The use of Flivasorb® in highly exuding wounds

Martin Tadej

Abstract
Exudate can be an excellent indicator of what is happening within a wound and, therefore, provides valuable information during patient assessment. The volume, consistency, and particularly odour and colour, of any exudate will inform the practitioner about bacterial contamination, infection and stage of healing (Hampton and Collins, 2003). However, in the chronic wound, exudate must be effectively managed if the optimal moist environment necessary for wound healing is to be created, the negative effects of chronic exudate on fibroblasts are to be avoided (Phillips et al, 1998), and the surrounding skin protected from the risks of maceration (White, 2006). It is, therefore, important to understand chronic exudate and its effects so that appropriate treatment for the wound and peri-wound area is provided. Flivasorb® (Activa Healthcare) dressings, which include superabsorber particles, can absorb the exudate and retain it firmly within the dressing, ensuring that the potentially damaging chronic wound exudate does not reflect back onto the wound, causing maceration. This article will describe the role of exudates in wound healing, the problems associated with chronic wound exudates and how Flivasorb dressings with superabsorbent particles can provide an optimum healing environment in highly exuding wounds.

Key words: Chronic wounds  ■  Exudate  ■  Flivasorb  ■  Superabsorbent particles  ■  Wound healing

Wound exudate is a generic term given to fluid produced from chronic wounds, fistulae or acute injuries once haemostasis has been achieved (Thomas, 1997). It is formed when red cells and platelets have been filtered out of blood as it passes through capillary walls (Thomas, 1997). If there is an injury, the vessel walls dilate due to the production of histamine and exudate increases. Exudate closely resembles blood plasma and fluid leaks from capillaries into body tissues at a rate that is determined by the permeability of the capillaries and the pressures (hydrostatic and osmotic) across the capillary walls. The relationship between the factors that determine how much fluid leaks out is known as Starling’s hypothesis. In general, the majority (about 90%) of the leaked fluid is re-absorbed into the capillaries. The small amount that is not re-absorbed is returned to central circulation via the lymphatic system. As a result, in normal venous return, the leakage from the capillaries is balanced by the re-absorption and drainage of fluid (Folestad et al, 2007).

This changes when the valves in the veins cease to function effectively and oedema can occur as the extracellular system becomes flooded with fluid. This leads to poor nutrition in the tissues and low oxygen levels and can be directly responsible for tissue breakdown. Once a wound occurs, the fluid in the tissues will leak out into the wound bed, forced by the hydrostatic pressure in the veins – the only way of reversing this is through compression therapy.

There are several factors involved in the production of wound exudate (Table 1). Exudate in the acute and healing wound can have many effects:

- Metalloproteinases found in exudate break down collagens and help to remodel the extracellular matrix in healing (Vickery, 1997)
- A moist wound environment promotes healing (Winter, 1962)
- Fibroblasts grow faster in exudate (Vickery, 1997)
- Exudate contains growth factors that promote tissue regeneration (Kreig and Eming, 1997)
- Exudate facilitates the migration of cells involved in tissue repair
- Exudate acts as a transport medium for white cells
- Staphylococci easily replicate in exudate (Vickery, 1997)
- High exudate production can equal low serum proteins
- Patients may consider exudate ‘dirty’ or the odour may be offensive. It may limit social life
- Exudate requires a large amount of nurses’ time for changing dressings
- Exudate is associated with skin maceration (Kreig and Eming, 1997)
- Bacteria in the exudate can be proteolytic, which delays healing and damages peri-wound areas
- Exudate assists in the process of autolysis (Dealy, 1997)
- Exudate contains neutrophils and is, therefore, antibacterial in nature.

Therefore, in the healing wound, exudate appears to promote healing in a number of ways, including stimulating cell proliferation. Matrix metalloproteinases (MMPs), which break down the cell-supporting extracellular matrix, are present mainly in an inactive form (Folestad et al, 2007).

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Table 1. Factors involved in exudate production

<table>
<thead>
<tr>
<th>Factor involved</th>
<th>Outcome</th>
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<tbody>
<tr>
<td>Hydrostatic pressure</td>
<td>Increased pressure within the capillaries will open the junctions between the vessel cells, increasing the fluid loss</td>
</tr>
<tr>
<td>Wound infection and wound colonisation</td>
<td>Bacteria can also influence the production of exudate by causing an increase in capillary permeability</td>
</tr>
<tr>
<td>Temperature</td>
<td>Causes vasodilation and an increase in fluid loss from the capillaries</td>
</tr>
<tr>
<td>Wound type</td>
<td>Leg ulcers will have increased fluid loss due to the dependency of the limb</td>
</tr>
<tr>
<td>Type of dressing</td>
<td>‘Wet’ dressings will increase the fluid in the wound</td>
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</table>

The optimal level of wound exudate required to facilitate healing has not yet been determined (Cutting, 1999). It remains unclear whether moisture is actually a prerequisite to wound healing as Winter’s work (1962) on the moist wound was performed on epithelialising tissue, not a full thickness, highly exuding wound (this seminal research was confirmed by Hinman and Maibach (1963) and the concept of moist wound healing is now commonly accepted by clinicians (Seaman, 2002)).

However, there has never been an adequate definition of a moist wound and there is little information available on how much fluid needs to be in a wound bed for it to be called moist. It may well be that the fluid produced, moment by moment, within the wound bed and soaked into the dressing, is sufficient to promote wound-healing and the term ‘dry dressing’ may be a misnomer when this fluid exchange is constantly taking place.

