



GROA

THE SMART CHOICE OF HA DERMAL FILLR

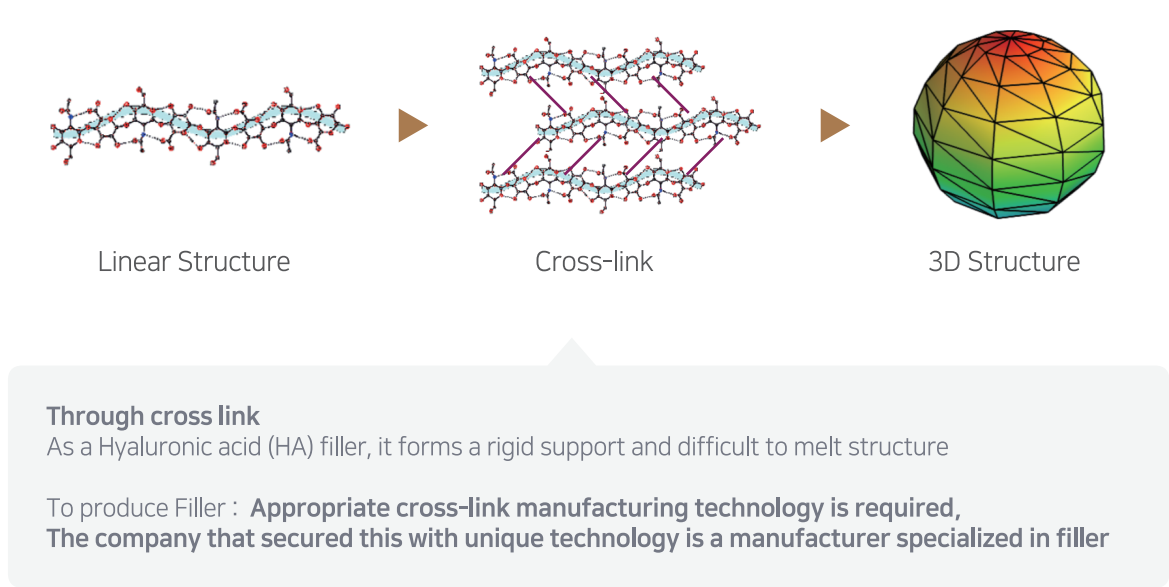


01

Hyaluroni Acid crosslinking technology

Filler structure is made through cross-link

If you do not cross-link hyaluronic acid, it will not be supported and maintained as a filler.



Hyaluroni Acid crosslinking technology

Pendant phenomenon in BDDE among crosslinking agents

Recently known problems with BDDE crosslinked products.

**Figure2.** When dissolved in water, hyaluronic acid (HA) behaves as a fluid, with excellent biocompatibility but poor mechanical properties (A). Modification of HA molecules by cross-linking improves mechanical properties by creating gels that have a firmer structure and are able to resist degradation (B). Modification does not necessarily cross-link HA to other HA molecules, resulting in a pendant cross-linker (C). Such structures often result in softer gels.

**Pendant effect**

- ▶ The phenomenon in which the crosslinks to be bonded on both sides are bonded only to one side  
Causes : increasing these factors
  - ① Increasing HA to increase viscosity
  - ② Increasing crosslinking efficiency
  - ③ Using higher MW
- ▶ Weakens long lasting of the filler
- ▶ Modifies HA and can cause side effects

**Many products that imitate BDDE technologyface Pendent problems**

ORIGINAL ARTICLES

**Comparative Physical Properties of Hyaluronic Acid Dermal Fillers**

JEFFREY KARLIK,\* GARY D. MOSHITT, MD,<sup>1†</sup> LIPING YU, PhD,\* GRACE CHANG,\* AND JULIA GERSHKOVICH\*

**Determination of modification degree in BDDE-modified hyaluronic acid hydrogel by SEC/MS**

Biao Yang<sup>a</sup>, Xueping Guo<sup>a,b,\*</sup>, Hengchang Zang<sup>a</sup>, Jianjian Liu<sup>b</sup>

