CLINICAL MICROBIOLOGY

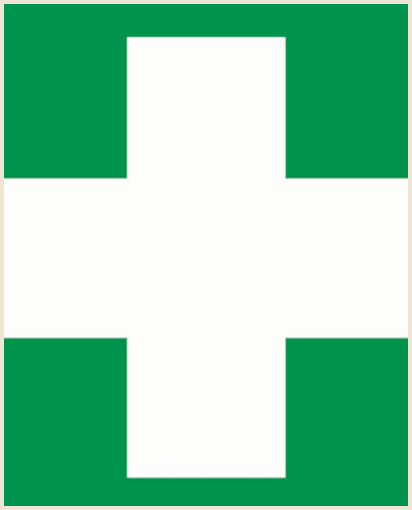
Maggots to the rescue

Think of maggots feeding on a wound and most people recoil in disgust at the very thought. Through their preferential consumption of dead tissue, however, 'disgusting' maggots decrease the risk of post-operative infections, according to a study reported in *Clinical Infectious Diseases*.

For many years, maggot therapy was recognized as an effective method of wound debridement — the removal of necrotic and contaminated tissue prior to wound closure. In more recent times however, concerns have been raised relating to the safety of maggot debridement therapy (MDT). MDT typically involves applying dressings containing disinfected maggots — specifically the larvae of the blowfly *Phaenicia sericata* — to the wounds of patients. To address the safety and utility concerns of this method of debridement, Ronald Sherman and Kathleen Shimoda conducted a retrospective analysis of MDT procedures performed at their hospital over a period of five years. The researchers found that although six (32%) of the wounds that were not pre-surgically treated with MDT developed post-operative infections, not one of the 10 wounds that were treated with MDT developed infections. Further analysis of the data demonstrated that the only factor significantly associated with post-operative wound infections was the absence of pre-surgical MDT.

This study demonstrates that pre-surgical MDT is an effective therapy in preparing wounds for closure. The reasons for the actual reduced infection rate in MDT-treated wounds are not clear, but previous studies have shown that maggots secrete antimicrobial peptides, cytokines and epithelial growth factors that stimulate wound healing. What is clear, however, is that, although the results of this study are encouraging, a large prospective multi-centre clinical trial is essential for a complete understanding of the risks and benefits of MDT.

David O'Connell



References and links

ORIGINAL RESEARCH PAPER Sherman, R. A. & Shimoda, K. J. Presurgical maggot debridement of soft tissue wounds is associated with decreased rates of post-operative infection. *Clin. Infect. Dis.* **39**, 1067–1070 (2004)

PROTOZOAN PARASITES

Spot the difference

A new report in *Proceedings of the National Academies of Sciences, USA*, describes a prokaryotic-like glyoxalase pathway in the eukaryotic parasite *Leishmania major*, a finding that could provide a new target for rational drug design.

The glyoxalase pathway — which comprises the enzymes glyoxalase I and II (GLO1 and GLO2) — is required for the detoxification of endogenous toxins such as methylglyoxal. Methylglyoxal spontaneously forms a hemithioacetal adduct with glutathione, which is then converted by GLO1 and GLO2 into D-lactate and free glutathione.

Alan Fairlamb and co-workers identified a putative *GLO1* gene in the recently completed *L. major* genome. Sequence comparisons of this gene revealed 47% identity to *Escherichia coli*, 51% identity to *Synechococcus* sp. WH 8102, but only 33% identity to human GLO1 sequences. In addition, phylogenetic analyses placed *L. major* GLO1 within the proteobacterial and cyanobacterial lineages, underlying the similarity to prokaryotic GLO1 enzymes.

GLO1 requires the presence of a metal co-factor for activity, and prokaryotes and eukaryotes have different requirements — human enzymes require zinc and *E. coli* enzymes require nickel. Analysis of the gene sequences showed that the residues shown to be important in *E. coli* metal binding are conserved in the *L. major* GLO1 sequence, indicating that *L. major* GLO1 requires nickel rather than zinc. To confirm this, the authors expressed and purified *L. major* GLO1 and stripped it of all metal co-factors. The resulting apoenzyme was reactivated with nickel, but zinc had no effect.

However, this proposed *L. major* glyoxalase pathway is also distinct to those of prokaryotes such as *E. coli*. *L. major* is known to have an unusual thiol metabolism — it produces trypanothione rather than glutathione. The authors looked at the kinetic properties of *L. major* GLO1 and found that, with trypanothione, it was as efficient as the human enzyme was with glutathione; however, there was a 200-fold difference between its activity with trypanothione and glutathione.

Taken together, these data provide evidence for a new category of trypanosomal GLO1 enzymes. New antitrypanosomal agents are needed, particularly in the developing world, and the differences between *L. major* and human glyoxalase systems indicate that it could be a much-needed target for rational drug design.

Jane Saunders

References and links

ORIGINAL RESEARCH PAPER Vickers, T. J. *et al.* A trypanothione-dependent glyoxalase I with a prokaryotic ancestry in *Leishmania major*. *Proc. Natl Acad. Sci. USA* **101**, 13186–13191 (2004)

WEB SITE

Alan Fairlamb's laboratory: http://www.dundee.ac.uk/biocentre/SLSBDIV1ahf.htm