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Silver nanoparticles-chance of bacterial resistance overcoming?

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Silver is used by people not only as decorative element in jewellery, but also as bioactive element in medicine and food industry for thousands of years. At the turn of the 19th and 20th centuries, colloidal silver was used as the main antibacterial agent in human medicine. However, with the discovery of penicillin in the first half of the 20th century, application of silver and its compounds as antibacterial agent in medicine was diminished. Unfortunately, wide application of antibiotics in medicine practice led to the quick spreading of resistant bacterial strains. Therefore, at the end of 20th century the interest of scientists in silver as an antibacterial agent was renewed. The first article published by Sondi, et al. in 2004 reported excellent antibacterial activity of silver nanoparticles against Gram-negative bacteria. Many studies were published from this time which reported excellent antibacterial activity of silver nanoparticles against both Gram-negative and Gram-positive bacteria including resistant bacteria strains. Rediscovered antibacterial activity of silver was quickly applied in practice, especially in the textile industry. However, toxicity of silver and unknown interactions of its nanoparticles with living matter is the main reason why silver nanoparticles are

not used in human medicine to yet. Recently published studies showed that silver nanoparticles can be effectively used in very low concentration with antibiotics due to synergy effect in the antibacterial activity of both agents. Unfortunately, recent researches aimed at the possibility to induce bacterial resistance to silver nanoparticles revealed that bacteria can effectively lower antibacterial activity of silver nanoparticles by the aggregation mechanism induced by the bacterial proteins. This is a new obstacle for possible application of silver nanoparticles in human medicine.

Biography

Libor Kvitek completed his PhD in Physical Chemistry at Charles University in Prague (1993). After a short employment in the pharmaceuticals industry, he started his academic career at Palacký University in Olomouc (1991), where he works as Associate Professor of Physical Chemistry. His main research interest is Nanotechnology and Coin Metal Nanoparticles. He has published more than 60 papers in reputed journals (H-index 19; more than 3000 citations) and currently he is serving as the Vice Dean of the Faculty of Science, Palacký University in Olomouc.

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