

# Surgical Sutures & Needles



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# **Sutures Characteristics**

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# **Physical Characteristics**

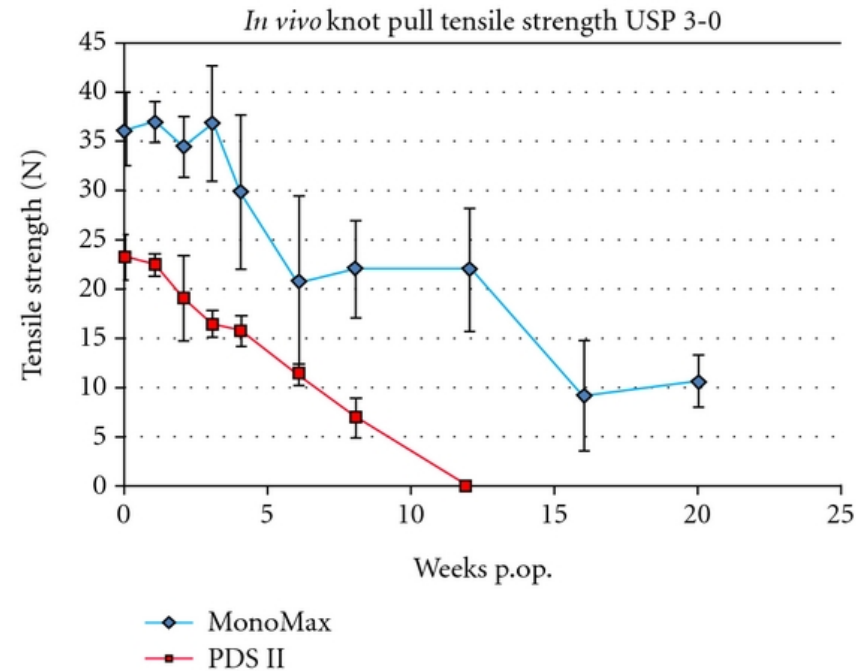
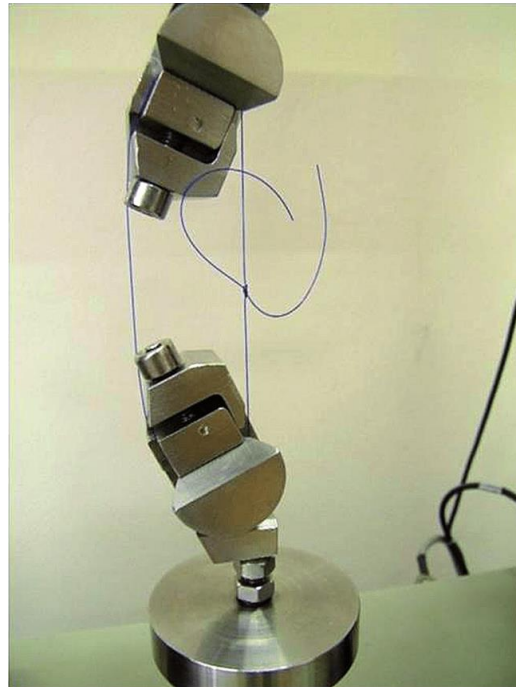
# Physical Characteristics: 1. Size

## Measuring Units - United States Pharmacopeia (U.S.P.)

- 7-0 and down: Microsurgery, Ophthalmology
- 5-0 to 6-0: Skin – Face, Blood vessels
- 3-0 to 4-0: Skin – Limbs, Bowel anastomosis
- 2-0: Skin – Torso, Light Fascia
- 0 and up: Heavy Fascia, Drain fixation

