WoundEvidence

Single paper review

Malone, M. (2017)

smith&nephew
Supporting healthcare professionals for over 150 years

Effect of cadexomer iodine on the microbial load and diversity of chronic non-healing diabetic foot ulcers complicated by biofilm *in vivo*

Cadexomer Iodine demonstrated to reduce the numbers of biofilm bacteria in diabetic foot ulcers after only 7 days and without prior sharp debridement.

Evidence

Level 2+ evidence*

Objective

Study to employ suites of molecular and microscopy techniques to investigate if Cadexomer Iodine can reduce *in vivo* the microbial load of chronic non-healing diabetic foot ulcers (DFUs) complicated by biofilm over a 7 day treatment period and without prior sharp debridement

Methods

- Chronic non-healing DFUs defined as a wound of >6weeks duration failing to respond to standard care
- Cadexomer Iodine ointment (IODOSORB) applied every second day for 7 days (total of three applications)
- No sharp debridement
- Tissue biopsy taken from the wound edge before and after treatment
- Biofilm visualisation techniques:
  - Scanning Electron Microscopy (SEM)
  - Fluorescent In-Situ Hybridization (FISH)
- Biofilm community analysis using molecular methods to assess total biofilm numbers and relative numbers of different species

Results

- Reduction in wound biofilm following Cadexomer Iodine treatment
  - Biofilms were confirmed in 100% (17/17) participants using visualisation techniques SEM and FISH
  - Significant reduction in biofilm numbers in 11/17 patients (range 1-2 $\log_{10}$ 16S copies/mg tissue) following 7 days treatment with Cadexomer Iodine (CI) ointment (p=0.02)
- Reduction in protease activity following Cadexomer Iodine treatment
  - Matrix Metalloproteinase (MMP-2 and MMP-9) reduction measured in 8 patients (wound fluid volume too low in remaining patients) following CI treatment
  - Significant reduction in MMP-9 (p=0.05)
  - In general, any reductions in the levels of MMPs were correlated to reductions in the microbial load (p=0.03)
- Microbial richness and diversity
  - Overall, no change in microbial diversity (i.e. the number of unique microbial types/groups) following CI treatment however the counts across bacterial groups were reduced
  - Specifically, CI treatment resulted in broad level of antimicrobial activity in reducing both facultative anaerobes such as *Staphylococcus* spp., *Serratia* spp., *Pseudomonas* spp. and obligate anaerobes including Clostridiales family XI

CONCLUSIONS

- First *in vivo* study to show a clinical reduction in biofilm bacteria in non-healing DFUs
- Biofilm confirmed by molecular and microscopy techniques
- Significant results (reduction in biofilm and protease activity) observed in most patients after only 7 days of treatment with IODOSORB and with no prior sharp debridement

Authors:	Malone, M, Johani, K, Jensen, S O, Gosbell, I B, Dickson, H G, McLennan,S, Hu, H, Vickery, K
Title:	Effect of Cadexomer Iodine on the microbial load and diversity of chronic non-healing diabetic foot ulcers complicated by biofilm *in vivo*
Aim of the study:	To determine the performance of Cadexomer Iodine against microbial populations from chronic non-healing diabetic foot ulcers (DFUs) complicated by biofilm *in vivo*, using molecular, microscopy and zymography methods
Study Type:	Diabetic foot ulcers (DFU)
Wound Type:	Closed surgical incision
Speciality/Indication:	Chronic non-healing wounds
Products:	IODOSORB°
Number of patients:	17 patients
Reference:	Malone, M. *et al.* Effect of Cadexomer Iodine on the microbial load and diversity of chronic non-healing diabetic foot ulcers complicated by biofilm *in vivo*. *J. Antimicrob. Chemother*. Epub ahead of print, (2017)
Details:	Peer reviewed journal | PubMed listed | Impact factor 5.313

* Well conducted case control or cohort studies with a low risk of confounding, bias, or chance and a moderate probability that the relationship is causal; **P values:** The result of a test to determine if a conclusion or difference is significant. P values are expressed in thresholds of 'extremely significant' (< 0.001), 'very significant' (0.001 to 0.01), 'significant' (0.01 to 0.05), and 'not significant' (≥0.05). **Statistical significance:** The likelihood that an outcome is attributable to a specific cause, rather than a random occurrence.