Implant infections could be banished thanks to scaffold breakthrough

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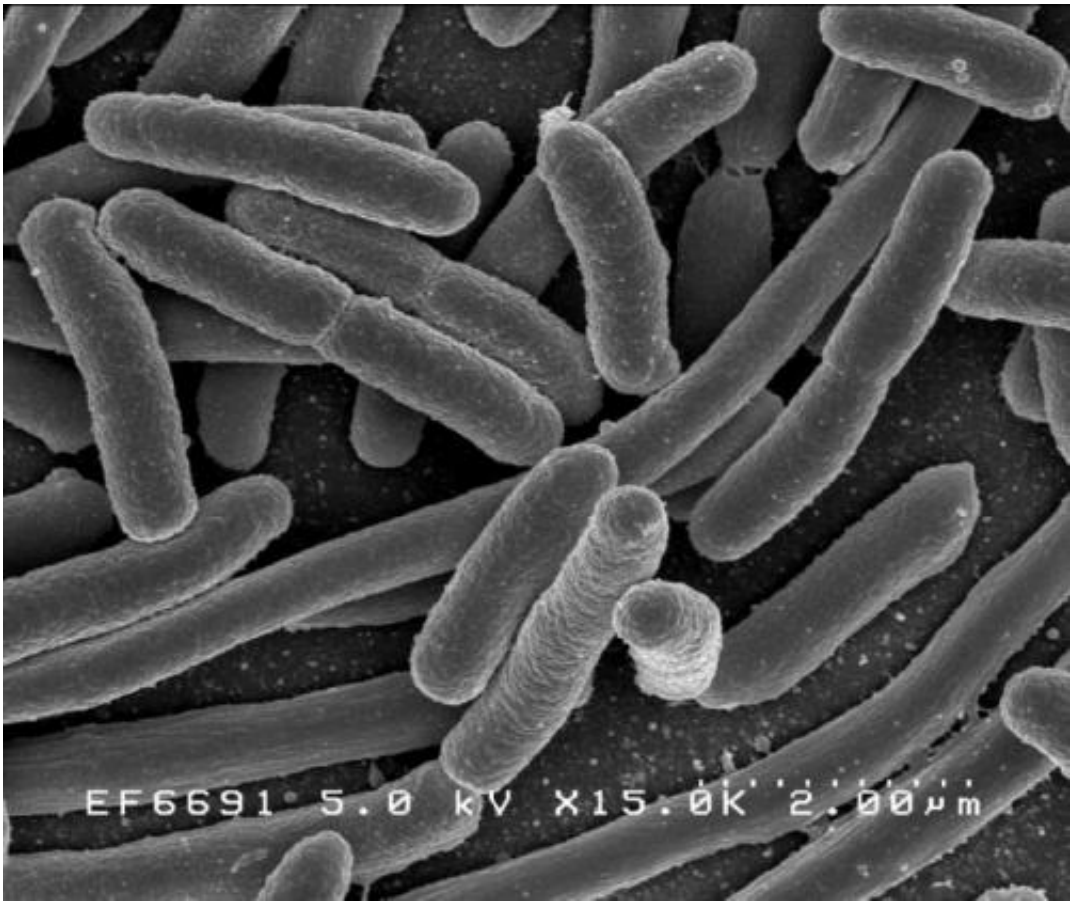

Escherichia coli. Credit: Rocky Mountain Laboratories, NIAID, NIH

Researchers in Ireland have taken a major step forward in the battle against medical implant infections.

They developed a new type of implant scaffold to provide localised drug treatment and prevent infection, which has already proven effective against two types of major problem bacteria.

Publishing their results today in the journal *Biomedical Materials*, the team from the National University of Ireland Galway show that stabilised collagen scaffolds loaded with a particular antibiotic were able to prevent both *Escherichia coli* and *Staphylococcus epidermidis* from forming.

Lead author Dr Dimitrios Zeugolis, from NUI Galway's Regenerative, Modular & Developmental Engineering Laboratory (REMODEL) and Science Foundation Ireland (SFI) Centre for Research in Medical Devices (CÚRAM), said: "Implant infections remain a major healthcare problem. They can require long hospitalisation periods to disturb and treat bacterial biofilm formation. There can also be a need for additional surgeries to remove or replace the infected implant, which if not done in time may lead to sepsis.

"Although localised drug treatment, via an implanted scaffold has shown promise, the ideal scaffold cross-linking (to initially withstand the aggressive infection environment) and drug (to fight against infection) have not, until now, been found."

The team first developed a collagen scaffold, with a 0.625 per cent concentration of hexamethylene diisocyanate (HDI) used to stabilise it. They then tested the scaffolds with variable concentrations of the antibiotics Cefaclor and Ranalexin.

Dr Zeugolis said: "Both drugs showed similar loading efficiency, release profile and cytocompatibility. However, only collagen scaffolds loaded with 100 μg/ml of Cefaclor showed adequate antibacterial properties against both *E-coli* and *Staphylococcus epidermidis*.

"Our cross-linked collagen scaffold marks an important step forward against a problem that is both a major health problem and a severe economic burden to healthcare systems internationally."

More information: E K Tsekoura et al, Battling bacterial infection with hexamethylene diisocyanate cross-linked and Cefaclor-loaded collagen scaffolds, *Biomedical Materials* (2017). DOI: 10.1088/1748-605X/aa6de0

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