# Physical Characteristics: 2. Tensile Strength

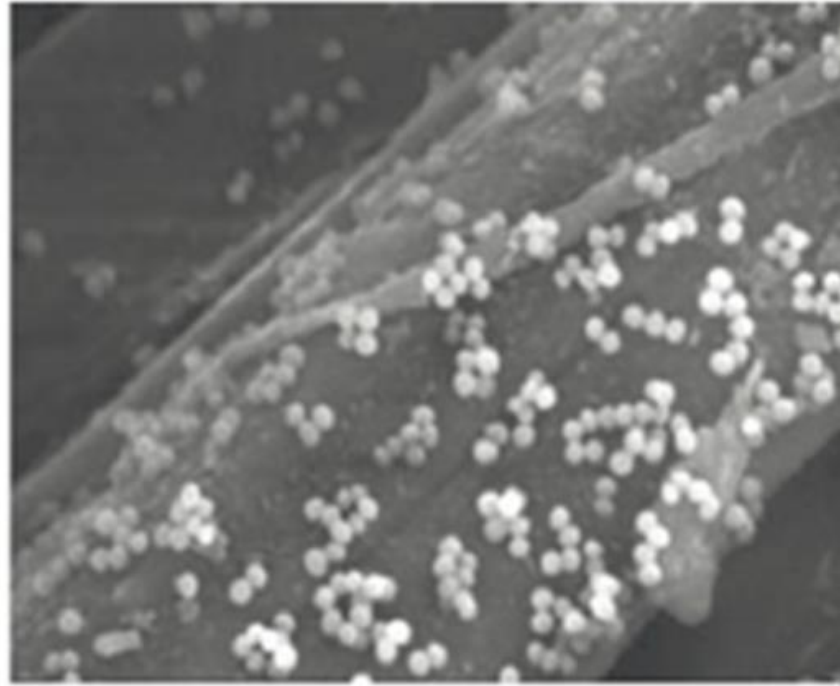
Every suture has a predicted strength (only in pulling = tensile)



The strength is determined by the process of absorption in vivo

# Physical Characteristics: 3. Capillarity Action

Braided sutures can absorb moist and fluid and transfer them crossways



What do you see in the picture?

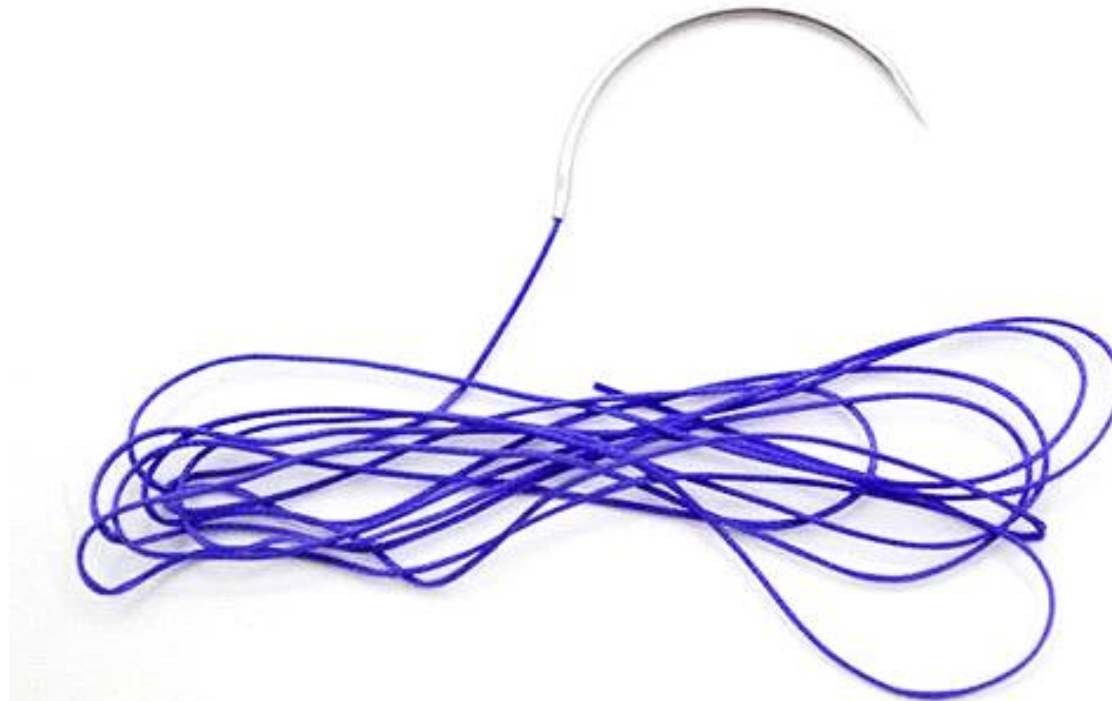
Usage of sutures with increased capillarity action increases the risk for infection