In the chronic wound, exudate contains proteolytic enzymes and other components not seen in acute wounds (Vickery, 1997) – proteases, from proteolytic enzymes, can be responsible for damage to the skin surrounding the chronic wound (Cameron and Powell, 1996) (Figure 1). Proteases can also destroy new fibroblasts and delay healing further (Phillips et al, 1998). Exudate then becomes a shared problem between nurse and patient and can be particularly difficult when peri-wound areas deteriorate because of exudate ‘overspill’ and protease damage (Hampton and Collins, 2003).

**Flivasorb**

A vital element of wound healing is the control of exudate to ensure that the ideal wound environment (a wound that is moist but not wet (Benbow, 2008)) is maintained, particularly if the surrounding skin is to be protected from the risks of maceration and breakdown (Figure 1). Flivasorb® (Activa Healthcare) absorbs any exudate and holds it within the centre of the dressing without the potential for reflection of fluid back onto the skin. The wound contact layer of the dressing is a smooth polyethylene, which reduces the possibility of wound adherence. Above this is a polypropylene layer, which facilitates the even distribution of absorbed exudates into the absorbent core. The next layer is the absorbent cellulose core, containing super-absorbent polymer (sodium polyacrylate) particles with the capacity to absorb very large amounts of exudate. The top layer is a non-woven polypropylene layer, which prevents leakage of the absorbed fluid onto clothing.

The excellent absorptive properties of Flivasorb ensure that a moist but not macerated wound bed is an achievable aim, while reducing the number of bacteria and, subsequently, proteolytic enzymes, that will be held in the central core (Figure 2). Absorbing these damaging proteolytic enzymes may help to improve the imbalance between the number of bacteria and proteolytic enzymes and consequently promote wound healing while reducing the potential for maceration and infection.

The flat edges of Flivasorb also conform to the skin, making it more comfortable for the patient when under compression as there are no hard dressing edges to press into the skin.
These liquid-binding polymers (super-absorbing particles: SAP) are used in many applications where efficient fluid uptake and retention are required and these characteristics are very appropriate in this indication. The polymer network structure retains liquids permanently inside the dressing and hardly release it, even under compression – this makes it especially useful where re-wetting would cause problems (Steinlechner et al, 2008).

Also, because Flivasorb binds the exudate to the centre of the dressing and does not reflect it back onto the skin, there is a greatly reduced potential for maceration. This makes Flivasorb very cost effective as there is a reduced need for dressing changes.

However, unlike some absorbent dressings, Flivasorb does not rapidly draw exudate into its central core. Therefore, due to this longer absorption time, the potential risk of associated pain is reduced. The absorption capacity of Flivasorb, which contains superabsorbent polymers, is more than twice as high as that of traditional absorbent dressings that have a cellulose core.

Case study
This case study features a 58-year-old obese woman who had some difficulty mobilising, but still worked in her own florist shop. She referred herself to the Wound Healing Centre with a venous leg ulcer.

She had suffered with bilateral leg ulcers for many years and in this case a Doppler showed an ABPI of 0.9. The wounds were particularly difficult to treat because they would not tolerate compression – she also found many dressings extremely painful. The wound on her right leg was almost circumferential (Figure 3) and caused her a lot of pain – this meant that the nurses could manage the symptoms but had difficulty providing active treatment leading to healing. The wound was constantly sloughy and extremely malodorous suggesting colonisation of bacteria and a constant bio-film, although there were no signs of clinical infection.

Flivasorb was chosen because multiple treatments had been used in the past and the wound never progressed to healing. The aim was to keep her comfortable and reduce the obvious colonisation of the wound in the hope that it would reduce the pain and she would be able to tolerate full compression. Figure 4 shows the wound after three weeks treatment with Flivasorb and there is a cleaner and less shiny wound bed, suggesting that the bio-film has been reduced. The absorbent action of the dressing and its ability to ‘hold’ the fluid without reflecting it onto the wound meant that bacteria was also absorbed and not released. After four weeks, the slough was 80% reduced and was no longer malodorous (Figure 5).

In this case, Flivasorb was used as a secondary dressing at the beginning of the treatment and primary dressing once the slough was reduced. Figure 6 demonstrates how the wound exudate is absorbed and retained in the dressing core.

Conclusion
The new Flivasorb dressings, with superabsorbent polymers, are a genuinely useful alternative in the treatment of wounds.
Exudate can be an excellent indicator of what is happening within a wound and, therefore, provides valuable information during patient assessment.

The volume, consistency, and particularly odour and colour, will inform the practitioner of bacterial contamination, infection and stage of healing.

However, in the chronic wound, exudate must be effectively managed if the optimal moist environment necessary for wound healing is to be created, the negative effects of chronic exudate on fibroblasts are to be avoided and the surrounding skin protected from the risks of maceration.

It is, therefore, important to understand chronic exudate and its effects in order that treatment for the wound and peri-wound area is appropriate.

Flivasorb®, with its superabsorber particles, can absorb this exudate and retain it firmly within the dressing, ensuring that the potentially damaging chronic wound exudate does not reflect back onto the wound, causing maceration.

This article describes the role of exudates in wound healing, the problems associated with chronic wound exudate and how Flivasorb, with its superabsorbent particles, can provide an optimum healing environment in highly exuding wounds.