



GLUBRAN[®]2

The gentle power of a drop.

—
Class III medical device, synthetic,
CE certified for surgical and
endovascular use

GEM SOLUTION
COMES FROM
EVOLUTION.



Summary

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14	Biocompatibility
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GLUBRAN 2 / GENERAL INFORMATION

SUPPORTING THE SURGEON, WITH BETTER RESULTS FOR PATIENTS.

**25 years
sustaining surgery.**

The evolution of GEM derives from its continuing commitment to research and efforts to improve products and demonstrate their effectiveness and quality, not only through the contribution of our expert professionals, but also through clinical studies on the most innovative devices.

GENERAL SURGERY 37-84

CANCER SURGERY

61,64,66,69,73,74,82,84-86,89,94,97

UROLOGY 95-105

GYNECOLOGY 93,94,100

THORACIC SURGERY 85-92

NEUROSURGERY 20-21

DENTAL SURGERY 22,26,27,191,193,196

OTOLARYNGOLOGY 22-28

VASCULAR SURGERY

143,146, 154,162

PEDIATRIC SURGERY 29-36, 99

CARDIAC SURGERY 12-19

DIGESTIVE ENDOSCOPY 110-136

**INTERVENTIONAL RADIOLOGY
AND NEURORADIOLOGY**

3,6,77,87,110,118,121,125,134, 137-190





ADHESIVE

SEALANT

HEMOSTATIC

BACTERIOSTATIC

SCLEROSING

EMBOLIZING

A REVOLUTION, IN A DROP.

- **Versatile, polymerizes quickly in contact with tissue and in a moist environment** ^{59,98,100,159}
- **Creates a thin, elastic, breathable film, firmly adhering to tissues or prosthetic materials** ^{2,7,30,65,84,91}



UNIQUE FORMULA commercially available

A second generation product modified by the addition of a monomer

N-Butyl 2 Cyanoacrylate (NBCA)+ Methacryloxysulfolane (MS)

SIX PRODUCTS IN ONE DROP.

**SIX properties in ONE SINGLE product,
for over 80 surgical indications.**



ADHESIVE

High tensile strength: the minimum acceptable load is 435 N [approx. 18 kg/cm²]. ^{1,2,13,16}



SEALANT

Applied using dedicated nebulizers, it forms a thin film with sealing and waterproofing properties, thanks to its synthetic nature and high adhesive power. ^{2,27,30,64-68,77,88,91,106-108}



HEMOSTATIC

Reacts with blood, even when uncoagulated, inducing "mechanical" hemostasis at the site of bleeding. ^{7,62,63,95-97,116-119,121-127,131-134}



BACTERIOSTATIC

Inhibits bacterial proliferation for an average of 7 days. ^{1,5,7,10,11,28, 34,76,115}



SCLEROSING

Injected into the lumen of the vessel/varix, it polymerizes, generating local thrombosis and resulting fibrosis and sclerosis. ^{5,113,128-132,135}



LIQUID EMBOLIZING AGENT

Injected into the blood vessel it polymerizes, forming a tight-fitting mold to the walls of the vessel and occluding it. This generates a definitive occlusion, equivalent to a surgical ligature. ^{3,6,77,87,110,118,121,125,134,137-190}



**When it
makes a
difference.**

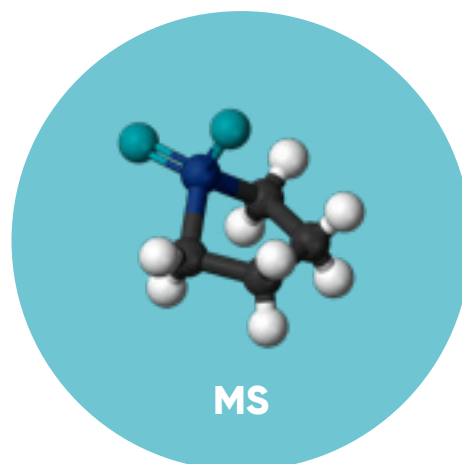
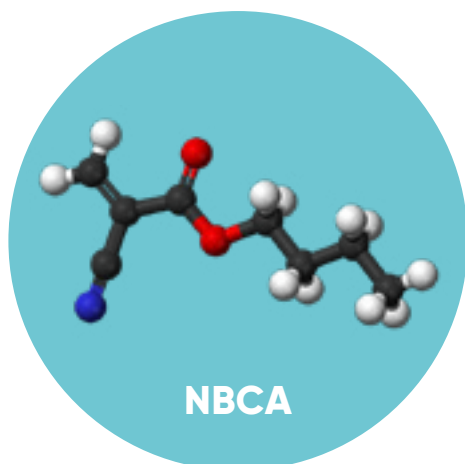