# Handling Characteristics

# Handling Characteristics : 1. Memory

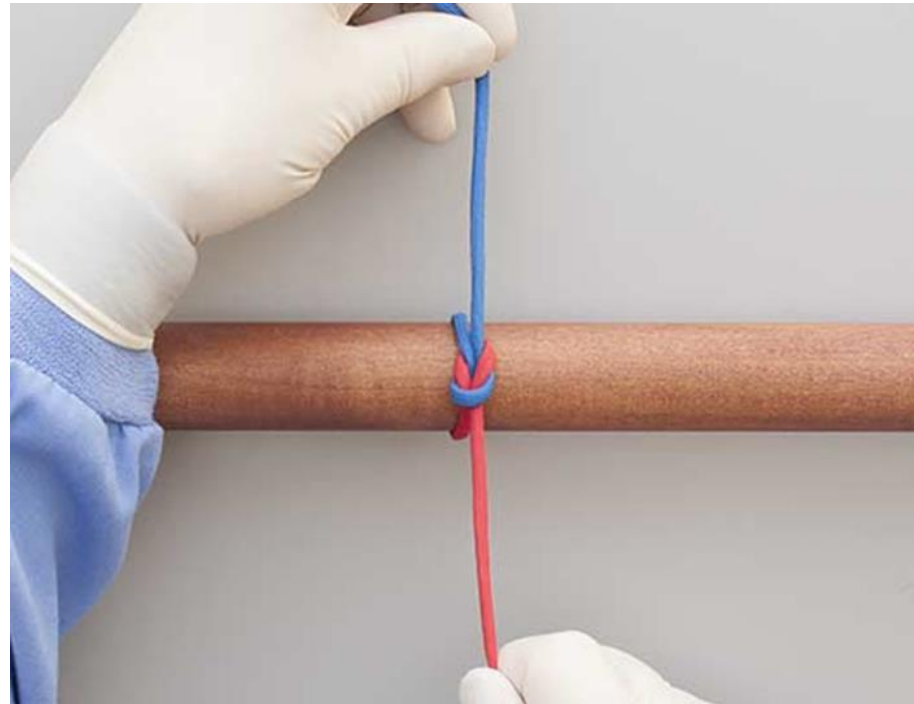
The suture tends to go back to the shape it was stored in



A suture with high memory tends to be springy and tangled

# Handling Characteristics: 2. Pliability

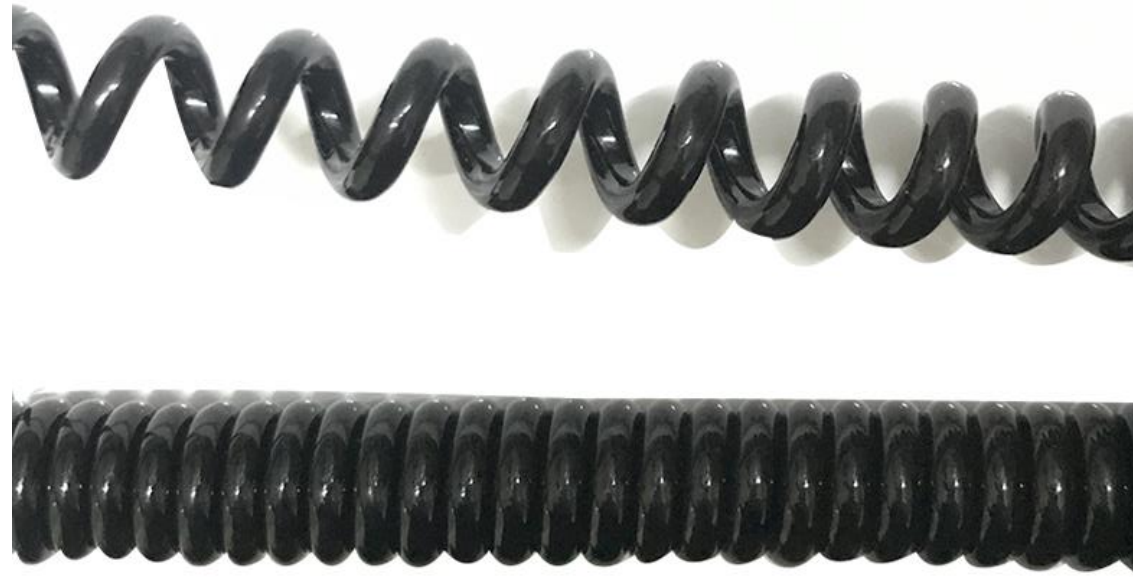
The ability of the suture to maintain the shape it was given



