



# The 3-Step Dressing System to Heal, Protect, and Restore Your C-section Wound

Novel Polyurethane Gel Material  
for Wound Healing and Scar Prevention

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## 01 Abstract

Mechanisms of hydration and occlusion are the main basis of the therapeutic action in treating hypertrophic scars and keloids (S. Y. Lin, 2001) .

Supporting on the wound skin was also an important factor for minimizing scars. Adequate adhesion and appropriate breathable materials were employed to design this new material. A new material for scar caring has been developed with hydrophilic polyurethane gel. Polyurethane gel (Motif Medical) was good performance at breathability, extensibility and not-irritating. Used in scar control to provide downforce, closing force and moisturizing.

A Series of in vivo tests showed hydrophilic polyurethane gel performed better than lots of products that commonly used in clinical, like steri-strip, polyurethane film and silicone patch in treating postoperative wounds and reducing scar generating. This study revealed that hydrophilic polyurethane gel was potential to become another good choice in treating postoperative wounds and scars.

## 02 Physical Properties

### Studies of Motif Medical and other products

Series morphological and physical properties studies were employed to estimate different materials as an ideal scar care dressing (Table 1).

The purpose of physical properties test is to digitize the most suitable conditions for skin and scar control. Adhesion affects the tightness between the dressing and the skin. Tensile strength and elongation shows fitness between materials and skin. Moisture vapor transmission rate (MVTR) tells us how much moisture can pass through the materials. Motif Medical PU gel have good fitness with appropriate adhesion and elongation. PU gel has similar MVTR to human skin.



(A) Elongation test



(B) No adhesive residue and harm

FIGURE 1

	PU Film	Motif Medical	Steri-strip	Silicone	Ref
INITIAL ADHESION (gf)	130	130	130	60	ASTM D2979
TENSILE STRENGTH (MPa)	2	3.5	13	3.0	ASTM D1000
MVTR (g/m <sup>2</sup> /24 hrs)	1500	500 ~ 700	1500	120	DIN EN 13726-2 skin: 400 ~ 600
ELONGATION (%)	150	200	10	100	ASTM D412 75

TABLE 1. PHYSICAL PROPERTIES OF WATERBORNE POLYURETHANE-UREA FOAM

# 03 Studies

## Study of hypertrophic scar in rabbit ear

In this study we used rabbit ear models for excessive dermal scarring which has some clinical and histological resemblance to human hypertrophic scar (Nabai, 2017). In this study, a common commercially available product PU film (Opsite), steri-strip and silicone gel sheeting was employed as a comparison group.