A GREAT ADHESIVE AND EXCELLENT BACTERIOSTATIC SEALANT.*

- It also interacts and reacts with liquids other than blood: serum, lymph, gastric and pancreatic juices, bile, saliva, urine.
- Reacts with blood, even when uncoagulated, inducing "mechanical" hemostasis at the site of bleeding . ^{63-84,95,98-109,197}
- Hemostasis is ensured, even in anticoagulated patients or in patients with hereditary coagulopathies. ^{103,143,146,161}

*1,2,5,7,10, 11,13,27,28,30,34,64-68,77,88,91,106-108,192

RELIABLE BIOCHEMISTRY.



Appearance

TRANSPARENT



Ready to use ^{1,7,35,37,196}



Does NOT polymerize in the presence of air ¹⁴²

Smell

**TYPICAL OF
CYANOACRYLATES**



Storage between +2 and +8 °C



**Can stay at room temperature (22.5+/-2.5 °C)
for 5 days** ¹

Density

SIMILAR TO WATER ¹



Effective in moist environment ^{1,59,98,100,159}

The advantages of MS:



Polymerization temperature:
45 °C, much lower than 80-90 °C
typical of pure monomeric
cyanoacrylates ^{6,8,59, 98,100,159}



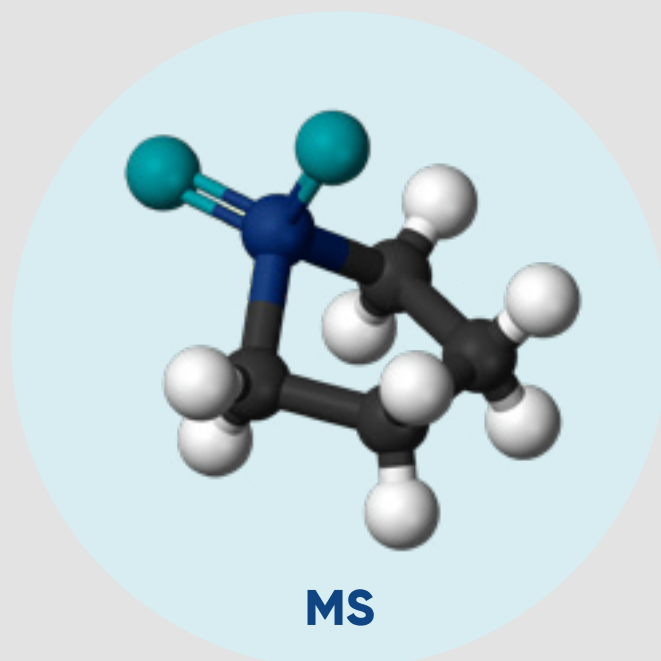
Biocompatibility ^{1,2,5,7,200}

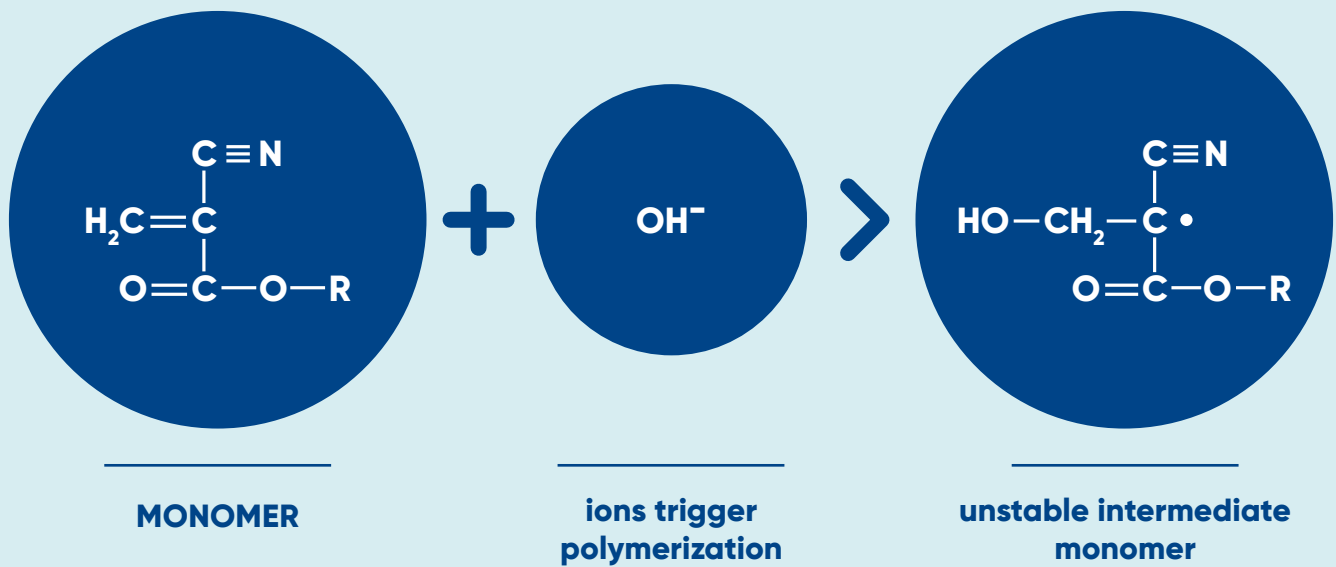


NO tissue necrosis ^{3,7,6,172}



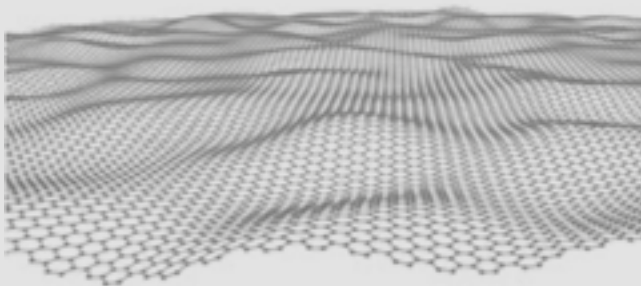
