Maggot Debridement Therapy

Mr Carl Baptista, Director Research & Development, ORIGIN Group
Clinical Application in History

• First documented during Napoleonic Wars - “prevented the development of infection and accelerated healing” (Larrey 1832)

• Clinically used during the American Civil War (1861 – 1865)

• Stopped in 1930s - advent of antibiotics. Then, MRSA

• Re-introduced into UK around 1995

• First clinical trial in Singapore @TTSH in 2008
  – 14 patients (15 wounds, scheduled for amputation
  – Results: Successful outcome for 7 patients
1st Medical Grade Maggots Biomedical Lab in Singapore
LUCILA CUPRINA (SHEEP- BLOW FLY)
Where do maggots come from?

Life cycle
fly - maggot - fly - maggot
Adults emerge on the 8th day from the pupa stage. At about 3-4 weeks, adult females begin laying eggs. After mating, females can lay 2-4 batches of 200 eggs in their lifetime.

Eggs are harvested from slivers of meat and allowed to hatch. 1st instar maggot (1mm) emerges around 18 hours.

Maggots will first form a beige cocoon initially, slowly turning into a darker shade of brown until they mature. This process takes about 7 days.

1st instar maggot (1mm) takes about 4 days to reach 3rd instar (10mm); feeding on rotting meat. They will then search for a dry environment to pupate. This is known as pre-pupa stage.
Procurement & Production Process

Upon collated orders by 1 pm everyday, Eggs are harvested from slivers of sheep hearts.

Eggs are then delicately separated by hands within a specified time frame.

Eggs are rinsed with tap water and disinfectant solution.

Each batch of sterilized eggs is inoculated on blood and choc agar for disinfectant control to test for sterility.

Eggs are rinsed and shaken for 45 minutes.

The eggs are repeatedly rinsed and shaken for 45 minutes.

After rinsing, the eggs are transferred into a test tube for sterilization.

Finally, the eggs are placed into sterile transportation vials; ready for delivery.
Considerations of MediFly Type

FREE RANGE
- Applied for maximum of 48-hrs
- Allows natural mechanical benefit of maggots’ movement
- Extensive coverage

Baggot
- Applied for maximum of 72-hrs
- Reduces pain
- Removes ‘Yuk’ factor
- Time management – quick application and removal
Ulcers Grade 4 – 6
Last case scenario
Maggot Debridement Therapy

the use of live medical grade sterile larvae to effectively clean the wound bed of devitalized tissue which impedes the normal wound healing process
Three commonly recognised phases, which overlap:

- Inflammatory phase
- Proliferation phase
- Maturation phase

An orchestrated series of events, with culmination of these biological processes resulting in the replacement of normal skin structures with fibroblastic mediated scar tissue.
Living creatures requiring oxygen and food to survive

No teeth!

Chemical factories – move over surface of wound secreting a powerful mixture of proteolytic enzymes which break down dead tissue, liquidizing it.

The maggots then ‘suck’ up this liquid and ingest it

Only liquefy devitalized tissue including MRSA
• Ingest and digest the bacteria within the devitalized tissue in the wound, which are killed in their gut (Robinson and Norwood 1933)

• The secretions increase the pH of the wound to around 8 to 8.5 due to the production of ammonia (excreted), inhibiting the growth of some bacteria (Messer and McClellan 1935)

• Secrete chemicals with inherent antimicrobial activity and these help combat infection (Pavillard and Wright 1957)
Indications

- ANY CHRONIC ULCER:
  Pressure Sores, Diabetic Foot Ulcers, Venous, Ischemic, Malignant, Burns....
- MRSA
- Devitalized tissue – slough, necrosis, gangrene
- Non-aggressive & quick debridement
- Bio-film formation
- Alternative to surgery
- Painful adhered Slough
Contra-Indications

- Wounds that contain fistulae, or connect with vital organs
- Pseudomonas infections
- Haemophiliac
- Use with caution near exposed blood vessels – monitor wound regularly
- Dry necrotic wounds
- Pain – Baggots
- Osteomyelitis?
Osteomyelitis?
What exactly am I applying?

