The Humeca skin graft mesher

and V-carriers
Humeca introduces a new range of grooved skin graft carriers for expansion and perforation, called ‘V-carriers’.

The symmetrical V-shaped groove pattern of these carriers prevents unwanted sideward movement of the carrier in the mesher during cutting. The standard length of these carriers is 280 mm (11.0 inches), which is more than the standard length of existing carriers.

Furthermore care has been taken to ensure that the groove pattern of a carrier connects exactly to that of another one. This enables cutting of extra long graft strips without any disturbance of the mesh pattern in the graft.

All V-carriers are compatible with the newly developed Humeca® skin graft mesher. V10-type carriers are also compatible with Zimmer® meshers and V15-type carriers are compatible with Aesculap® / B.Braun® meshers.

V-carriers are available for expansions 1:1.5 and 1:3, used for conventional skin meshing, where the expansion of the graft surface is the main goal.

For larger expansion ratios Humeca developed the modified MEEK technique. This technique enables the application of small (3x3 mm) square grafts and expansion is realized by unfolding prefolded gauzes. Especially in severe burns the MEEK technique should be the method of choice because of faster epithelialization, more efficient use of skin (better graft take and smaller donorsites), easier handling of the graft and better final results.

In addition to the V-carriers for expansion, Humeca introduces a new type of a meshgraft carrier that only perforates the graft without the intention of expanding it: the 1:1 V-carrier.

Perforations in a graft are intended to achieve sufficient drainage of the wound bed in case full sheet grafts are used, in order to prevent the occurrence of seroma or haematoma under the graft.

Full sheet grafts are frequently applied when skin grafting is required in cosmetically sensitive body parts, such as the face, the neck and the dorsal aspect of the hands, in order to avoid the appearance of an unaesthetic mesh pattern.

The development of the Humeca® V-carriers for skin grafting was sponsored by the Dutch Burns Research Institute (BRI) in Beverwijk, The Netherlands.

Additional support was given by the Red Cross Hospital, Beverwijk, The Netherlands.

The 1:1 perforation V-carrier was developed and clinically tested in cooperation with the burn centre of the University Hospital of Gent, Belgium.
Skin grafting is a well-known means of reconstructing a skin defect. Because a wound is re-epithelialized from the edges towards the centre, the perimeter of the graft is the only part that contributes to the epithelialization process. Expansion techniques are used to speed up that process. An expanded graft presents a larger cumulative perimeter through which epithelial outgrowth can proceed. Besides, with graft expansion, larger areas of skin defects can be covered with smaller sections of graft.

One of the most popular expansion techniques, widely used in burn surgery, is the meshgraft method, introduced by Tanner and Vandeput in 1963.

Meshing a graft gives it a three-dimensional flexibility that enables it to conform to irregular and concave surfaces. The slits in the graft allow sufficient drainage of fluid. At moderate expansions the results of the meshgraft technique are quite satisfying.

Humeca supplies V-carriers for meshing grafts with an expansion ratio of 1:1.5 and 1:3.

At larger expansions however, the graft becomes more fragile and difficult to handle. Draping it correctly (dermal side down) on a wound bed without damaging the mesh structure becomes increasingly difficult at larger expansion ratios.

Besides epithelialization might be delayed due to the large distances the new epithelium has to grow. For such cases the MEEK technique is more appropriate.
V-carriers for perforation

The Humeca® V-carrier 1:1 is intended for perforation purposes, without expansion.

Why perforations?
Perforation is frequently applied when sheet skin grafts (either split-thickness or full-thickness) are used. Sheet grafts are perforated for the following reasons:

- **Drainage**
The slits in the graft allow adequate drainage of fluid. Drainage prevents separation of the graft from its wound bed by haematoma or seroma. Sheet grafts are often used on the face and hands. It is however these two sites that have an extremely vascular bed, making the chances of the appearance of haematoma higher. Collection of fluid under a graft is said to be one of the major causes of graft loss. Consequently perforation leads to increased graft survival.

- **Improved cosmetic results**
Expanded meshed grafts are frequently criticised because of the poor appearance of the residual mesh pattern, making surgeons reluctant to consider this technique. By using a 1:1 mesh, where the graft perforations are narrowed to slits instead of holes, it is possible to prevent such a pattern to appear and get results similar to a sheet graft. It is also reported that a perforated graft gives a more matt appearance than the shiny surface of a sheet graft, which makes it more suitable when grafting the forehead.

- **Infection control**
To reduce infection occurrence.