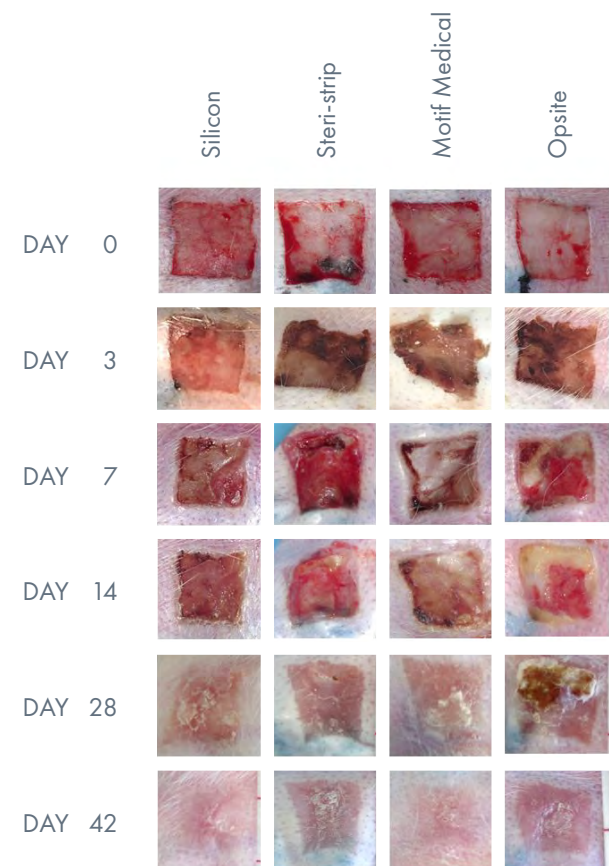
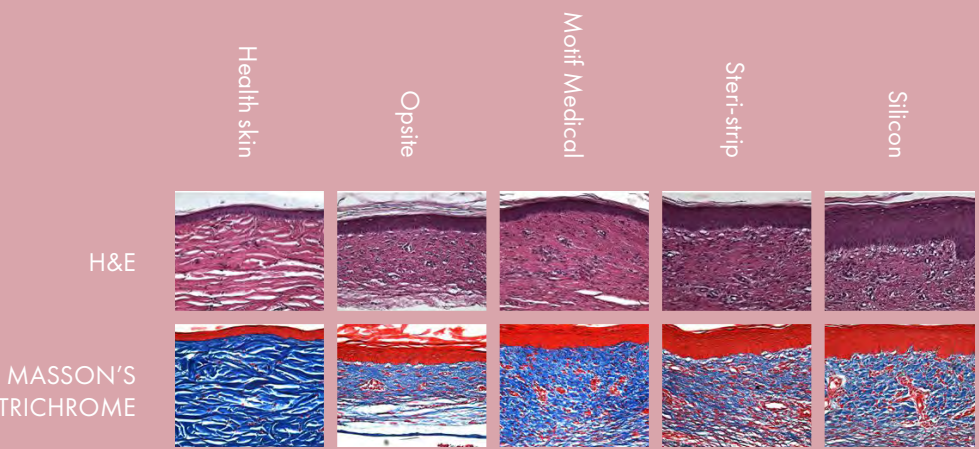


FIGURE 2. Entire or Whole appearance of the wound from day 0 to day 42 for the different treatment groups. Creating a full-thickness wound inside of rabbit ear covering with different dressing. Taicend PU gel shows good scar control than other

FIGURE 3. H&E staining of the wound sites showed the dermis layer of opsite was incomplete compared to other groups. Motif Medical group has less nucleus and thinner epidermis than steri-strip and silicone groups that entered a period of remodeling. Masson's trichrome staining also showed that Motif Medical group has less erythrocytes, and moved into the remodeling stage.

## 04 Conclusion

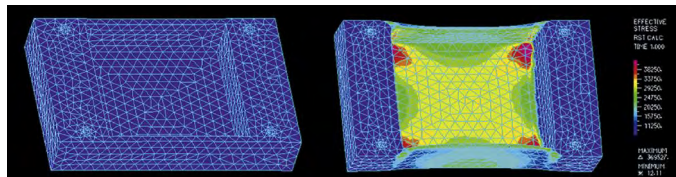
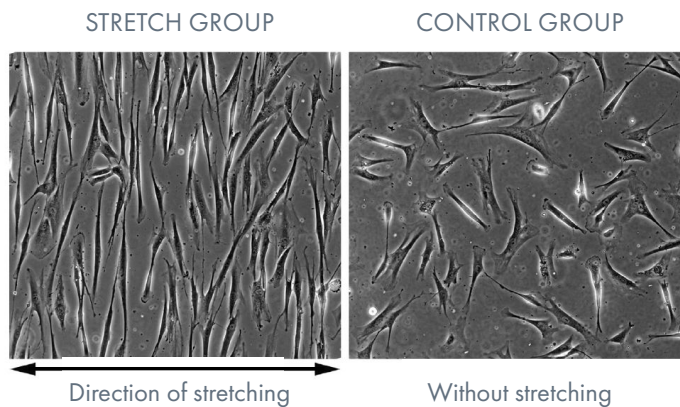
1. Motif Medical PU gel has good fitness with appropriate adhesion and elongation. PU gel has similar MVTR to human skin.
2. In hypertrophic scar models, Motif Medical PU gel shows good scar control than other products. The Histological sections of H&E and Masson's trichrome staining revealed that PU gel has less nucleus and erythrocyte, and moved into the remodeling stage.



