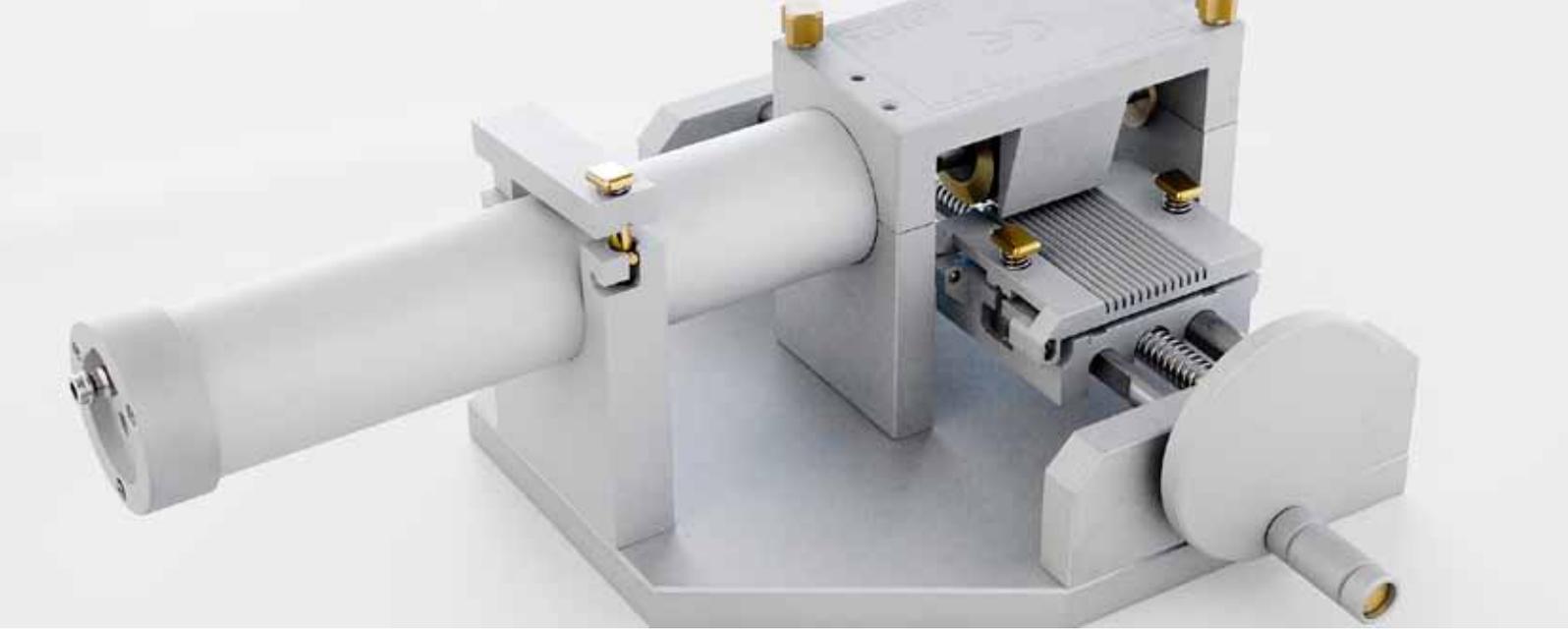


humeca

Meek

SKIN TRANSPLANTATION TECHNOLOGY



M E E K

M I S S I O N

Our mission is to provide medical experts with materials and equipment for optimum treatment of their patients and to offer them the highest level of support and service. Our goal is continuous improvement of our products, the source of which we believe is intensive communication with experts in the field.



THE MEEK TECHNIQUE

In 1958 a remarkable technique for expanding autografts was described in a publication by the American surgeon C.P. Meek^{1,2}. With a so-called 'MEEK-WALL' dermatome postage stamp autografts were obtained and expanded using double pleated gauzes. In this way a regular distribution of autograft islands was achieved with a ninefold expansion. This technique however required too much skill and it became eclipsed by the introduction of mesh skin grafts (Tanner et al.) in 1964. Eventually production of the MEEK-WALL dermatome and pre-folded gauzes was discontinued.

However, lack of autograft donorsites is increasingly encountered as a limiting factor in achieving wound closure in case of extensive skin defects. The meshgraft technique requires donorsites of suitable size and shape and epithelialization may be delayed in case of expansion ratios greater than 1:4. Besides, widely expanded meshed autografts might become too fragile and unmanageable.

