Maggot debridement therapy (MDT) - not a ‘fly by night’ therapy!

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Perhaps it is understandable that maggots discovered in wounds are often met with cries of horror and disgust. However, when they are purposely placed on a patient to cleanse and promote healing of a problematic wound, the resulting comments can be somewhat different, even joyous on occasion.

Maggot Debridement Therapy (MDT) is the controlled placement of “sterile” or disinfected fly larvae (i.e. maggots) in a wound bed to assist the cleansing of necrotic tissue. Over the last two decades this technology has made an impressive comeback; MDT is even now available on prescription in the UK. This old fashioned therapy has been re-badged under various guises including, “larval therapy”, “biosurgery” and/or “biotherapy”, purposely avoiding the “maggot” word. The maggots employed are the immature stage of the fly species *Lucilia sericata*, a common blowfly, and a well known pest in the sheep industry. It is the main species of fly utilised worldwide for MDT, as the fly’s young have the unique feeding behaviour of devouring devitalised tissue, whilst leaving the surrounding healthy tissue intact.

MDT was once a routine procedure undertaken in over 300 hospitals throughout Europe, USA and Canada during the 1930s and early 1940s. The medical journals from this era list osteomyelitis, abscesses, carbuncles, burns, cellulitis, gangrene and leg ulcers as having been successfully treated. Throughout this period the therapy was well received by clinicians, although the high cost of maggots was a concern. Other less common difficulties encountered in this era were the lengthy process of applying the cumbersome containment devices (Fig. 1) for maggots, and the physical and emotional distress to patients. With the advent of antibiotics and the development of new surgical techniques MDT was quickly forgotten and slipped into obscurity.

The past success of MDT in the treatment of chronic wounds during the 1930s was one of the main criteria for its rebirth. During the 1980s extensive clinical trials using MDT were undertaken at the University of California, Irvine, USA. The trials concluded that therapy still had many benefits to offer the patients in the treatment of chronic wounds. Not only do the maggots remove necrotic tissue in a precise manner, they assist in controlling infection, and promote the regeneration of healthy tissue and healing. This is achieved by the beneficial affects of the maggots’ secretions that contain powerful proteolytic enzymes that break down dead tissue, which is then ingested. Due to the antimicrobial nature of the secretions, the bacteria are destroyed as they pass through the gut. The development of fibroblast cells is also thought to be stimulated by the maggot's secretions.

These days, this non-invasive therapy can be performed in hospitals, medical centres, outpatient units or during a home visit by trained nurses, thus avoiding a future trip for the patient to theatre for surgical debridement. MDT offers the patient more independence plus a reduction in the unpleasant smells, often associated with chronic wounds, and these in turn improve the patient’s quality of life.

![Figure 1. Types of maggot cages and an application method from 1934.](image-url)
The therapy is unaffected by x-rays, antibiotics or hyperbaric treatment, and it has few side affects, although pain has been recorded by some patients. MDT has added the advantage of fast-tracking wound closure and preparing the wound bed for other wound healing modalities, such as skin grafting. Evidence also suggests that it is successful in combating the hospital “super-bug” MRSA.

Improved dressings and innovative methods of delivering and maintaining the maggots in wounds have revolutionised MDT therapy. In 2002 the “Biobag”, a containment bag (commonly referred to as “teabags”) was introduced. These are sterile fabric pouches in which the maggots are sealed, and enable easy placement and removal, provide secure containment, and in turn are more aesthetically pleasing because they reduce visibility of the contents. The novel BioFOAM dressing, developed and produced in 2004, has improved the therapy with control of exudate during the treatment whilst providing a favourable environment that enhances maggot activity. These simple devices have assisted MDT to become a streamlined, highly cost-effective wound care tool. Recent studies in the UK have found maggots can now “cut treatment duration from 89 days to just five” and slashed the cost from £2,200 to £300 per patient. Although the therapy has had an impressive success rate it is not a cure for all wounds; however, it is very effective in the treatment of chronic ulcers, venous stasis ulcers, neuropathic foot ulcers and non-healing traumatic and post surgical wounds and burns.