## STAGE 2 PROTECT

# Surgical Hydrogel Patch

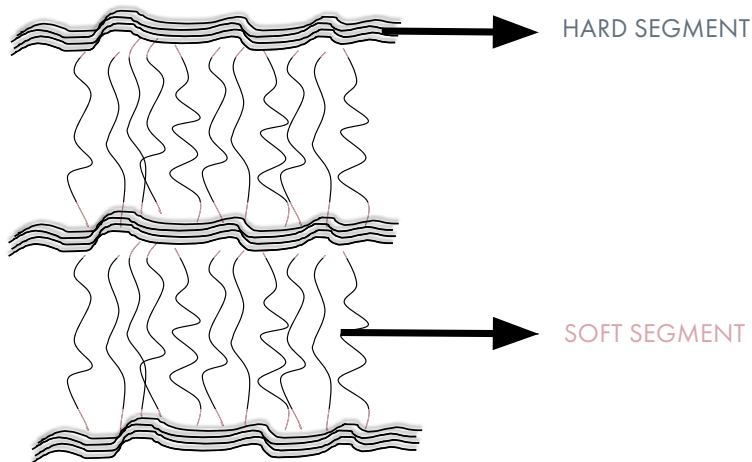
## Scar formation initial prevention



Providing closing force is one of the key points to prevent scars.

In previous study, use four fixators around to stretch fibroblasts, the data shows that fibroblasts are immediately arranged perpendicular to the stretching direction, and unstretched fibroblasts are randomly distributed. We found that fibroblasts will increase their migration distance and speed after mechanical force.

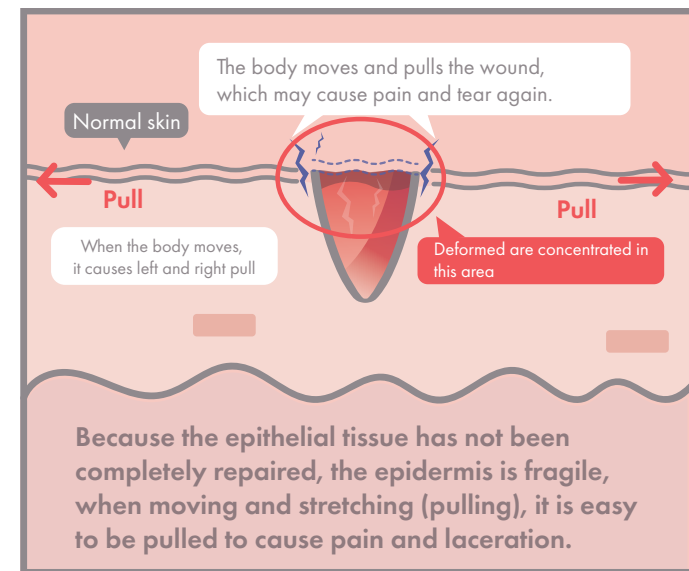
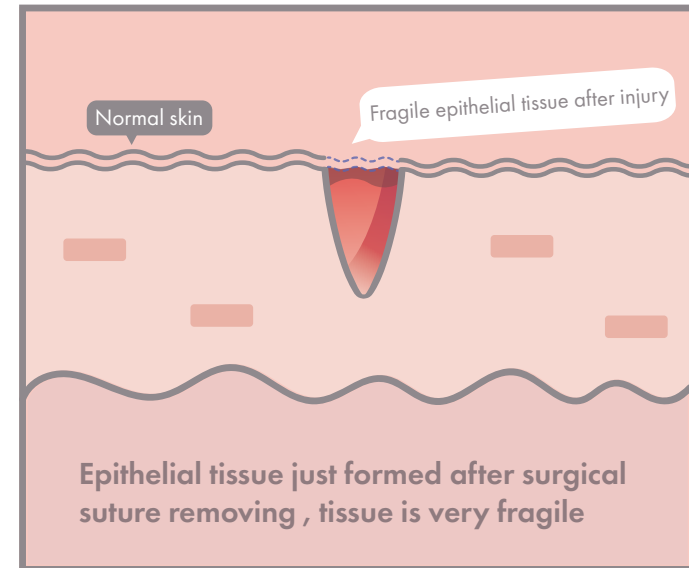
- *Journal of Plastic, Reconstructive & Aesthetic Surgery* (2013) 66 : e351-e361