In cooperation with surgeons of the Red Cross Hospital Beverwijk, Humeca re-designed the MEEK technique. Imperfections of the original method were overcome. A sprayable adhesive was introduced and the prefolded gauzes are now manufactured with expansion ratios of 1:3, 1:4, 1:6 and 1:9.

The clinical results with this modified MEEK technique, as first described by Kreis et.al.^{3,4}, are excellent. Graft take appears to be superior to other methods, especially in problematic zones and in case of qualitatively inferior wound beds. Only very small donorsites are required. Any small piece of patients skin can be used. The graft islands are close together in a regular pattern. Epithelialization and hospitalization times are reported to be shorter compared to the meshgraft method⁷. As the graft islands are not mutually connected, failure of a few islands does not necessarily affect the overall graft take. Cosmetic results are reported to be comparable with those obtained with meshed autografts of a lower expansion. The method appears to be a simple technique to achieve a regular distribution of postage stamp grafts, correctly orientated to the wound surface.

Encouraging results are reported in combinations of the MEEK technique with dermal generating templates, like Integra^{®14,15}) and with sprayed cultured autologous keratinocytes²⁵).





A 42x42 mm (1.65x1.65") cork plate...



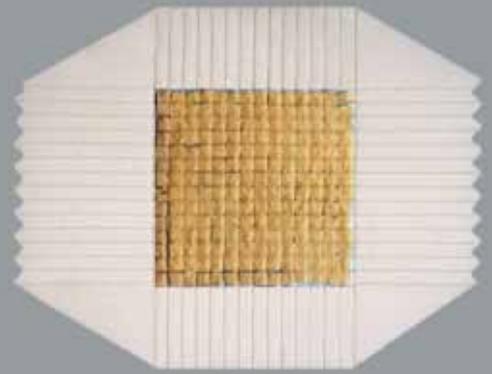
is covered with a piece of split skin autograft



Also small graft pieces can be used



The graft is cut into 196 3x3 mm squares



After the epidermal side of graft is sprayed with an adhesive, the graft is transferred to a prefolded gauze

MEEK SURGERY

At operation wounds to be grafted are excised down to the underlying fascia and haemostasis is secured. A square piece of cork measuring 42x42 mm (1.65x1.65") with thickness 2.5 mm (0.1") is covered with a split skin autograft, dermal size down. Smaller graft remnants are also suitable by placing them on the cork plate like a 'puzzle'. The cork, covered with graft, is then placed in a special MEEK cutting machine.

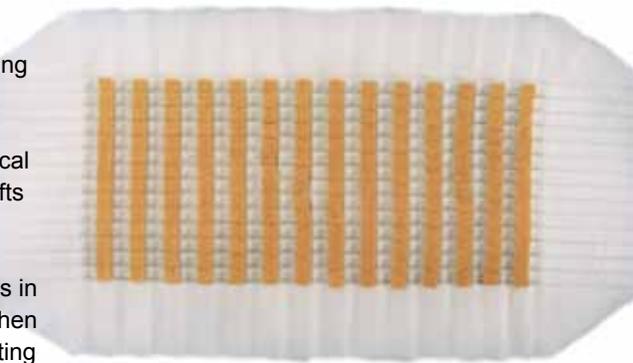
The machine contains 13 parallel circular blades. The cork plate with the graft on it is passed through the machine, where the rotating blades cut through the graft, but not through the cork. Thus the graft is cut into 14 stripes, 3 mm (0.12") wide. After the first pass, the cork is rotated 90° and passed through the machine once more, thus cutting the graft into 14x14 = 196 square pieces measuring 3x3 mm (0.12x0.12").

The upper (epidermal) surface of the graft is then sprayed with an adhesive dressing spray and allowed to dry and become tacky. The cork plate, covered with graft and adhesive is then pressed onto a prefolded polyamide gauze, which is folded on an aluminium foil backing into 14x14 square pleats, the size of which corresponds to the size of the cuts in the graft. Then the cork is gently removed, leaving the graft islands adhering to the gauze. The gauze is pulled out by firm traction on all four sides, until the pleats become completely unfolded. Finally the aluminium backing is peeled off,

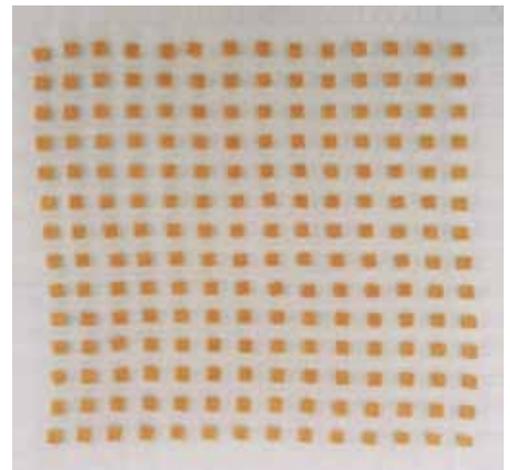
to leave the expanded gauze with the separated adherent autograft islands ready for transplantation.