**Elasticity of the film at the end of
polymerization** ^{2,7,30,65,84,91}



POLYMERIZATION ^{192,194,198}

In:

- > Moist environments and tissues
- > BLOOD or OTHER BODY FLUIDS (serum, lymph, gastric or pancreatic juices, bile, saliva, urine)
- > Polymerizes after 1-2 seconds, complete after 60-90 sec



- > During polymerization a thin, elastic film is formed that adapts to the anatomy of the tissues. ¹⁰⁶⁻¹⁰⁸
- > At the end of polymerization, the surface of the film is no longer adhesive. ⁸

NOTE

Distilled water/glucose/mannitol do not activate polymerization ^{3,7,6,172}

The background is a solid teal color. In the center, there is a large, white, stylized water drop shape. Scattered throughout the teal background are numerous small, white, circular dots of varying sizes, some of which are partially covered by the white drop shape.

**Zero
residue,
zero traces.**

A BIODEGRADABLE FILM.

HYDROLYTIC DEGRADATION

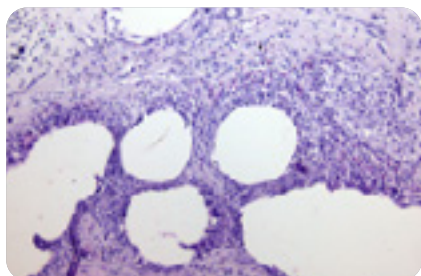
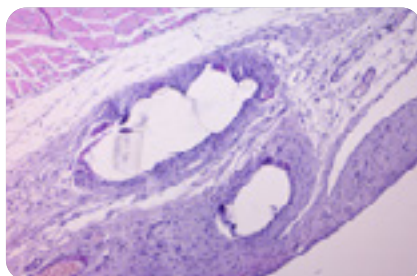
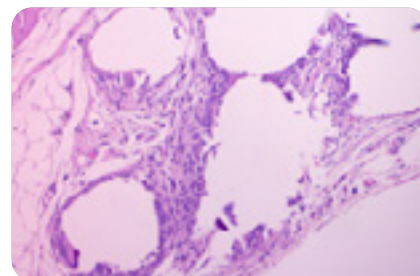
Carboxylesterases circulating in the blood BIODEGRADE Glubran[®] 2 by means of hydrolytic mechanisms, in a period ranging from 15 days to 6 months.