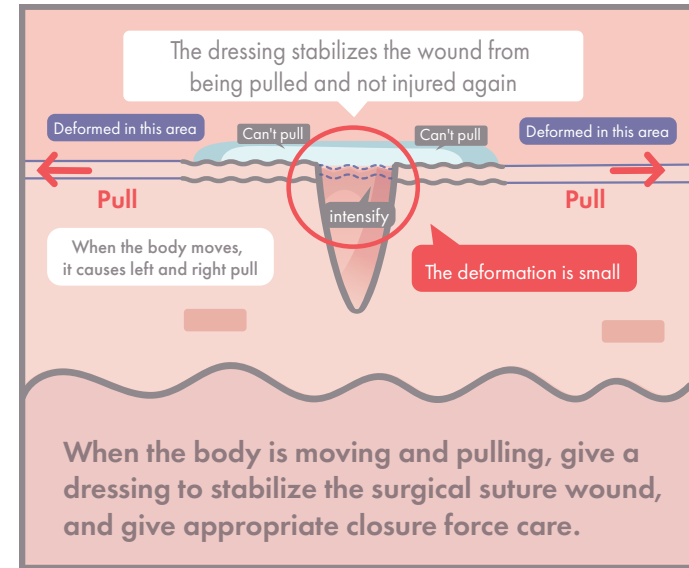
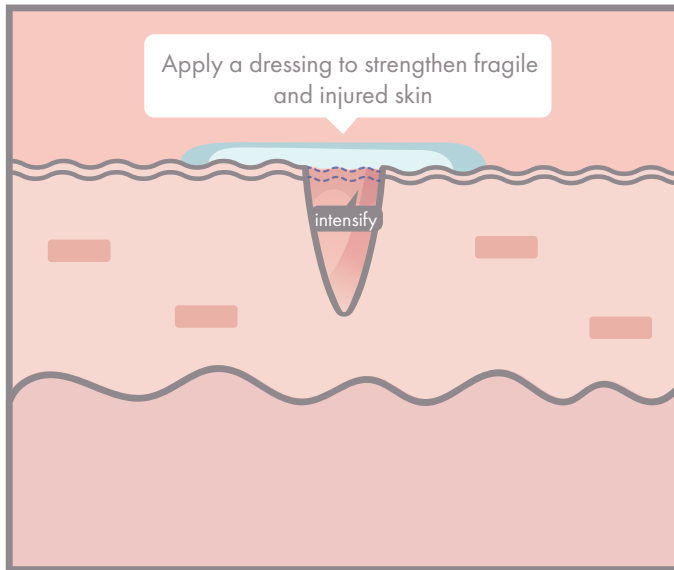
## STAGE 2

Mechanical tension around cutaneous wound impacts scar formation. When injured that tension causes the wound to splay open. Stage 2-Surgical hydrogel patch is designed to provide lateral closing force and dispersed tension. Stabilize scars to avoid being pulled and then repeatedly inflamed and hyperplasia.

