Bacteria-binding polymers: a novel way to reduce bacterial load in infection

Steve Rimmer, Sheila Mac Neil, Linda Swanson and Ian Douglas

BUG BINDING POLYMERS-the Sheffield University team

POLYMER CHEMISTRY

PHOTOPHYSICS

TISSUE ENGINEERING

MICROBIOLOGY

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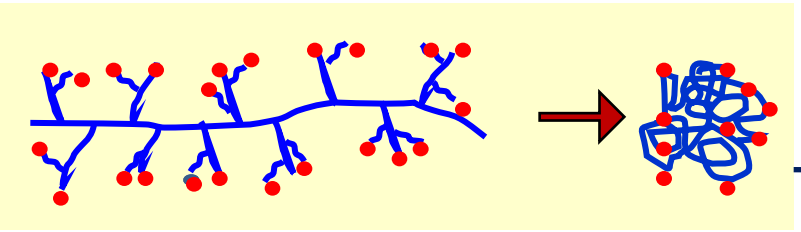
What is the clinical problem?

Increasing number of chronic non-healing wounds

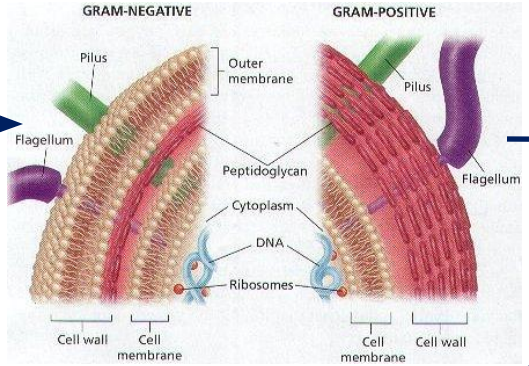
Acute trauma leading to infection in field situations lacking laboratory facilities