The degradation products are excreted from the body through the kidneys and pulmonary excretion.⁶⁵

In more vascularized tissues, elimination is faster.^{55,200}

Glubran[®] 2 does not stop the healing and tissue regeneration process.

The same newly formed tissue cells penetrate the film of Glubran[®] 2 and continue to colonize it and reproduce, until it is eliminated.^{55,200}

**7 DAYS****15 DAYS****30 DAYS**

Histological samples of abdominal wall cross-sections of rats undergoing hernia repair with prosthesis fixation using Glubran[®] 2. Interaction between prosthetic mesh fibers and host tissues at 7, 15 and 30 days after surgery (Modified by Poli et Al. 2019).²⁰⁰

A DROP OF SAFETY.*

BIOCOMPATIBILITY TEST ¹

- Cytotoxicity
- Genotoxicity
- Mutagenicity

TISSUE TESTS ¹

- Intracutaneous reactivity on rabbit
- Allergic sensitization on guinea pig
- Muscle implantation test in rabbit

RESULTS

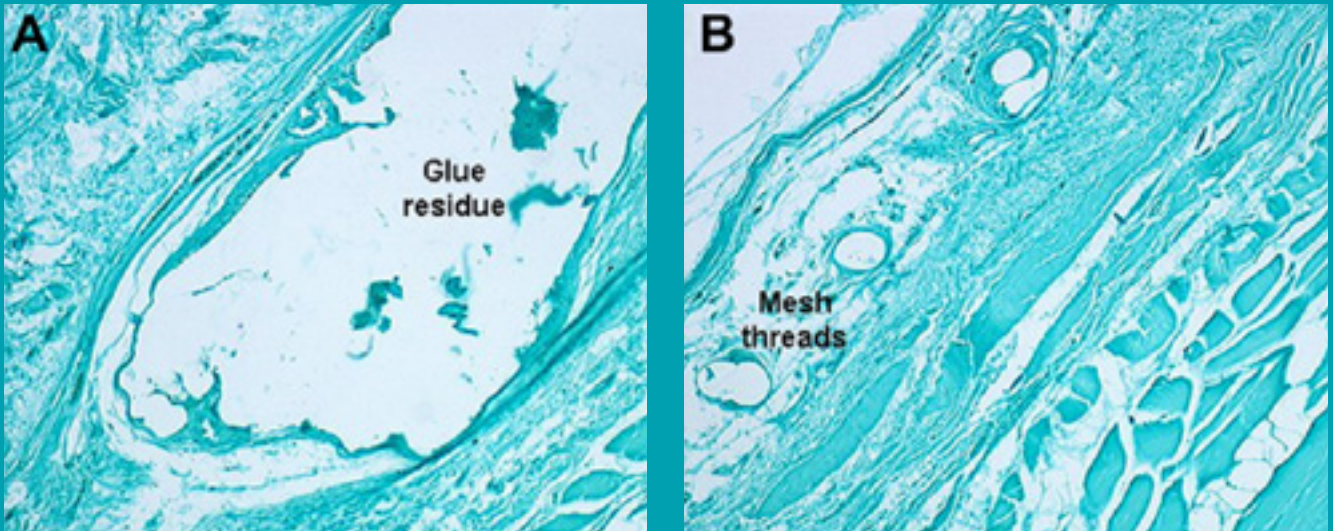
The product causes moderate inflammation, typical of foreign body reactions such as suture threads ^{1,7,200}

NO chronic inflammation ^{1,3,6,7,200}

Once polymerization is complete, Glubran® 2 behaves like an INERT BIOMATERIAL ^{1,2,7,27,78,202}

- Over 2 MLN treatments
- 25 years of safety
- Over 200 publications

*52,161,166,192,194,201



"Cyanoacrylate surgical glue as an alternative to suture stitches in fixing meshes for hernia repair." ⁷

- ... No PMN (PolyMorphoNucleated), necrotic cells or apoptotic cells were observed.
- "...when cyanoacrylates with longer alkyl chains (longer degradation) were finally synthesized, these began to be used clinically without histotoxicity..." ¹⁹²

Constantly evolving solutions.