### UNCOVERED WOUND



## WOUND COVERED WITH PROPER DRESSING



- Provide closing force by horizontal inward tension.
- Different chemical structures with high proportion of soft segments to increase fitness and elasticity. (Elongation=200%)
- Good breathability (MVTR=700 g/m<sup>2</sup>/24hr)
- Provide a humid and sealed environment



STAGE 3 PROTECT

## Scar Care Dressing

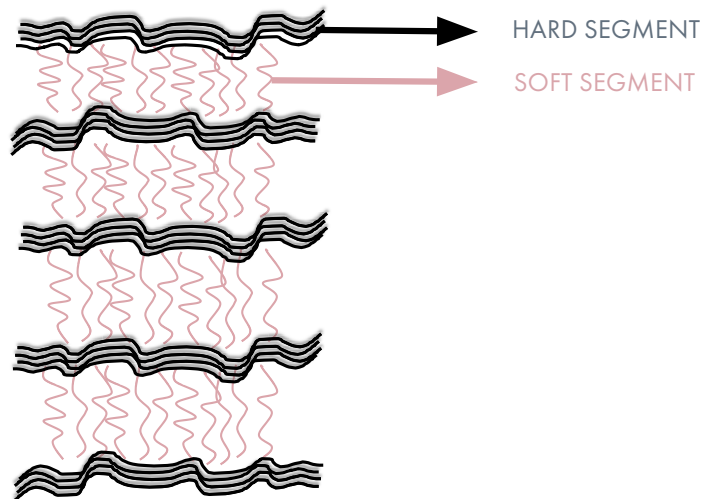
### Long Term Scar Prevention



Provide downforce to disperse high skin tension at the scar edge is the other key point to prevent scars.

The mechanical force distribution of keloid scar by finite element analysis showed high skin tension at the keloid edges. When the skin is stretched, high tension areas are developed on the junction between hard scar and soft healthy skin. Comparison between clinical appearance shows that inflammation is strong at the high tension area. In this area, angiogenesis and accumulation of collagen are accelerated. Tension is closely related to scar growth pattern and degree.

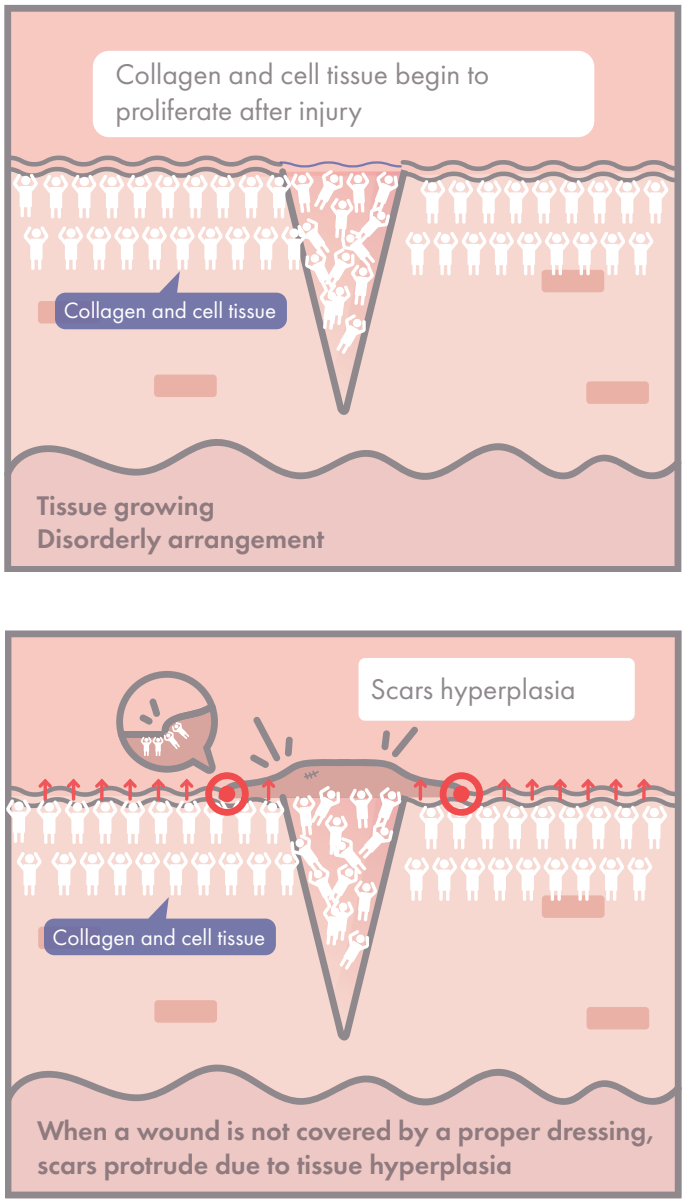
- *Experimental Dermatology* (2019) 28 : 464–471.