After trimming the margins, or folding them double down, the gauze is applied, graft side down, to the wound bed and secured with surgical staples. After about 6 days the grafts have grown sufficiently into the wound bed to allow removal of the gauze, leaving the autograft islands in situ on the wound. The grafts are then covered with a non-adherent sheeting to prevent any movement during daily dressing changes. After a further 5-6 days the sheeting is removed. Daily dressings are continued until epithelialization is complete.

Only in cases of a large expansion factor (1:9), it is recommended to cover the MEEK grafts with an overlay of allografts, meshed 1:1.5 (a procedure called 'sandwich grafting'). At lower expansions ratio, the use of allografts is not necessary. Alternatively cultured autologous keratinocytes can be applied to accelerate wound closure at large expansions.



Expansion is realized by unfolding the gauze, first in one direction...



... and then in the other direction



Cork plates are covered with autografts



Gauzes 1:9 applied to the back of a patient



Gauzes being removed 6 days post grafting



Gauzes removed



Result shortly after complete epithelialization

DONORSITE AREA

In 1988, R. Peeters and A. Hubens of the Stuivenberg Hospital, Antwerp, Belgium, proved that the actual expansion ratio of a meshed graft is much less than the given one⁵⁾. They compared the expanded graft surface area to the original non-expanded graft surface area.

Based on their findings we calculated the graft surface area required to cover a 100 cm² (0.11 ft²) burn wound with a meshed graft and compared it to the area required when using the MEEK technique.

The result is shown in the graph. The vertical axis represents the graft surface, while the horizontal axis shows the expansion ratio.

Conclusion

The MEEK technique (with true expansion ratios from 1:3 to 1:9) requires only about half of the graft surface compared to the meshgraft method.

Consequently, in comparison with the MEEK technique, the application of widely meshed grafts requires more grafting procedures in case of severe burns. A high graft take, less spillage and a better principle of expansion contribute to the overall opinion that the MEEK technique is the most effective way to deal with the patients' skin. In an overall view, the MEEK method turns out to be less time consuming than meshing, especially in case of large burns²¹⁾.



Burn on a shoulder, gauzes 1:6 applied

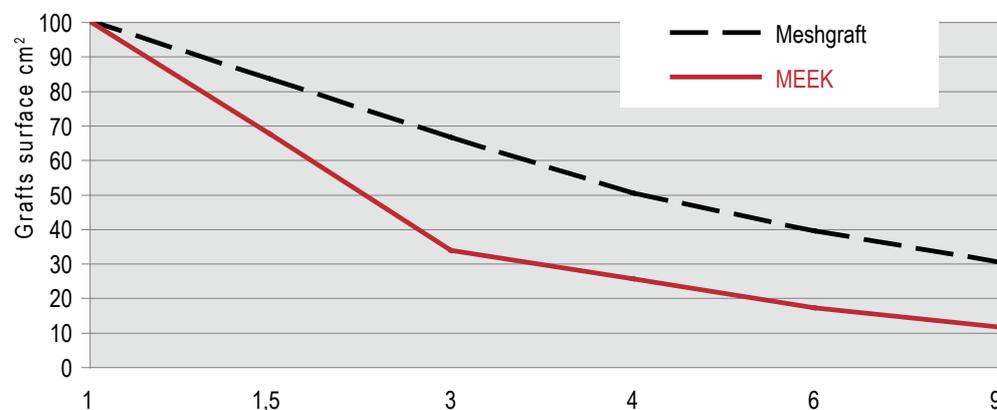


Same burn, 6 weeks post burn
White spots indicate anti-bacterial cream



Same burn, 6 months post burn

Graft surface required to cover a 100 cm² (0.11 ft²) burn





Axilla and upper arm 21 days post burn, before operation



Gauze applied to the wound (upper arm)



Gauze secured with staples

MEEK CASE

By dr. A.W.F.P. Vloemans, surgeon at Red Cross Hospital Beverwijk, The Netherlands

An 84 years old woman was admitted in our burns centre because of a burn wound she sustained in the kitchen. While taking a kettle from the gas stove her nightgown caught fire. At first she did not notice, but after a while she saw her clothes burning. She put out the flames and cooled the burns under the shower.