Methods to perforate grafts
One of the simplest methods often applied in the operation theatre is piercing a sheet graft with a scalpel blade by hand. This can be done either by piercing the graft directly or by placing a piece of graft on a grooved meshgraft carrier and cutting it with a scalpel at right angles to the grooves. These methods are labour intensive, and often the number of slits is insufficient to guarantee enough drainage. Nevertheless the method seems adequate in case of small grafts.

Another way of perforating is to use a 1:1.5 meshed graft without expanding it. After all theoretically the holes in the graft remain slits when the graft is not expanded. However it appears to be very difficult to apply such a graft to the wound bed without disturbing the pattern of slits. During transfer of the graft to the wound, due to internal friction the slits will become holes anyway and ones this occurs it is almost impossible to regain the original shape of the graft. So this method is not recommended when the final results of the perforated graft should be comparable to the results of a sheet graft.

Another attempt for perforation was described in 1986 by Davison et al. and it was called ‘sideways meshing’: a grooved meshgraft carrier is cut into pieces and the pieces are turned 90°, covered with a graft and then passed through the mesher in that sideward direction. Cutting the carriers in pieces however is cumbersome and it limits the length of the graft (max. length equals the width of the carrier).

The pictures on the next page show some applications of perforated sheet grafts.
The picture on the left shows grafts on a hand.

The fingers were covered with full sheet grafts that were not perforated.

The occurrence of haematoma and seroma under these grafts, due to insufficient drainage, can clearly be recognized.

In such areas contact between the grafts and the underlying tissue will be insufficient and consequently graft take will be low.

The lower left picture shows a graft on a foot.

Before applying the graft, it was perforated with a Humeca® V-carrier 1:1.

Drainage of fluids through the slits in this graft is clearly visible.

This drainage enables optimum contact between the graft and the underlying tissue.

As a result graft take is expected to be better compared to full sheet non-perforated grafts.
V-carriers: features

- Compatible with existing Zimmer® and Aesculap®/B.Braun® meshers
- Symmetrical V-pattern of grooves prevents sideward movement
- Standard length 280 mm (11.0”), width 78.8 mm (3.1”)
- Expansion ratio 1:1.5 and 1:3
- Special carrier available for 1:1 perforation (drainage) of sheet grafts
- Groove patterns of carriers connect to each other
- Highly flexible medical grade polypropylene material
- Individually sterile packed in peel pouch; standard boxes 10 pcs.
- Attractively priced

V-carriers: ordering information

V10 type carriers are to be used in the Humeca mesher and Zimmer meshers.
V15type carriers are to be used in the Humeca mesher and Aesculap / B.Braun meshers.

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<th>Code</th>
<th>Description</th>
<th>Box Quantity</th>
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<td>V15-3.0/10</td>
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<td>box 10 pcs.</td>
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</tbody>
</table>

Another example of a graft, this time meshed on a 1:3 Humeca® V-carrier.
In addition to the V-carriers, Humeca developed a mesher to complete the product line for meshgrafting.

The Humeca® mesher is provided with a unique spring mechanism that prevents the blades from excessive pressure on the carrier during cutting. Due to their production process (injection molding) all meshgraft carriers have inevitable variations in thickness. When the thickness of a certain section of the carrier exceeds the maximum distance between the blades and the lower roller, the pressure exercised by the blades on the carrier surface will increase exponentially. Such high pressure manifests in increased friction and in the end it will damage the blades. On the other hand the mesher might not cut the graft completely at a thinner section of the carrier. To avoid such undesired phenomena, Humeca provided the mesher with springs that can meet with thickness variations in carriers. The springs can be adjusted in two positions: one for the V10 and one for the V15-type of V-carriers.

During cutting the carrier is guided both at the left and the right side to assure straight movement and exact connection of the grooves of a second carrier if applied.

Unlike most conventional meshers, where the carrier is moved through the device by means of intermittent pulling a ratchet, the Humeca® mesher is driven by the continuous rotation of a handle. A gearwheels set limits the required force. The rotation makes meshing procedure less time consuming and the design is far more ergonomic.

Mesher: ordering information

- 6.HM01 Humeca mesher.
- 6.KN50/36 Cutting axis with 50 blades Ø 36 mm.
- 6.BLHM01 Circular blade, Ø 36 mm.
- 6.HMAC01 Autoclave case for Humeca® Mesher
- 6.HMAC02 Autoclave case for the cutting axis of the Humeca® Mesher
Humeca BV

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