### STAGE 3

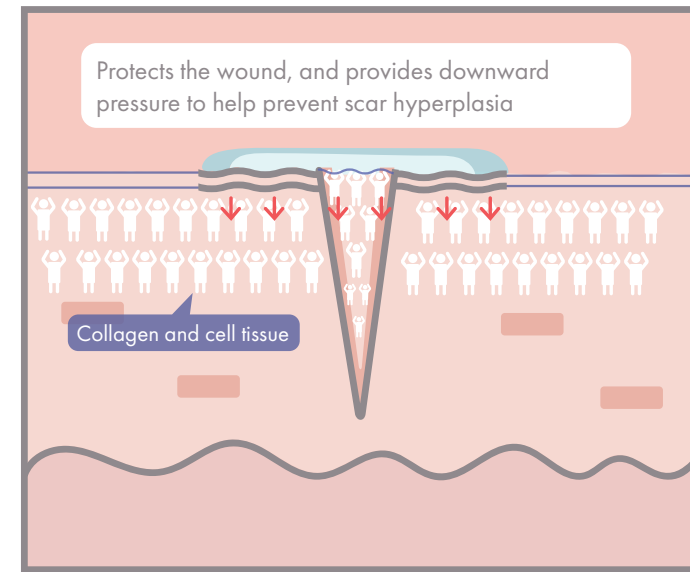
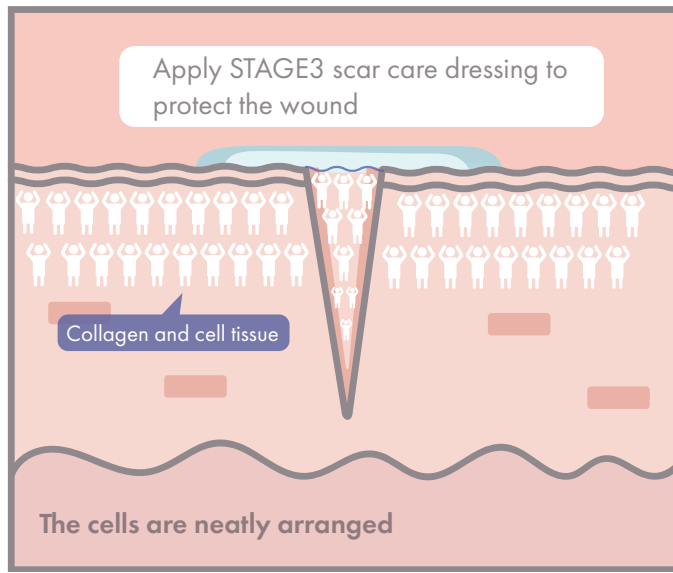
Scar care dressing is designed to disperse the pressure on both ends of the scar. Reduces tension at the scar junction, reduces inflammation and excessive collagen hyperplasia.

### UNCOVERED WOUND



## 05 STAGE 3

### WOUND COVERED WITH PROPER DRESSING



- Provide vertical downward force
- Different chemical structure: low proportion of soft segments to increase stiffness. (Elongation=150%)
- Low but non-infiltration breathability ( $MVTR=500 \text{ g/m}^2/24\text{hr}$ )
- Provide a humid and sealed environment



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