- 1\textsuperscript{st} in-star maggot (approx. 1mm)
- They turn into flies in the wound?
- Count in and out?
- Painful?
### How many to apply

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How to Apply?

• Create ‘cage system’ dressing to contain maggots
• Need O2 and food
• Allow room for expansion
• Consider position of discharge
• Off-load
Step 1: Primary Dressing
Frame the wound with Hydrocolloid dressing

Step 2: Primary Dressing
Place live maggots onto gauze and invert onto the wound

Step 3: Primary Dressing
Encage using gas/air permeable tape e.g. Tagaderm, Opsite

Step 4: Secondary Dressing
Place moistened gauze lightly above the Bio Dressing
Application of Maggots in a Bag
Removal – Maggots remain in Bag
• Managing increase in discharge
• Pain / Crawling
• Off-loading
• Regular change of secondary dressings required for effective treatment
What to expect on removal

- Maggots will have grown to approx. 1cm
- Sterile water to irrigate wound clean of maggots
- Photosensitive – create dark environment
- Leave some in, not to be concerned
- Dispose in biohazard waste bag and drown in alcohol based solution. Double bag.
Dispose in biohazard and drown alcohol solution
Emergency Escapees!!!!!!

- Contact your hospital pest control company
- Contact your nurse clinician in charge
- Discard all escapees as you would with dressing – biohazard waste and drown in alcohol.
Painful Ischemic Ulcer

- 60-Yrs old Male
- Type II Diabetes
- Poor diabetic control
- Smoker
- Successful Revascularization
- Slough adhered – painful for debridement

3 DAYS

POST APPLICATION ONE BAGGOT

- Patient reported minimal pain or discomfort
- Despite advice – Self-discharge for personal reasons
- Outpatient – Seen fully granulating
Diabetic chronic ischemic ulcer

Skin appearance dorsum and plantar dusky, with minor blanching apparent. Necrotic edges dry and adherent. Bone visible within the wound bed – 4th metatarsal region.

• Singapore for third opinion.
• Re-vascularisation – pop bypass
• Remained questionable to viability of forefoot
Application two free range vials

2 DAYS
Total 6 vials applied = 3 dressings

INITIAL PRESENTATION 11 May

PRESENTATION 17th May
Pressure Ulcer Buttock

- 40 year old male, paraplegic
- present for 4+ months duration
- pressure ulcer
- wound slough adhered and painful
• 54-Yr old Male, TYPE II Diabetic
• Began as a blister on big toe – quick deterioration and gangrene
• Offered forefoot amputation due to deterioration of all lesser toes
• Re-vascularized successfully

Post Forefoot Amputation

2 DAYS

Post application of one Free Range

• Patient graft surgery same days as removal of MDT
• Discharged 2 days post graft.
Chronic Heel Pressure Sore

Pre-Application
- 70-Yrs old Female
- Type II Diabetes
- <30 yrs. duration
- Acute Ischemia – Revascularized
- Debridement of non-viable Achilles Tendon

Post application:
Apply 3 Free Range

2 DAYS

Post application:
Apply 2 Free Range

2 DAYS

Post application:
Apply 5 Free Range

- No pain reported
- Proceed with Negative Pressure dressing
- Continues to granulate & decrease in aperture
Any Chronic Wound.......?
Post removal of MDT
Fungating Breast Wound
Why Maggots to conventional dressings?

• Studies demonstrated maggots can clean wounds in a fraction of the time taken by more conventional dressings (Waymen et al. 2001)
• Maggots on average clean wound bed in 5 days; hydrogels 86 days..... Consider long term cost implications not just the short!
• Management of infected wounds containing bacteria that are difficult to kill with more conventional treatments.
• Eliminate MRSA from wounds.
• Reduce need for long antibiotic use – cost effective
In 2008 TTSH approached ORIGIN Scientia to undertake a study to report on our initial experience with MDT, our patients’ perception and to assess factors likely to influence outcome. All patients included on this trial were scheduled for amputations either major or minor. Within only 3 months it was very apparent that MDT was successful in terms of reducing amputation rates significantly. Of the 14 patients, with 15 wounds all scheduled for amputation, 47% had successful outcomes. Ie. 47% did not require amputation.
MAGGOTS SUCK! Keep an open mind.........