



Maggot Debridement Therapy

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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



I have 10,000 Friends



LUCILA CUPRINA (SHEEP- BLOW FLY)

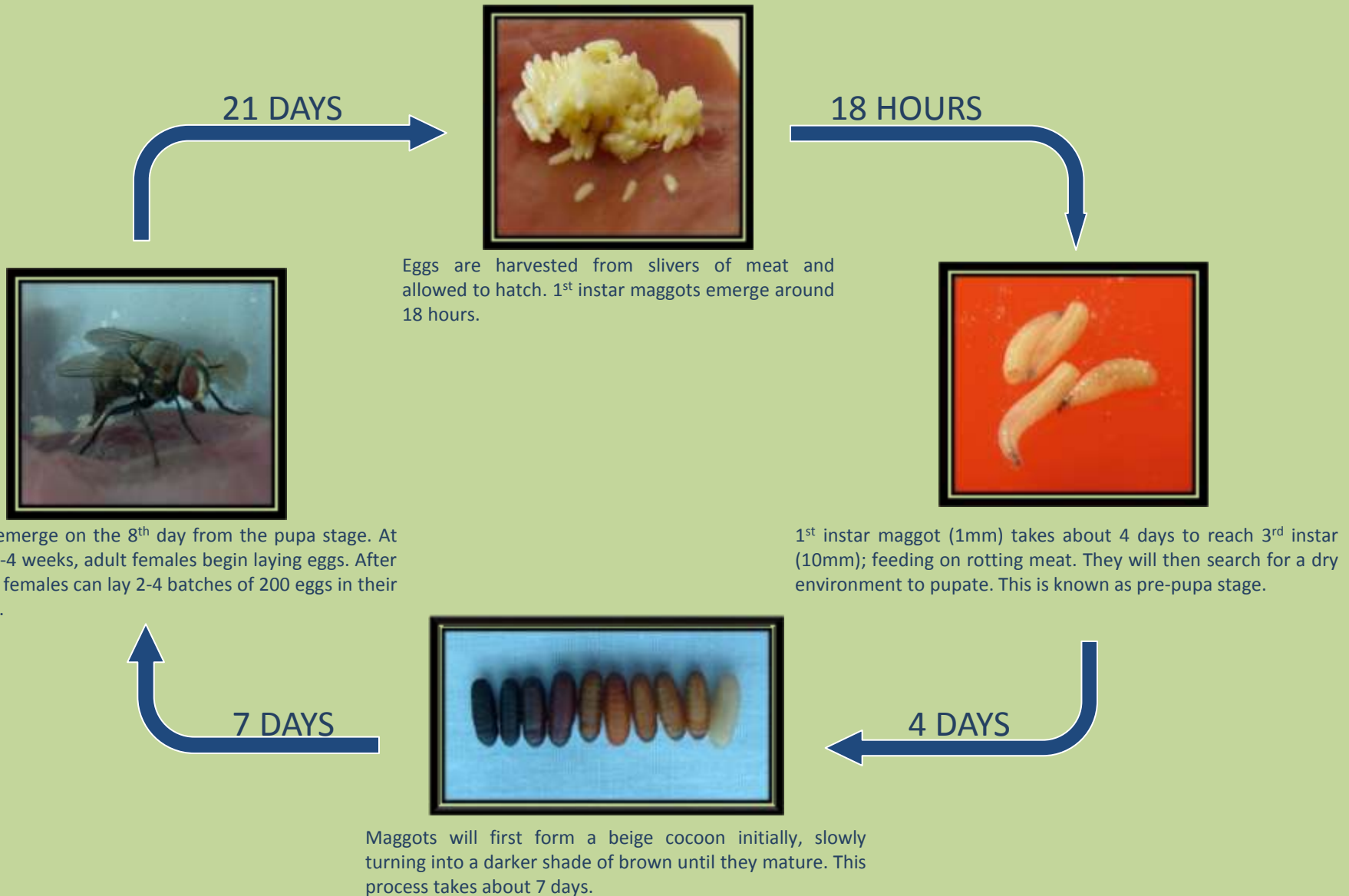
Where do maggots come from?



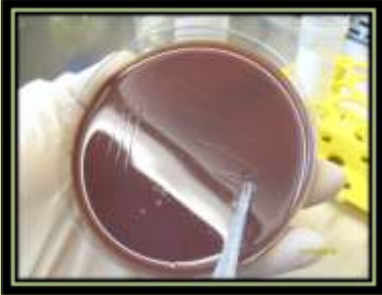
Life cycle

fly - maggot - fly - maggot.....