➤ G-NB-2



➤ G-NB2-50



➤ G-NB2S-25

1 ml / 0.5 ml / 0.25 ml

10 sterile single-dose aluminum blister packs

Shelf life 2 years



CUSTOM APPLICATIONS.

Wide range of dedicated applicators.

Devices for drop-by-drop applications



> G2-DCD-210-8T

Tip for thin linear application



> G-DT

Laparoscopic catheters for drop-by-drop application



> G2-LPC



> G2-LPC-RIG

Nebulizers for:

Laparoscopy

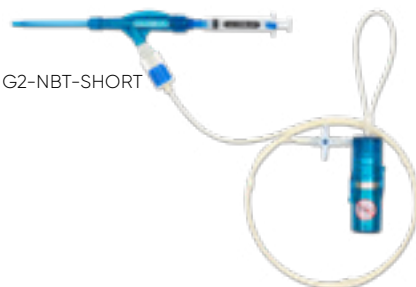


> G2-NBT-SMALL



> G2-NBT

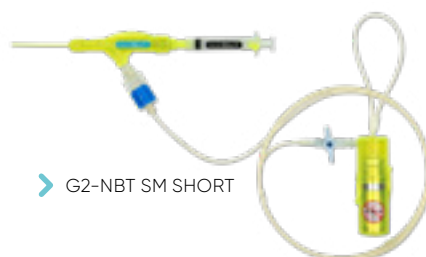
Laparotomy



> G2-NBT-SHORT



> G2-NBT RIG



> G2-NBT SM SHORT

GLUTÄCK

Laparoscopic atraumatic fixing device for hernia prostheses



> GB-DS-30
GB-DS-60

> GB-DS SH 30
GB-DS SH 60



AS A BACTERIOSTATIC SEALANT

GENERAL SURGERY

To prevent and reduce

Micro-leakage and extravasation of fluids with consequent formation of fistulae, seromas and lymphorrhoea.

To seal

- Anastomosis (vascular, gastrointestinal, biliary, urological) ^{2,5,7,29,192,194}
- Sutures ^{7,9,19,26,28,43,47,66,85}
- Manual and mechanical resection lines ^{15,63-66,82,106}
- Resection surfaces of parenchyma and organs (liver, kidneys, pancreas, spleen, lungs) ^{69,70,81,82,85,86,91,95,97,192}
- Surgical cavities following removal of organs or tumor masses ^{74,84,94,97}

To treat

- Fistulae (biliary, anal, perianal, urinary, pharyngeal, liquoral, bronchial, pleural, esophageal, tracheoesophageal, gastric, gastrointestinal, duodenal and pancreatic) ^{22,32,75-80,88,90,92,99,110-115}

LIVER SURGERY

To prevent

The formation of bilomas and biliary leaks after liver surgery and cholecystectomy ^{81,82,152,159}

THORACIC SURGERY

For aerostasis

Pulmonary resection interventions, lobectomies, pneumonectomies, bullectomies, volume reductions, tracheobronchial resections ⁸⁵⁻⁹²

NEUROSURGERY

To seal

- Sutures of cranial and spinal dural plastic surgery in combination with other products (gauze, hemostatic sponges) ²⁰
- The transsphenoidal access of the Turkish saddle, for removal of pituitary adenomas ²¹

BREAST AND GYNECOLOGICAL SURGERY

To close and seal

- Sectioned lymphatic vessels to prevent and reduce the formation of seromas and lymphorrhoea ^{84,94}



AS A SURGICAL ADHESIVE

SURGERY

To fix

- Hernia prostheses ^{4,7,9,37-60,93}
- Prostheses in sacrocolpopexy ⁹³
- In vaginal, perineal, uterine plastic surgery ²⁴⁻²⁵
- Omentum ^{106-108,204}
- Fabric patches (biological and synthetic) ^{6,12-14,27,61,105}