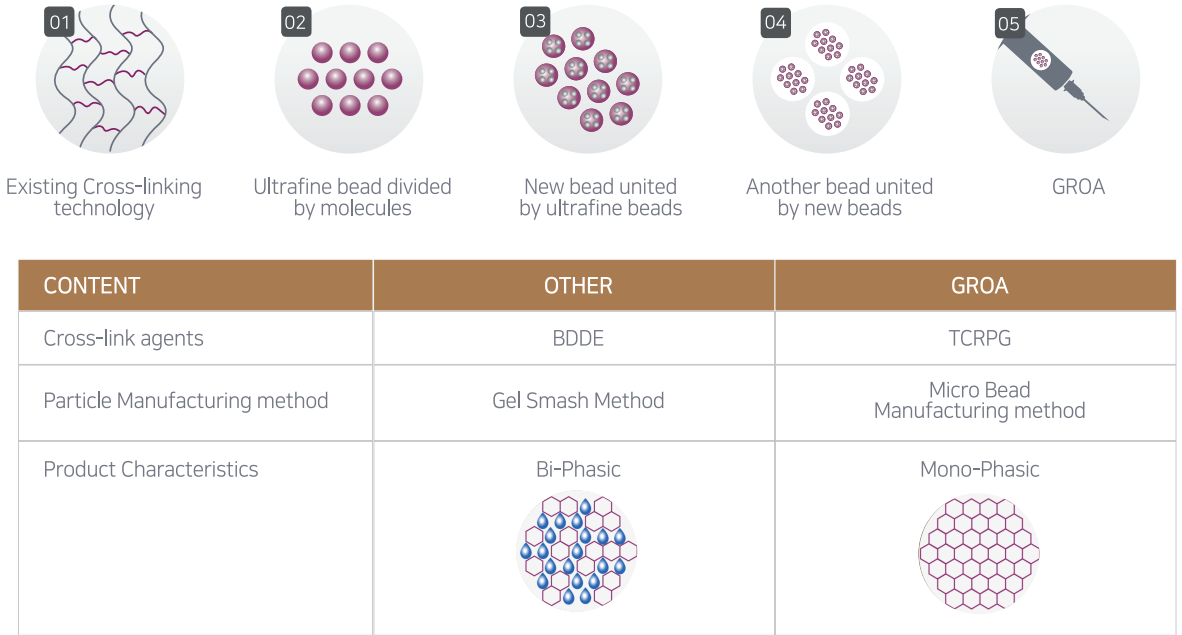
<sup>a</sup> School of Pharmaceutical Science, Shandong University, Jinan, China  
<sup>b</sup> Innochange Freida Biopharm Co., Ltd., Jinan, China

02

Hyaluroni Acid crosslinking technology

PCCL tecnology

Maximized the viscosity of the cross-linked HA by applying the patented 3-staged micro bead process.



Hyaluroni Acid crosslinking technology

Comparison of Cross Link Agent (BDDE Vs DVS)

If you do not cross-link hyaluronic acid, it will not be supported and maintained as a filler.

CONTENT	BDDE	TCRPG
Chemical Name	1,4-Butanediol diglyceryl ether	Divinyl Sulfone
Structure		
Molecular Weight (Dalton)	202.25	118.15
Molecule length (Ratio)	3 (lf)	1 (then approx. 1/3)
The number of atoms forming a bridge between HA molecules	14 units (Possibility of surplus atoms †)	5 units
Manufacturing characteristics	Easy to process / loose crosslinking	Process Difficult / Dense Crosslinking
Crosslinking degree	Due to incomplete crosslinking Pendent phenomenon occurs	Complete crosslinking
Cross-Link		



## 03 Quality Characteristic Great Moldability

GROA results in a superior outcome compared to other companies

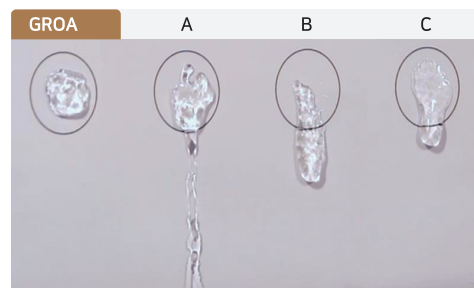


Photo of Viscosity test (after 4 mins, at 36.5°C) vertical Glass

It can be seen that the product has **excellent viscoelasticity**

**Does not flow down** by gravity after human injection

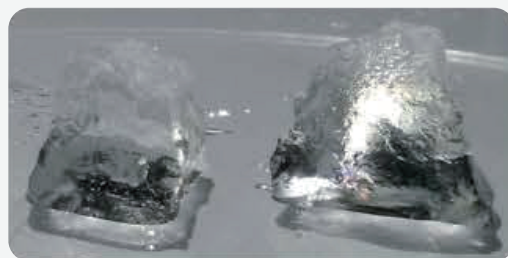
**Does not scatter or move down** due to massage