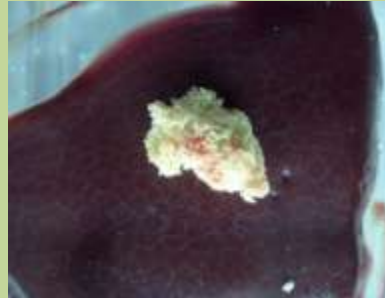
Life Cycle of Lucila Cuprina



Procurement & Production Process



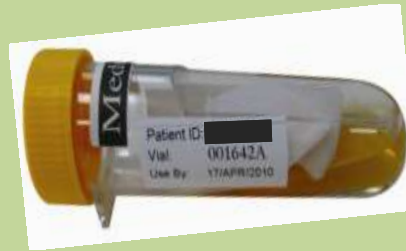
Finally, the eggs are placed into sterile transportation vials; ready for delivery



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.



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



Eggs are rinsed with tap water and disinfactant solution



The eggs are repeatedly rinsed and shaken for 45 minutes



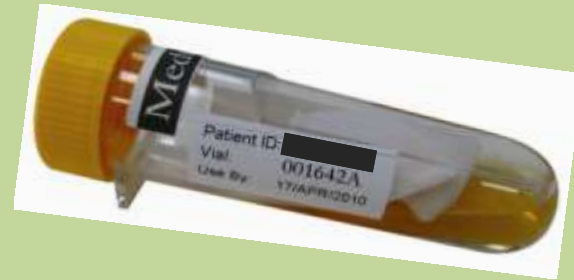
After rinsing, the eggs are transferred into a test tube for sterilization

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



Slough



Gangrene



Necrosis



Ulcers Grade 4 –6 Last case scenario



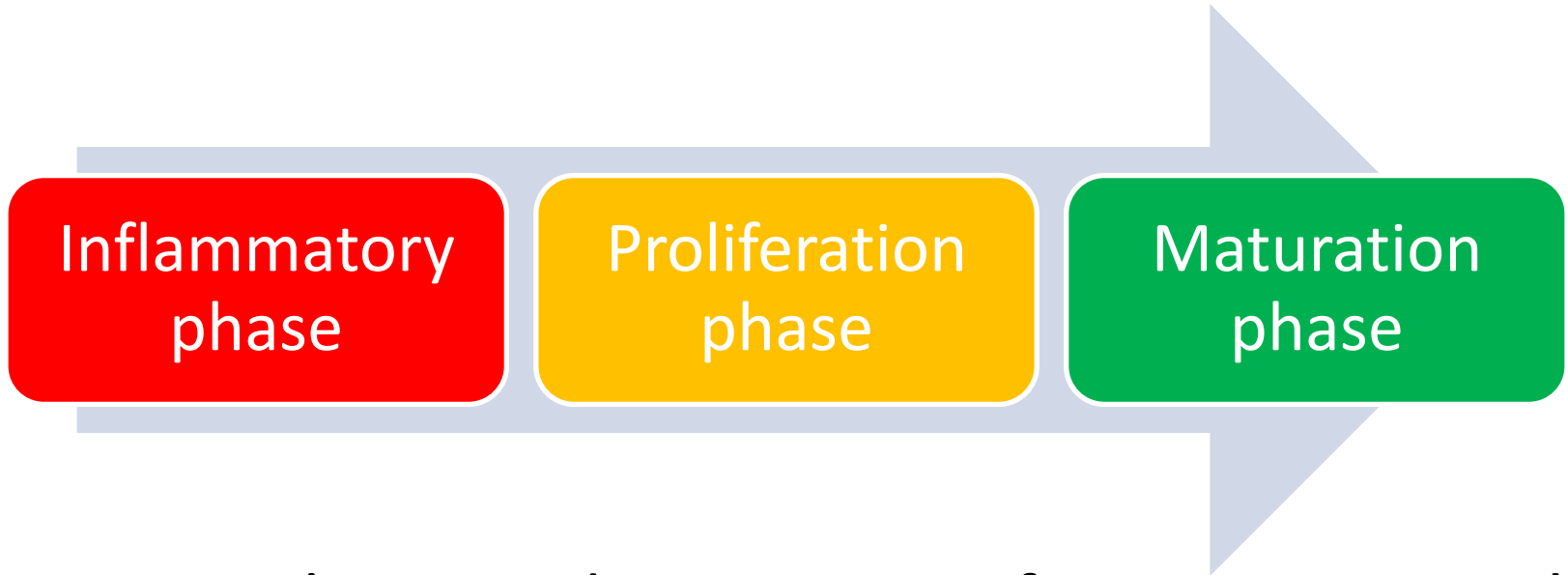
Maggot Debridement Therapy

the use of live medical grade sterile larvae to effectively clean the wound bed of devitalized tissue which impedes the normal wound healing process



Acute (NORMAL) Wound Healing

Three commonly recognised phases, which overlap:



