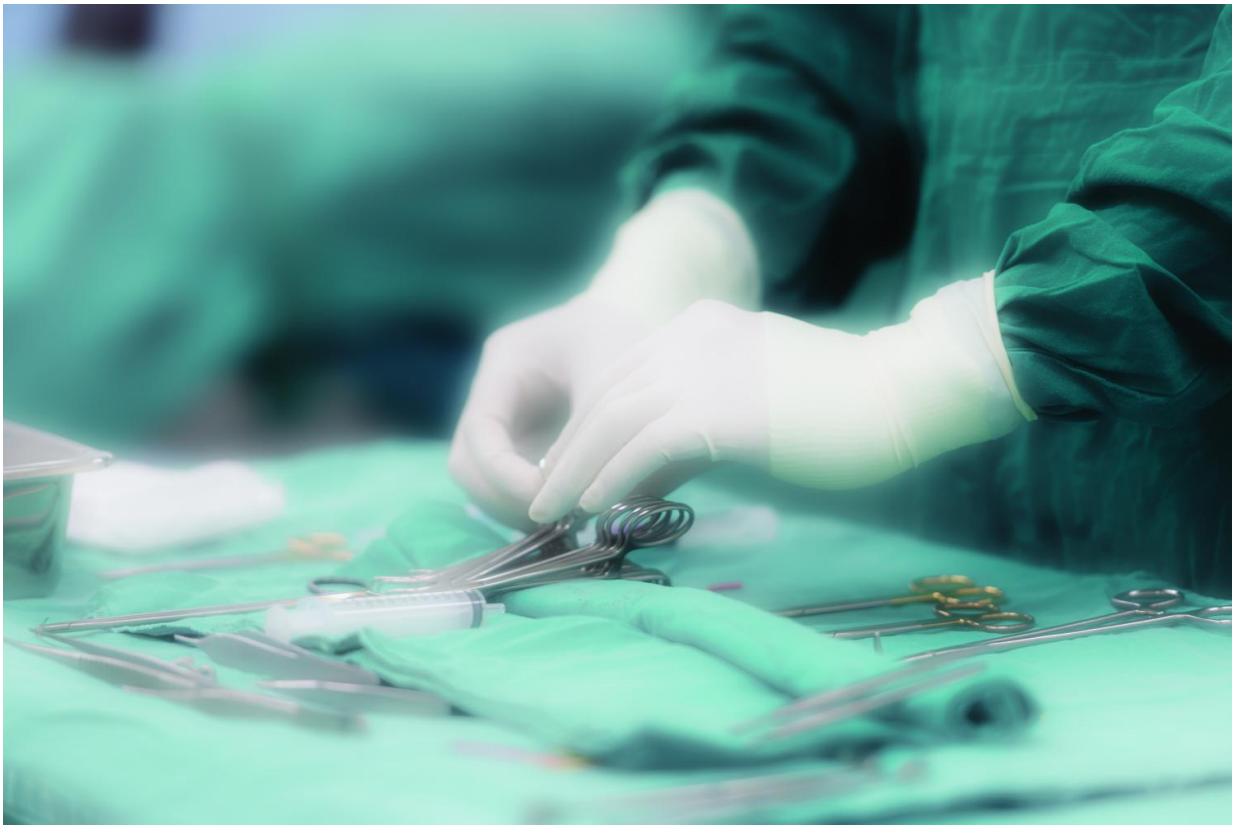
# Antibacterial medical implants

April 29 2016



A team of researchers produced a material that not only repelled bacteria but also attracted healthy cells. Credit: Copyright : Chanawit Sitthisombat

Researchers in Singapore and Hong Kong have created a novel, bacteria-repelling biomaterial that could increase the success of medical implants.

The new material is designed to help healthy cells "win the race" to a

medical implant, beating off competition from bacterial cells and thus reducing the likelihood of the implant being rejected by the body.

The failure rate of certain medical implants is high – around 40% for hip implants – due to the formation of thin films of microorganisms on an implant when it is first inserted into the body. This prevents healthy cells from attaching and results in the body eventually rejecting the implant, potentially leading to serious medical complications for patients.

Reporting their findings in the IOP Publishing journal *Biomedical Materials*, a team of researchers from the Agency for Science, Technology and Research in Singapore, Nanyang Technological University and City University of Hong Kong produced a material that not only repelled bacteria but also attracted healthy cells.

The base of the material was made of multiple layers of water-soluble macromolecules called polyelectrolytes, onto which specific bonding molecules, called ligands, were attached.

The team tested various concentrations of different ligands. They found that a naturally occurring protein building block called RGD was effective at inhibiting the attachment of bacterial cells and attracting healthy cells when it was attached to multilayers of certain polyelectrolytes. It surpassed collagen in this regard.

"The method we developed helped the host cells win the so-called 'race-for-surface' battle, forming a confluent layer on the implant surface which protects it from possible bacterial adhesion and colonisation," explains the lead author, Vincent Chan of Nanyang Technological University.

Medical implants currently incorporate antibacterial silver coatings. "However, the total amount of silver used must be very carefully

controlled because high concentrations could kill mammalian cells and become toxic to the human body," says Professor Chan. By comparison, "the bio-selective coatings we've created do not have this problem, as the materials used are non-toxic and the environmentally sustainable preparation process uses water as a solvent."

"At the moment this is just a proof-of-concept study, so there is still a long way to go before the coating can be used on implants in a clinical setting," he adds. "In future studies we hope to improve the long-term stability of the coating."

Provided by Institute of Physics