



Antibiotic-sparing wound gel shows “real promise” in fighting biofilm infection

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Dr Fenella Halstead



Scientists from the National Institute for Health Research (NIHR) Surgical Reconstruction and Microbiology Research Centre (SRMRC) in Birmingham have shown a new antimicrobial wound gel - SurgihoneyRO™ - can eradicate biofilms and aid the fight against antibiotic resistance ⁽¹⁾

The engineered honey which uses sustained, low levels of Reactive Oxygen ® to disrupt bacterial biofilm, is already being used on patients to improve healing of infected, long-term wounds ^(2,3)

In World Antibiotic Awareness Week (Nov 13-19), doctors and nurses are being urged only to only prescribe antibiotics if they are really necessary and will work.

Biofilms are slimy, glue-like membranes that protect microbes from the body's immune system and increase their resistance to antibiotics. Evidence suggests that biofilms are present in most chronic, non-healing wounds with a recent study suggesting prevalence could be as high as 78 per cent (4)

But there is good news: scientists have discovered SurgihoneyRO™ can curb the growth and activity of bacterial biofilm found in chronically infected burns and wounds. The gel becomes active on contact with the wound exudate.

The findings, published in the *Journal of Wound Care*, found SurgihoneyRO™ has significant activity against mature biofilms, or fixed communities of bacteria, that make wounds difficult to treat.

Fenella Halstead, a clinical scientist who led the study, said: "With the ever-increasing threat of antibiotic resistance and the recognition that conventional antibiotics taken by mouth are rarely useful to treat chronic infections, such as venous leg ulcers, there is a real need for new and novel topical antimicrobial agents.

"SurgihoneyRO™ is a key example of a topically-applied antibiotic-sparing agent and is showing real promise both clinically and in laboratory tests."

The new study comes as the latest Public Health England guidance on common infections recognises Reactive Oxygen wound gel as a treatment for venous leg ulcers to reduce bacterial load and infection (5). The rationale explains it could cut unnecessary antibiotic prescribing and the amount of time community nurses currently spend dressing and treating non-healing leg ulcers.

To establish if SurgihoneyRO™ has a role in eradicating mature, pre-formed biofilms, the researchers cultured 16 strains of major wound-infecting pathogens, such as *Pseudomonas aeruginosa*, *Acinetobacter baumannii*, *Escherichia coli* and MRSA. This involved placing suspensions of the bacteria into wells of a 96 well microtiter tray, and leaving the biofilms to grow over 72 hours on plastic pegs inserted into each well. The engineered honey was then serially double-diluted with distilled water to give different strengths – 1:3, 1:6, 1:12, 1:48, 1:96, 1:384, 1:768, 1:1536, 1:3072 and 1:6144, and the biofilms placed into the wells containing the honey. Positive and negative controls were included. The plates were then sealed and incubated for 24 hours to see if SurgihoneyRO™ could significantly reduce biofilm seeding and by inference have killed some of the cells in the biofilm.

The results showed all 16 bacteria were susceptible to SurgihoneyRO™ after 24 hours with a reduction in seeding observed ranging from 58 per cent to 94 per cent. It was dose-dependent with smaller reductions in seeding of biofilms as the concentration of SurgihoneyRO™ became weaker. Even at the lowest dilution of 1:6144, there was still reduced biofilm seeding for nine out of 16 pathogens tested. The greatest effects were seen when the gel was used at the strongest concentration (1:3).

The report stated: “Using a simple and effective in vitro assay we have provided further evidence that SurgihoneyRO™ is antimicrobial and has significant activity against preformed, mature biofilms of a range of clinically important wound pathogens.

“All isolates were susceptible to SHRO and significant reductions in seeding observed following 24 hours exposure....”

The study concluded: “The in vitro finding show that SurgihoneyRO™ is antibacterial against mature biofilms, significantly reducing biofilm seeding of a range of different species of bacteria, including common wound pathogens and multi-drug resistant isolates.

“As well as reductions in biofilm seeding, we also observed reduced biofilm mass, which together would suggest that SurgihoneyRO™ has anti-biofilm properties, and consequently that the treatment does not just kill the outermost planktonic bacteria in the biofilm.

“The findings therefore support the anecdotal clinical data for biofilm efficacy and the topical use of SHRO for the treatment of chronic wounds where biofilms are likely to be present.”

Notes to the editor:

References

1. Halstead F, Webber B, Oppenheim B, Use of an engineered honey to eradicate pre-formed biofilms of important wound pathogens: an in vitro study. *Journal of Wound Care*, Vol 26, No 7 July 2017
2. Dryden M, Dickinson A, Brooks J, Hudgell L, Saeed K, Cutting K. A multi-centre clinical evaluation of Reactive Oxygen topical wound gel in 114 wounds. *Journal of Wound Care*, March 2016.
3. Hudgell L, Mr Jeremy Crane. Improved healing of challenging wounds with SurgihoneyRO – a novel antimicrobial agent with antibiofilm action. Poster Wounds UK conference, Harrogate 2017
4. Malone M et al: The prevalence of biofilms in chronic wounds: a systematic review and meta-analysis of published data *J Wound Care* 2017a; 26 (1): 20-5.
5. Public Health England: Management and treatment of common infections: Antibiotic guidance for primary care: for consultation and local adaptation.

What is SurgihoneyRO™?

The use of honey for wound care dates back centuries and research has shown this is partly due to its physical properties including pH, osmolarity and antibacterial components.

SurgihoneyRO™ differs from other medical honeys, including Manuka, in that it does not rely on a single floral source and is engineered to produce precisely controlled, low levels of

reactive oxygen species (ROS), mainly hydrogen peroxide, for a sustained period. This is a major innovation.

SurgihoneyRO™ has CE mark and is an approved treatment for a wide range of wounds, including leg ulcers, diabetic foot ulcers, pressure ulcers, burns, skin graft sites, cuts and bruises. It is not yet available on prescription but can be ordered directly from H&R Healthcare in the UK. For more information see www.surgihoneyro.com

What is the NIHR Surgical Reconstruction and Microbiology Research Centre?

- The NIHR SRMRC is a national centre for trauma research, transferring innovation used in the treatment of injured military personnel to improve outcomes for all patients.
- It brings together the pioneering advances in surgery and infection control made by military and civilian scientists and medics working together.
- Launched in January 2011, the national trauma research centre will share its discoveries with the wider NHS to support delivery of excellence in a complex area of acute care.
- Based at the Queen Elizabeth Hospital Birmingham (QEHB), the centre harnesses expertise from the Ministry of Defence (MoD), University of Birmingham (UoB) and QEHB and has been funded £6m for a further three years by the National Institute for Health Research (NIHR) and the Ministry of Defence (MoD). (www.srmrc.nihr.ac.uk).

The National Institute for Health Research (NIHR)

- The NIHR is funded by the Department of Health to improve the health and wealth of the nation through research. The NIHR is the research arm of the NHS.
- Since its establishment in April 2006, the NIHR has transformed research in the NHS. It has increased the volume of applied health research for the benefit of patients and the public, driven faster translation of basic science discoveries into tangible benefits for patients and the economy, and developed and supported the people who conduct and contribute to applied health research.
- The NIHR plays a key role in the Government's strategy for economic growth, attracting investment by the life-sciences industries through its world-class infrastructure for health research.
- Together, the NIHR people, programmes, centres of excellence and systems represent the most integrated health research system in the world. For further information, visit the NIHR website(www.nihr.ac.uk).