On admission we saw a healthy obese woman with burns at the right upper arm, axilla and thorax. The total body surface area burned amounted 11%; about 9 % full thickness. The borders between full thickness and partial thickness were not sharp.

The medical history recorded insulin dependant diabetes and a stroke. As medication she also used acetylsalicylic acid.

Topical treatment consisted of daily application of Silver Sulfadiazin 1% cream dressings. Resuscitation was applied by means of an isotonic saline solution and fluids ad libitum. Insulin medication was continued based on blood sugar levels and also treatment with acetylsalicylic acid was continued.

As an early tangential excision was expected to cause a great blood loss and as the distinction between partial and full thickness was not clear, a secondary excision and grafting after healing of the partial thickness burns was performed.

Operation took place on post burn day 21; five days earlier treatment with acetylsalicylic acid was discontinued. The wound bed consisted of granulation tissue and remainders of necrotic dermis. Debris was excised using a dermatome. Haemostasis was performed by means of the application of an adrenalin solution to the excised wound bed.

A thin split thickness skin graft was harvested from the right upper leg. Ten MEEK gauzes 1:6 were prepared and applied to the wound. After fixation with staples the wound was covered with gauzes soaked in a silvernitrate solution. The donorsite was dressed with polyurethane foam dressing.

After 6 days the MEEK gauzes were removed from the wound. The graft take appeared to be about 80%.

Two weeks after the first operation, parts of the wound where the graft had not taken because of insufficient excision at the first operation, were excised again and grafted with MEEK gauzes 1:4. Parts of the wound with a good graft take, but insufficient outgrowth of epithelium were also re-grafted.

After the second operation only minor defects remained, requiring only daily application of a topical antibacterial dressing. Five weeks post burn the patient was released from hospital.



Gauzes and parts of gauzes on the wound



Initial result after the first transplantation



Re-grafting: a gauze is cut into pieces to graft smaller areas on the thorax



Standard hand driven MEEK machine with single cutting block



Motor driven MEEK machine with block shape motor



Motor driven MEEK machine with cylindrical shape motor

MEEK PRODUCTS

Cutting machine

The cutting machine contains 13 circular blades mounted on a cutting axis. The cork plate with the graft is placed in a cutting block that moves under a bridge during cutting. Both the drive of the blades and the drive of the cutting block can be performed by pneumatic motor or by hand.

The motor drive of the blades is exchangeable with the hand drive and both can be supplied as separate sets. The drive of the cutting block is not exchangeable; it is either motor driven or hand driven. The hand drive of the cutting block can be provided with gearwheels for faster run of the block. For pneumatic drive a pressure of 5-7 bar (72-100 psi) is required.

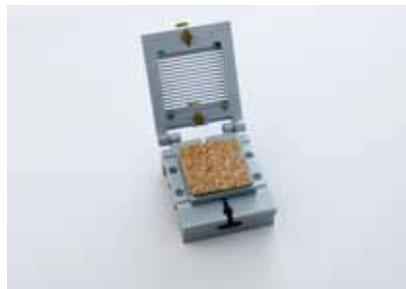
The blades are coated with a durable, wear resistant ceramic layer. The cutting axis can simply be replaced. Individual blades can also be replaced.

The machine is supplied with a single or a double cutting block. The double cutting block enables simultaneous cutting of two cork plates. Single and double blocks are exchangeable.

The machine is entirely steam sterilized, except for the motor. A sterilization case is available.

Gauzes

The pre-folded MEEK gauze consists of an aluminium backing and a polyamide fabric, slightly adhering to each other. After expansion the aluminium foil is disposed of, while the fabric with the grafts is applied to the wound. Each gauze is supplied with a 42x42x2.5 mm (1.65x1.65x0.1") cork plate and sterile packed in a peel pouch. Standard packages are 10 and 40 pieces in a box. Available expansion ratios are 1:3, 1:4, 1:6 and 1:9.