Increasing resistance to antibiotics

Decision making needs to be simple

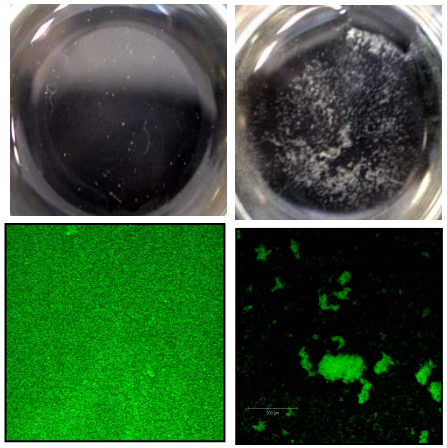


Polymer chemistry

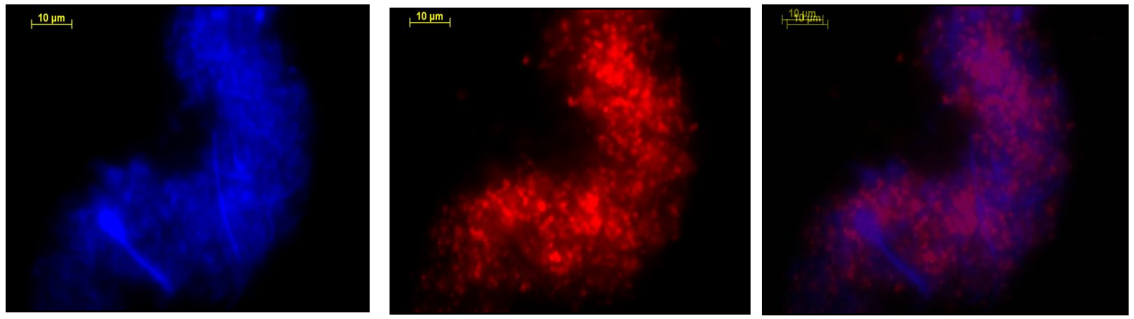


S.aureus / PBS

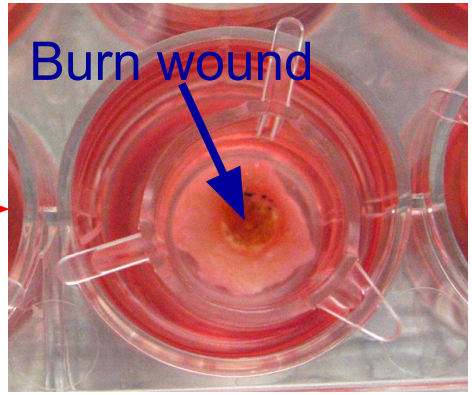
PNIPAM-VAN + *S.aureus*

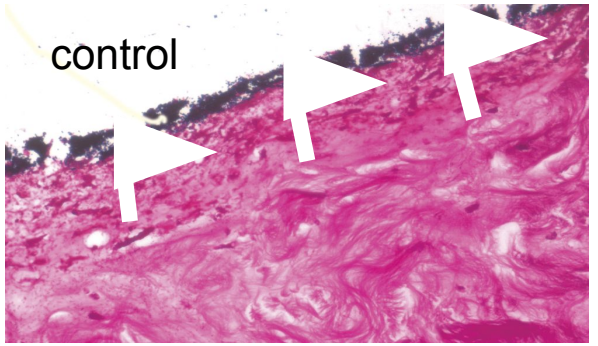


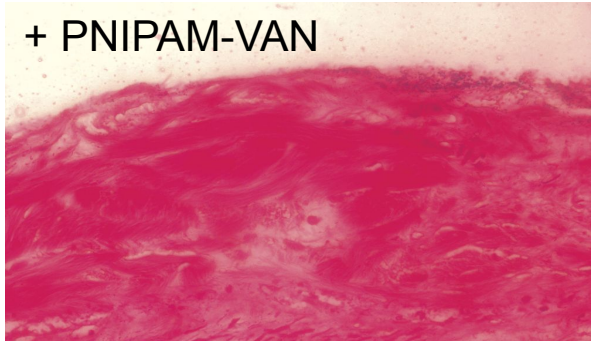
Microbiology



Burn







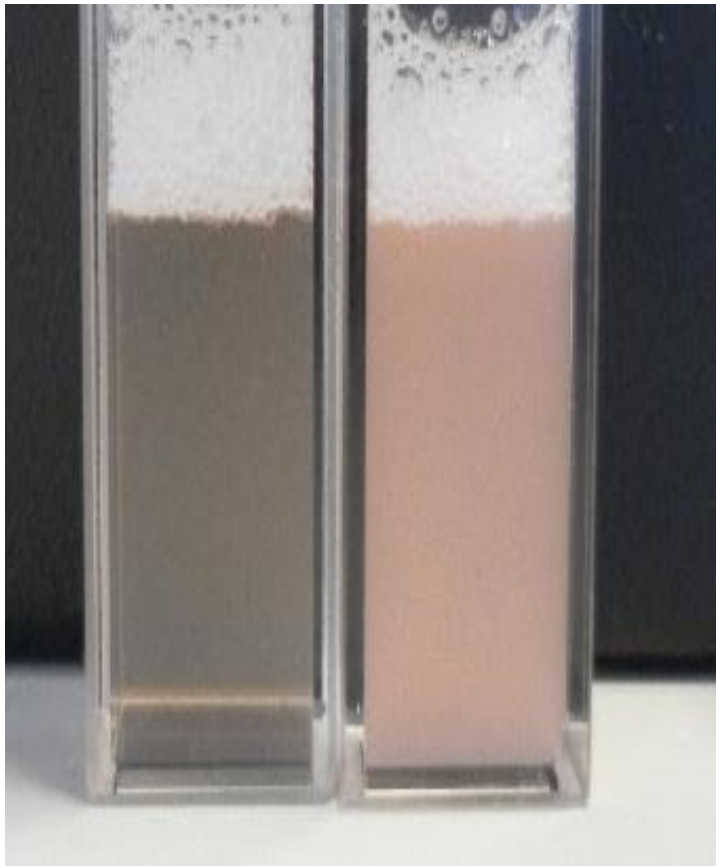
Tissue engineering

Final step-can we make it visible?

Bacteria detecting gel with fluorescent indicator

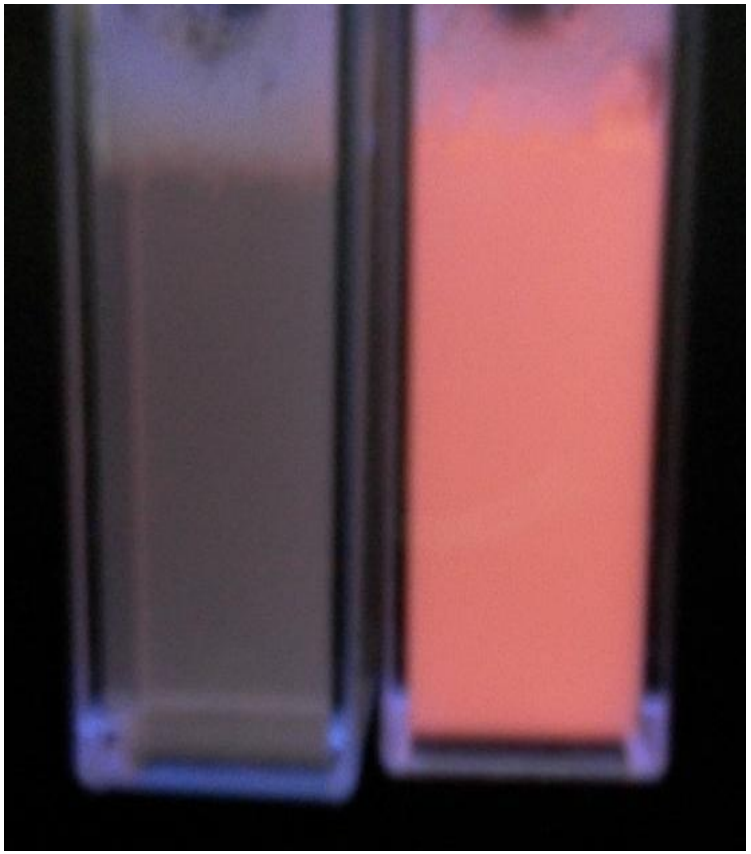
Visible light

No bacteria With bacteria



Ultaviolet light

No bacteria With bacteria



Publications and where next?

- Shepherd J, Douglas I, Rimmer S, Swanson L and MacNeil S. Development of three-dimensional tissue engineered models of bacterial infected human skin wounds. Tissue Engineering 15(3):475-484 (2009).

- Shepherd J, Sarker P, Douglas I, MacNeil S, Swanson L, Rimmer S and Swindells K. Binding bacteria to highly branched poly(N-isopropyl acrylamide) modified with vancomycin induces the coil-to-globule transition. Journal of the American Chemical Society 132(6): 1736-+ (2010)

- Sarker P, Shepherd J, Swindells K, Douglas I, MacNeil S, Swanson L, Rimmer S. Highly Branched Polymers with Polymyxin End Groups Responsive to Pseudomonas aeruginosa. Biomacromolecules 2011, 12, 1–5 (2010)

- **HAVE RECENTLY BEEN AWARDED TSB FUNDING TO DEVELOP A DETECTOR SYSTEM FOR APPLICATION OF THIS TECHNOLOGY TO WOUNDS-Will start Jan 2013.**