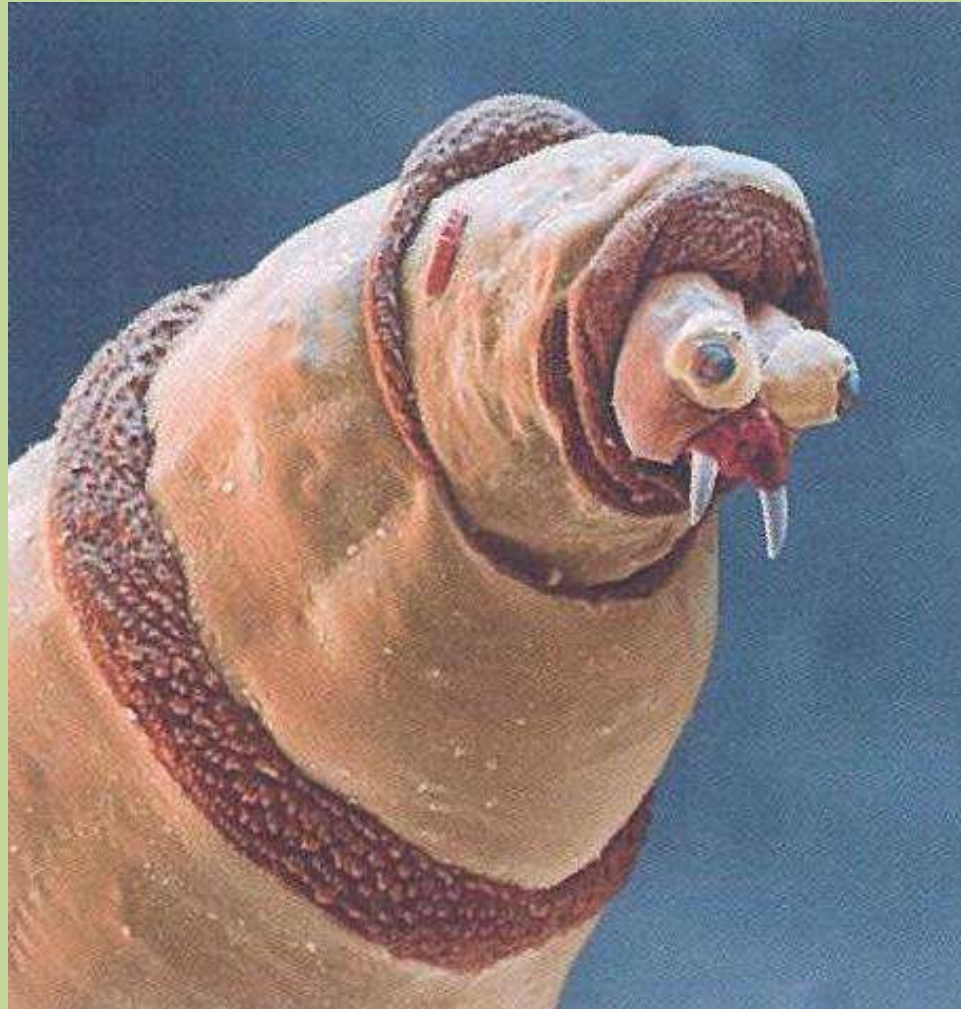
An orchestrated series of events, with culmination of these biological processes resulting in the replacement of normal skin structures with fibroblastic mediated scar tissue

MDT Debridement → A Clean Wound Bed



- 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**

MDT Debridement → A Clean Wound Bed



- 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?

- 1st in-star maggot (approx. 1mm)
- They turn into flies in the wound?
- Count in and out?
- Painful?



How many to apply

MediFly Maximum wound size (cm) Up to 2 x 2	Percentage of wound covered with slough / necrosis				
	20%	40%	60%	80%	100%
Up to 2 x 2	Yellow	Yellow	Yellow	Yellow	Yellow
5 x 5	Yellow	Yellow	Yellow	Yellow	Green
5 x 10	Yellow	Yellow	Yellow	Green	Green
10 x 10	Yellow	Yellow	Green	Green	Green
10 x 15	Yellow	Green	Green	Green	Cyan
15 x 15	Green	Green	Green	Cyan	Cyan
15 x 20	Green	Green	Cyan	Cyan	Cyan
20 x 20	Green	Cyan	Cyan	Cyan	Red
20 x 25	Cyan	Cyan	Cyan	Red	Red
25 x 25	Cyan	Red	Red	Red	Purple
25 x 30	Cyan	Red	Red	Purple	Purple
30 x 30	Red	Red	Purple	Purple	Purple

Number of flask	Yellow	1	Green	2	Cyan	3	Red	4	Purple	5
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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



MDT Application



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



- Singapore for third opinion.
- Re-vascularisation – pop bypass
- Remained questionable to viability of forefoot

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

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



2 Days



4 days total



Post Forefoot Amputation

- 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 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

2 DAYS

Apply
3 Free Range



**Post application:
3 Free Range**

2 DAYS

Apply
2 Free Range



**Post application:
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





● Mepilex ● Mepilex-Lite ● Mepilex-Border ● Mepilex-Border-Lite ● Mepilex-Transfer ● Mepitel

SafetaC
TECHNOLOGY

 **MÖLNLYCKE**
HEALTH CARE



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**

Cost Effective – Long Term

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. I.e. **47% did not require amputation**

MAGGOTS SUCK! Keep an open mind.....