Interest in MDT within Australia has slowly gained momentum with a demand for more information by wound care professionals as many conferences, workshops and teaching curricula for nursing staff often now encompass MDT. The Department of Medical Entomology, Centre for Infectious Diseases and Microbiology, at Westmead Hospital is the only organization in Australia providing disinfected larvae for MDT therapy. The department’s MDT client base has steadily increased, with orders being taken from all Australian states and territories, including many major and country hospitals, medical centres, home addresses in association with home care nurses, and even veterinary practices. Many of the clients comment on the outstanding results the therapy has achieved. Similar types of wounds that have responded well in Australia are overseas, infected infected leg ulcers, diabetic ulcers, wet necrotic and sloughy wounds, stump wounds, burns in human and animal patients.

Conversations with medical staff at participating medical facilities indicate there have been many nursing staff who were sceptical and had preconceived negative ideas regarding the role of MDT in hospitals today. This negativity is often replaced with surprise at the outstanding results this archaic therapy can deliver in just a few short days where more modern methods may have failed. However not all staff are convinced, there are reports of health care staff who refuse to become involved with MDT patients.

Many countries have accepted MDT as just another wound care resource available for consideration in the treatment of chronic wounds. In Australia, at present, its use remains relatively low key compared with other nations. However, in the limited capacity in which MDT has been utilised, the therapy has proven to be extremely successful, and it has the distinct advantage of being a rapid and cost effective alternative in the care of stubborn chronic wounds.

References

Upcoming events…
SEIB 2010 Conference
The University of Sydney, 19-20 May, 2010
To mark the internal launch of the new Sydney Institute for Emerging Infectious Diseases and Biosecurity (SEIB), a two day conference will be held at The University of Sydney on 19 and 20 May 2010.
SEIB 2010 will include symposia placing Emerging Infectious Diseases in context. Topics will include biosecurity, research, education and capacity building, multidisciplinary collaborations and scientific sessions on amplifiers of disease and options for disease control. Keynote Speakers include Professor Tony McMichael from National Centre for Epidemiology and Population Health ANU, and Dr Martyn Jeggo from the Australian Animal Health Laboratory VIC.
Students are invited to submit abstracts for The Dean’s Selection session. One abstract will be chosen from each Faculty for oral presentation. Students submitting abstracts will be sponsored and there is a limited number of complimentary places for students enrolled in undergraduate courses (graduate courses in Medicine and Law) to attend the conference presentations. Students interested in submitting abstracts should contact their Faculty Office. All students should submit a registration form.

For more information please contact SEIB at seib@sydney.edu.au

For more information on the feature article, events or to join the CIDM Public Health e-list and receive regular updates, please email Lou_Orszulak@wsahs.nsw.gov.au

Staff Profile ……
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Joanne Tamara Nitschke is a recent graduate from the University of Western Sydney obtaining her BSc Forensic Science in 2007, and comes to CIDM—Public Health from a regional multidisciplinary private laboratory within Port Macquarie Base Hospital. During her period as a hospital scientist Joanne gained experience and practicalities in Haematology and Coagulation, Biochemistry, Blood Banking and Histology.
Since joining CIDM as a research technical officer in 2009, Jo has been rotating through the various Reference Laboratories beginning in Molecular Biology where she has acquired skills in conducting single, semi-nested, ELISA and real time PCR amplification assays on clinical samples. Currently Jo is working in the NSW Enteric Reference Laboratory (ERL) obtaining knowledge and proficiency in the identification and serotyping of enteric pathogens, predominantly Salmonella in addition to Vibrio, Shigella, Yersinia enterocolitica and enteropathogenic Escherichia coli isolates. Jo assists ERL with the ongoing collaboration with NSW Public Health in the investigation and surveillance of epidemiological clusters of enteric pathogens, by providing information of serotypes via the maintenance and daily transfer of enteric database.
In the future Jo anticipates expanding upon her Microbiology training at CIDM to provide a comprehensive foundation of knowledge to assist in achieving her principal interests in Forensic Microbiology.