Wound Healing

The process of wound repair is a finely balanced sequence of events, each stage of healing is switched on and switched off by stimulators and inhibitors produced naturally by the body.
Wound Healing

Wounds Healing By Primary Intention

Minimal amount of connective tissue repair/ epithelialisation, usually heal rapidly - in 4-14 days

Wound Healing

Wounds Healing by Secondary Intention

Injury – Haemorrhage – Haemostasis

Inflammation – Proliferation

Contraction – Maturation

Healed Wound

Wound Healing

Successful wound healing is dependent on the deposition of ECM proteins

Controlled by

Proteases and their inhibitors
Wound Healing

ECM Protein

- Metalloproteases (collagenases etc)
- Serine protease (u-PA etc.)

Protein Degradation

- Tissue inhibitors of metalloproteases (TIMPs)
- Serine protease inhibitors

Normal Healing

- Haemostasis
  - Platelet aggregation factor release
- Early Inflammation
  - Neutrophil accumulation and decrease
- Late Inflammation
  - Monocyte/Macrophage accumulation and decrease
- Granulation tissue formation
  - Fibroblast/Endothelial cell proliferation
- Extracellular matrix formation
- Re-epithelialisation
  - Keratinocyte proliferation & migration

Compromised wound

- Chronic Inflammation
  - Infection / Bacterial colonisation
  - Inappropriate macrophage & lymphocyte populations
  - High protease levels
  - Inappropriate growth factors/cytokines
- Granulation Tissue Formation
  - Continuing fibroblast proliferation
  - Inappropriate ECM
- Endothelial cell proliferation
- Tortuous blood vessel formation
- Degraded extracellular matrix
- Re-epithelialisation
  - Defective / inhibited keratinocyte migration

Assessment

What to Assess

- The patient
- The wound
- The environment

(Bale & Jones)
The Wound
• Type
• Location/position
• Grading/classification
• Wound dimensions
• Condition of surrounding skin

Wound Assessment
• Nature of wound exudate
• Amount of wound exudate
• Amount of odour
• Amount of pain/ discomfort

Infection- Key Points
• The development of a wound infection is dependent on the pathogenicity and virulence of the micro-organism and the immuno-competency of the host
• The host-pathogen interaction does not always lead to disease
• Microbiological assessment alone is not a reliable method for diagnosing wound infection.
Infection

- Contaminated
- Colonised
- Critically colonised
- Infected

The following criteria were considered common to all wound types:

- Cellulitis
- Malodour
- Pain
- Delayed healing
- Deterioration in wound/wound breakdown
- Increase in exudate, except in acute wounds (healing by primary intention) and burns (full thickness)

(Cutting et al, 2005)

The Dilemma of Dressing Selection

- Hydrofiber
- Enzymatic
- Hydrocolloid
- Hydropolymer
- Alginate
- Speciality
- Antibacterial
- Antiseptic
- Polyurethane
- Foam
- Hydrogel
The ideal wound dressing should keep the wound:

- Moist but not macerated
- Non-adherent
- At the optimum temperature
- Undisturbed by frequent dressing changes
- At the optimum PH value

(Thomas, 1990)

The Dilemma of Dressing Selection

Choosing the right dressing

- Wound aetiology
- Wound bed condition
- Fluid production
- Dressing characteristics
- Cost
- Efficacy
- Patient preferences
- Competency

Silver

- Broad spectrum antibiotic
- Action related to amount and rate of silver released
- Impair bacterial cell respiration and function
- “Global influence on healing”
- Newer slow release formulations favoured

(Landsdown, 2005)
The Dilemma of Dressing Selection

Silver
Three forms of silver dressings:
• Silver released into the wound bed
• Absorb wound fluid and silver works within the dressing, or absorb wound fluid and release silver into wound
• Release silver sulphadiazine into wound

(Landsdown, 2005; White, 2003; Sibbald, 2003)

The Dilemma of Dressing Selection

Ideal Silver Dressing
• Low solubility, provides sustained release
• No substantial chemical reactivity of the silver with exudate
• Have an odour control function
• Local concentration adequate

(White, 2003)

The Dilemma of Dressing Selection

Iodine
• Povidone iodine
• Cadexomer iodine - hydrophilic beads of cadexomer-starch
• Toxicity related to iodine availability
• Newer formulations have lower concentrations but maintain efficacy

(Drosou et al, 2003; Cooper, 2004)
**The Dilemma of Dressing Selection**

**Iodine**
- Release sustained low concentrations of free iodine
- Has multiple cellular effects, inhibits bacterial proliferation
- Broad spectrum of activity against bacteria, mycobacteria, fungi, protozoa and viruses

(Drosou et al, 2003; Cooper, 2004)

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**The Dilemma of Dressing Selection**

**PHMB**
- Polyhexamethylene biguanide (PHMB), also known as polyhexanide and polyaminopropyl biguanide
- Is a commonly used antiseptic
- A review of the literature demonstrates in-vivo and in-vitro safety and effectiveness of PHMB for a number of applications
- An example of such a dressing is Suprasorb X + PHMB is an antimicrobial dressing for critically colonized and infected wounds

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**The Dilemma of Dressing Selection**

**Larvae**
The main effect of the larvae is in their ability to serve as efficient scavengers, removing dead or necrotic tissue without destroying living tissue
The Dilemma of Dressing Selection

Larvae

- Secrete proteolytic enzymes
- Kill bacteria in their gut due to acidic protein
- Secrete allantoin and urea
- Secrete ammonia and calcium carbonate

(Thomas et al, 1997)

The Dilemma of Dressing Selection

Honey

- High osmolarity
- Alters wound PH
- Has anti-inflammatory effect due to antioxidants
- Generates hydrogen peroxide at low levels stimulates angiogenesis & fibroplasia

(Molan, 1999)

We discussed...

- Wound repair
- Assessment
- Infection
- Dressing selection
- Cases
MANAGEMENT OF ACUTE AND CHRONIC WOUNDS TO PREVENT INFECTION

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