Single cutting block



Double cutting block



Serrated wedge ('cam')



Adhesive spray



Separate hand drive set 8



MEEK prefolded gauze with cork plate

Adhesive dressing spray

The adhesive is a spray bottle with a content of 200 ml (6.8 fl.oz). One bottle is enough to spray 200-250 gauzes.

Ordering information

Ordering info for all Humeca® products can be obtained from page 11 of this brochure.



Motor driven MEEK machine –
automatic version with two motors

MEEK FEATURES

- Very small donorsites
- Large expansion ratios (up to 1:9) possible
- Any small skin fragments can be used; no long strips required
- Graft islands are close together in a regular pattern, resulting in fast and uniform epithelialization
- All graft islands are correctly orientated (dermal side down) on the wound bed, resulting in excellent graft take
- Failure of a few islands does not affect the overall graft take
- Actual expansion ratio equals theoretical expansion ratio
- Cosmetic results are comparable with meshgrafts of a lower expansion
- Grafts adhere to a fabric and are therefore very easy to manipulate when applying them to the wound

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For ordering, please contact your local dealer. You can find dealers via the link in www.humeca.nl
 If Humeca has no dealer in your territory, please contact Humeca for inquiry, preferably via email info@humeca.nl

In order to provide Humeca quickly with brief and most adequate information and to assure soonest reply, the preferred method is to fill in the contact form that is displayed when using the contact link in the Humeca site www.humeca.nl

Humeca is a small organization with short communication lines. This allows very quick response and a high level of service.
 In case of ordering or request for quotation, please refer to the article codes given below.

ORDERING INFO

MEEK MICROGRAFTING

Equipment

3.HD/BLO	MEEK cutting machine, hand driven (block model) without cutting block
3.HD/CYL	MEEK cutting machine, hand driven (cylindrical model) without cutting block
3.MD/BLO	MEEK cutting machine, motor driven (block model), without cutting block
3.MD/CYL	MEEK cutting machine, motor driven (cylindrical model), without cutting block
3.MD/GW	MEEK cutting machine, motor driven, gearwheels, without cutting block
3.MD/AUT	MEEK cutting machine, automatic version (two axis motor driven)
3.BL38	MEEK circular blade, diameter 38 mm (1.50"). Required blade diameter depends on serial number machine
3.BL39	MEEK circular blade, diameter 39 mm (1.54"). Required blade diameter depends on serial number machine
3.CA01	MEEK cutting aid 41x41 mm (1.61x1.61")
3.CB01	MEEK single cutting block with cork holder
3.CB02	MEEK double cutting block with two cork holders
3.CH01	MEEK cork holder
3.CP4	MEEK pneumatic foot pedal with connectors and hose
3.GWS	MEEK gearwheel drive set
3.KN13/38	MEEK cutting axis with 13 ceramic coated circular blades, diameter 38 mm (1.50")
3.KN13/39	MEEK cutting axis with 13 ceramic coated circular blades, diameter 39 mm (1.54")
3.MAC02	MEEK sterilization case 434x254x172 mm (17.1x10.0x6.8")
3.MAC03	MEEK sterilization case 180x51x45 mm (7.1x2.0x1.8") for the cutting axis of the MEEK machine
3.RM004	MEEK pneumatic block motor with connectors and coupling
3.087	MEEK cylindrical pneumatic motor 2M12
3.SHD	MEEK hand drive set
3.SW01	MEEK serrated wedge (cam)

Disposables

2.3/10	MEEK Micrograft gauze, expansion 1:3, with cork plate, box 10 pcs.
2.4/10	MEEK Micrograft gauze, expansion 1:4, with cork plate, box 10 pcs.
2.6/10	MEEK Micrograft gauze, expansion 1:6, with cork plate, box 10 pcs.
2.9/10	MEEK Micrograft gauze, expansion 1:9, with cork plate, box 10 pcs.
2.3/40	MEEK Micrograft gauze, expansion 1:3, with cork plate, box 40 pcs.
2.4/40	MEEK Micrograft gauze, expansion 1:4, with cork plate, box 40 pcs.
2.6/40	MEEK Micrograft gauze, expansion 1:6, with cork plate, box 40 pcs.
2.9/40	MEEK Micrograft gauze, expansion 1:9, with cork plate, box 40 pcs.
2.9190	Spray adhesive, bottle 200 ml (6.8 fl.oz).
2.JG598	STERILIT® oil for surgical instruments, bottle 50 ml (1.7 fl.oz).



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