Research by George Winter in 1962 changed the way that both acute and chronic wounds are managed in modern healthcare. He proved that wounds kept moist would heal up to 50% faster than those left dry and so the development of advanced dressings began. His research, and much that has followed not only confirms that a moist wound healing environment supports the healing process, but it actually reduces the risk of complications and scarring.

The drive for better wound care
As our care standards, medicine and resources have advanced then so has our lifespan as humans. With this comes an increase in the incidence of chronic non-healing wounds which include leg ulcers and pressure sores associated with compromised circulation and coexisting disease. There are now over 200,000 people affected in the UK at any one time and with cases being typically managed over months and years the drain on the resources of the NHS is enormous. Accomplishing annual costs in excess of £3.4 billion per year in management research has naturally been driven towards finding the fastest possible route to wound closure both through optimal healing and a reduction in the need for unnecessary, and costly dressing changes. Being that our animals heal similarly to us and may face similar challenges with problem wounds, the advances made to improve rates of healing in human wound care and the products developed to achieve a moist wound healing environment are equally applicable in veterinary medicine.

The healing process and the ideal wound healing environment
The healing process and the ideal wound healing environment are equally applicable in veterinary medicine. The healing process and the ideal wound healing environment are equally applicable in veterinary medicine. Once debridement has been achieved the natural moisture in wounds is present in the form of wound exudate and provides an essential transport medium for cellular activity and chemical messengers. However, too little exudate will reduce the efficacy of the healing process by reducing the exposure of the wound to oxygen, nutrients, and growth factors. Too much exudate will reduce the efficacy of the healing process by increasing the moisture and temperature of the wound, which can lead to infection and delayed healing.

The ideal wound healing environment is a moist, clean environment that promotes the growth of healthy vascular tissue and the production of granulation tissue. This environment is essential for the production of new skin and the healing of wounds.

Table 1. The normal healing process

<table>
<thead>
<tr>
<th>Dressing Type</th>
<th>Management Aim</th>
<th>Absorb</th>
<th>Hydrate and protect</th>
<th>Maintain a moist, clean environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absorbent</td>
<td>Debride</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moist</td>
<td>Debride</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry</td>
<td>Debride</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wet</td>
<td>Debride</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As a principle, moist wound healing is now readily accepted as the optimal environment for normal healing processes to occur once debridement has been achieved. The natural moisture in wounds is present in the form of wound exudate and provides an essential transport medium for cellular activity and chemical messengers. However, too little exudate will reduce the efficacy of natural processes while too much contributes to maceration and deterioration of the surrounding wound tissue causing healing delay.

References
1. Winter, G. Formation of the scab and the rate of epithelisation of superficial wounds in the skin of the young domestic pig. Published in Nature 193:293. 1962
5. Haimowitz JE, Margolis DJ; Moist wound healing, in Krasner D, Kane D (eds); Chronic wound care; supplement) :12S-14S
Moist Wound Healing and Advanced Wound Care

### The ideal wound dressing:

The ideal wound dressing provides a sustained effect that improves healing. It should:

- Enable efficient macrophage activity and chemotaxis.
- Aid autolytic (natural) debridement through hydration of eschar.
- Reduce pain at the wound site.
- Avoid elevation of infection rates.
- Support epithelial and deposition of extracellular matrix.
- Prevent cellular dehydration and death.
- Smooth, smoother pathway for faster epithelial migration leading to reduced scar tissue formation.
- Reduced recurrence of inflammation due to cell death.
- Improve tissue integrity (improved elasticity and tolerance to trauma).

Further benefits should also be incorporated into the dressing, to include reducing the need for frequent dressing changes and reduction of trauma on removal. This is especially true when using products during the proliferative phase of healing where new fragile epithelium and granulation tissue should be preserved by changing dressings as infrequently as possible.

A comparison of ideals is shown in Table 3.

### Factors that are out of the control of the clinician may include:

- Those related to disease and medication, tissue deficit, and non-compliance.
- Although moist wound management will help maintain a healthy wound bed, healing by second intention is not always the fastest route to closure.

Dressings are no substitute for re-constructive work where healing delay is as a result of considerable tissue deficit or tension across margins or bony prominences. In any wound that fails to heal as expected contributing factors need to be identified, and despite the temptation to resort to novel and expensive products that make dramatic healing claims, when faced with a problem wound the optimal wound environment is still the best route to healing.

### Conclusion:

- Not all traumatic wounds present with simple closure options and as such a period of open wound management is not unusual once debridement has been achieved. In an effort to encourage a healthy bed of granulation over a wound bed, either for surgical closure or closure by second intent, it is essential to appreciate the moist wound healing principle and the products that are required to achieve balance through absorption or hydration. Modern wound dressings including the Vygon range have been developed with this in mind.

- Designed to help clinicians fine tune the wound environment dressings should not only maintain moisture at the wound bed, they should be painless to apply and remove, and should remain viable over an extended wear time when required. When used correctly advanced dressings not only encourage rapid healing, but have the potential to reduce not just pain, but the number of visits and anaesthetics required to get a wound healed. As clinicians this not only helps us heal wounds quicker, but lowers risk and significantly improves the overall patient experience.

#### Table 2. Benefits of moist wound healing following initial ligation and débridement

<table>
<thead>
<tr>
<th>Benefits</th>
<th>During Inflammation</th>
<th>During Granulation</th>
<th>During Epithelialisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disable inflammation</td>
<td>Reduce infection rates</td>
<td>Supports chemotaxis and deposition of extracellular matrix</td>
<td>Reduce scar tissue formation</td>
</tr>
</tbody>
</table>

#### Table 3. The ideal wound dressing:

<table>
<thead>
<tr>
<th>Dressing Ideals</th>
<th>Gauze</th>
<th>Dry dressings ep. Melolin/ Primatepor</th>
<th>NU-GEL®</th>
<th>NU-GEL® sheet</th>
<th>TIELLE® Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moist environment at wound interface</td>
<td>Maintains moist environment</td>
<td>Absorbs excess moisture</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Remove excess exudate without allowing “wicks through” to surface of dressing</td>
<td>Absorbs moisture</td>
<td>Absorbs excess moisture</td>
<td>N</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Act as a barrier to micro-organisms</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Be non-toxic, non-allergic and non-sensitising</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Be non-adherent and atraumatic on removal</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Leave no foreign particles in wound</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Offer thermal insulation to the wound bed</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Reduces nerve endings reducing pain at the wound site</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Allow gaseous exchange</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
</tbody>
</table>

#### Dressing for absorption and secondary layers: TIELLE® and TIELLE® PLUS:

Wounds with moderate to high exudate should be managed with a foam dressing that has the capacity to hold exudate for up to three days wear such as TIELLE® or TIELLE® PLUS. Wounds of this type include wounds where dressings are wet or saturated on removal after only a few days wear, as well as drain sites and draining sinuses. A gel should only be required if the wound contains stubborn sloughy material that requires softening for removal at the next dressing change.

#### How can you tell if the dressing is not the right one for your wound?

- If the dressing has stuck to the wound during wear and is difficult to remove without pulling healthy tissue with it, then the wound environment has become too dry.
- Either the dressing type should be reviewed, more hydrogel should be used or a less absorbent secondary layer should be chosen.

- If the dressing is soaked, strike through is visible, or the wound margins and surrounding tissue appears oedematous and plump, then the wound environment is too wet. A dressing with greater capacity for absorption such as TIELLE® PLUS will be required.