but also to other, which constitute essential part of the ecosystem. Higher doses of nanoparticles are harmful to human too.

The antibacterial properties of nanoparticles depends not only on the fact that they are composed of silver, but also on their exact size, shape and their surface protecting layer composition. There are such types of nanoparticles, which are highly toxic for one kind of microorganisms or cells, but for other they are not toxic. The mechanisms of their toxicity are not completely known. Detailed understanding of nanoparticles toxicity could allow to adjust their morphology and composition to tune their selective toxicity towards special kinds of cells. For instance cancer cells or infectious bacteria, but being safe for other cells in the body. This would allow to use them as a medicine.

In the Institute of Physical Chemistry of the Polish Academy of Sciences in Warsaw, Poland, the research on silver nanoparticle-bacteria interaction is carried out. Nanoelectrodes – electrodes as small as nanoparticles are positioned inside the bacteria and intracellular processes are studied upon nanoparticle treatment.

Maybe this research will help to engineer effective anticancer therapies and/or drugs against antibiotic resistant bacteria in the future?