To replace sutures in

- Repair of small epicardial lacerations ^{14-16,208}
- Tympanoplasty ^{24,25}
- Uvuloplasty ²⁸
- Circumcision, phimosis and frenulotomy ^{33-35,103}
- Closing trocar insertion points
- Surgical wounds ^{10,11,26,47,192,207,20}
- Dental surgery ^{22,26,27,193}

To glue

- Damaged tissue ^{17,27, 205,206}
- Bone and osseocartilaginous fragments ²⁰⁷
- Tracheoesophageal phonation valves

To occlude

- Fistulae
- Ducts (biliary, pancreatic, etc.)
- Canals (lymphatic etc.) ^{22,32,75-80,88,90,92,99,110,115}



AS A HEMOSTATIC

FOR ALL TYPES OF SURGERY

- Blocks punctate bleeding
- Adheres firmly to hemorrhage sites
- Adapts to micro folds of tissues

A simple and effective solution to achieve rapid hemostasis in 7,62,63,95-97-116-119,121-127,131-134

- Injuries with punctate bleeding after oncological surgery with partial or total removal of an organ
- Resection surfaces of various organs (liver, kidneys, spleen, pancreas, lung)
- Vascular and cardiac surgical anastomoses (arterial and venous bypass, arteriovenous, prosthetic-vascular fistulae, aneurysm repair)
- Bleeding oropharyngeal surfaces
- Parenchyma tissue on lacerations, hemorrhagic lesions
- Cholecystic bed, bladder bed
- Ovarian cysts, myomectomies, hysterectomies
- Gastro-duodenal ulcers, with endoscopic injection into the submucosa



AS A SCLEROSING AGENT

The endoscopists assistant ¹¹⁰⁻¹⁹⁰

When injected into varices (Esophageal, Gastric, Duodenal) polymerizes and occludes the vessel, inducing sclerosis. ^{5,113,128-132,135}

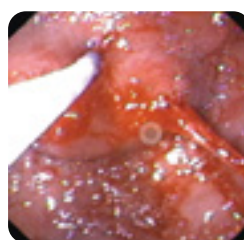
BLEEDING VARICES

1. Bleeding of Varices
2. Injection of Glubran[®] 2
3. Occluded Varix

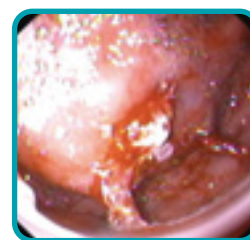
Endoscopic treatment of gastric varices
(Author Prof. G. Battaglia)



1.



2.



3.



AS A LIQUID EMBOLIZING AGENT

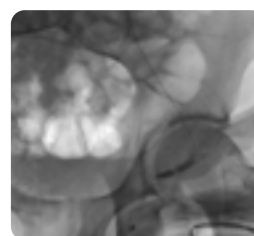
Interventional radiologists assistant (body and head-neck)

^{3,6,77,87,110,118,121,125,134, 137-190}

- Injected into the blood vessel, it polymerizes, forming a mold which adheres to the walls of the vessel, obstructing it and causing a definitive occlusion without recanalization.

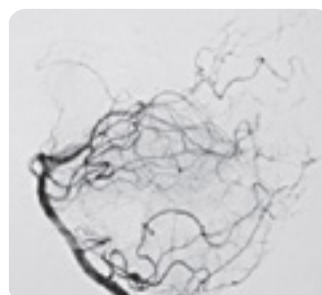
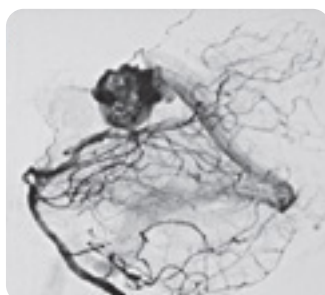
VARICOCELES ¹⁴²

Pre-embolization
Microcatheterization
Post-embolization



AVM EMBOLIZATION ^{142,190}

Bleeding of AVM before and after injection of Glubran[®] 2 with **complete obliteration and resolution.**



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