**It is a product that stays for a long time in the desired treatment area.**

Quality Characteristic

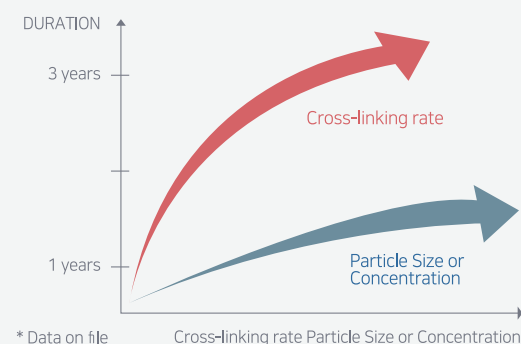
## Long lasting HA Filler? Patented PCCL\* technology

### GROA in Semi-solid Gel state



Possible to form the highest viscosity mass gel

### Longevity comparison graph



### Comparison to conventional products that claim to have produced a long lasting HA filler

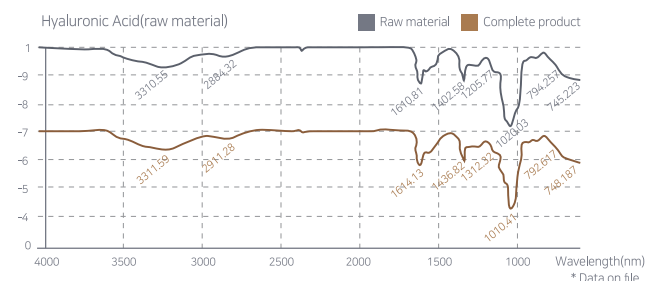
Most companies claim to have successfully manufactured a long lasting HA filler by increasing the cross-linking rate. However, due to limitations in the cross-linking technology these products instead have only increased viscosity and particle size, which does not contribute to a long lasting HA filler. Moreover, products that have only raised viscosity do not show good moldability.

\*PCCL : Multi Staged Crosslinking

## 04 quality characteristic Safe & Removable

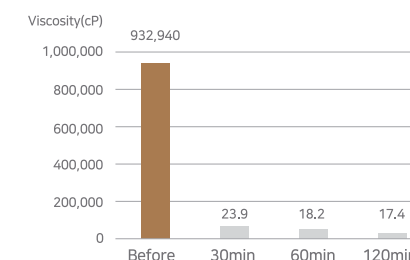
The product is safe with no chemical modifications in the HA, even after high cross-linking process.

### Refractive absorbance analysis



The wavelength pattern of GROA is the same as its raw material, showing that the product has not altered its physical properties.

### Hyaluronidase test

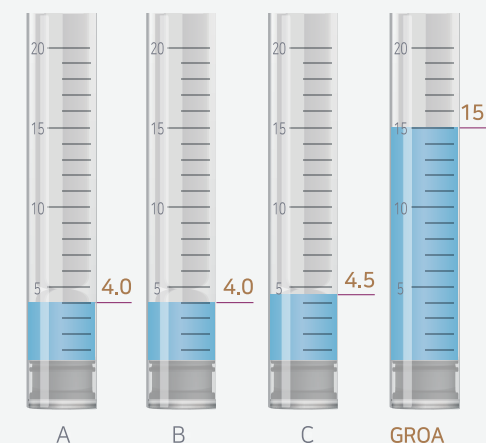


We can see how our product easily dissolves with hyaluronidase.

## 05 quality characteristic Superior hydrophilic capacity

Our product provides excellent volume effect through its high hydrophilic capacity and stable molecular structure even after high cross-linking rate.

### Comparison of moisture retention



Centrifugation at 3,000 rpm for 30 minutes  
(Status: 500cc of water added to a sample of 1cc)

- Shows higher volume effect compared to other fillers of same amount
- Excellent volumizing effect and easy molding even with a small amount



06

GROA  
Specification

UTW [Ultra thin wall needle] :  
The ultra thin wall needle has a larger inner diameter compared to regular needles.  
It improves flow rates and lowers extrusion force during injection.

Product	Cross-linking Level	Gel Texture	Concentration	Needle	Treatment Area
GROA FINE 	NON cross-linking		20 mg / ml (0.9% mannitol)	30G x 1/2" (13mm)	Frown Lines Lip Contour Crow's Feet Smile Lines Glabella Lines
GROA DEEP 	●○○○		20 mg / ml	27G x 1/2" (13mm)	Deep Facial Lines Lips Nose Nasolabial Folds Marionette Lines Mouth Frown Cheekbones
GROA VOLUME 	●●○○		20 mg / ml	23G x 1/2" (13mm)	Chin Augmentation Nose Bridge Chin Mid Cheek Malar Areas
GROA S 	●●●○		20 mg / ml	21G x 1/2" (50mm)	Hands
GROA H 	●●●●		20 mg / ml	18G x 1/2" (70mm)	Buttocks Calves Correction of Concave Deformities



07

GROA  
Product application part

GROA allows a precise procedure for specific areas, and ensures a safe and effective result.