The more pliable the suture is, the more secure are its knots

# Handling Characteristics: 3. Elasticity

The ability to go back to the original shape after being pulled

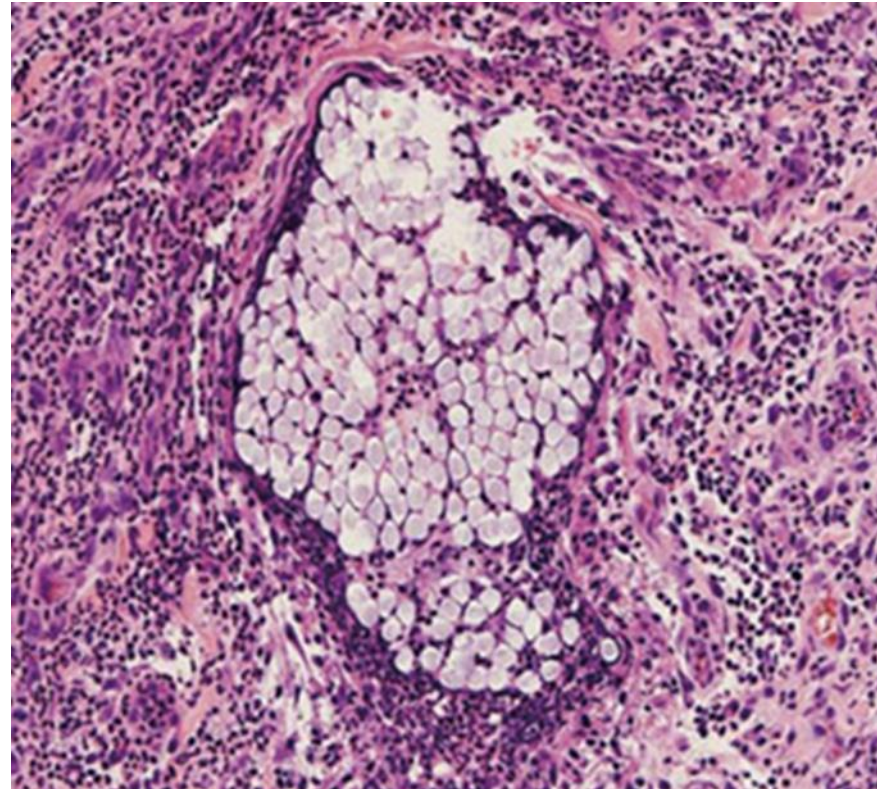


Elasticity is a positive value as long as the suture maintains its strength

# **Tissue Reaction Characteristics**

# Tissue Reaction: 1. Inflammation

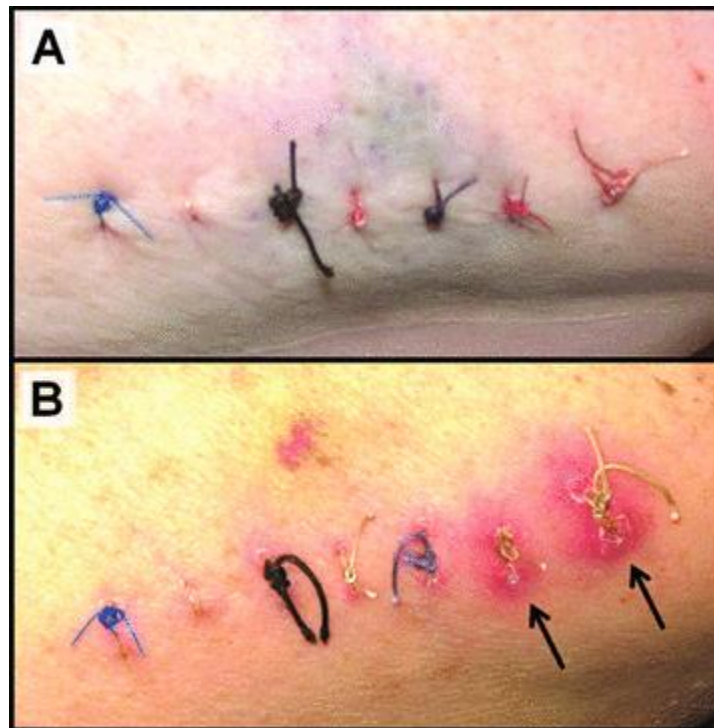
Foreign body creates inflammation around it as part of wound healing process



What do you see in the picture?

# Tissue Reaction: 2. Allergy

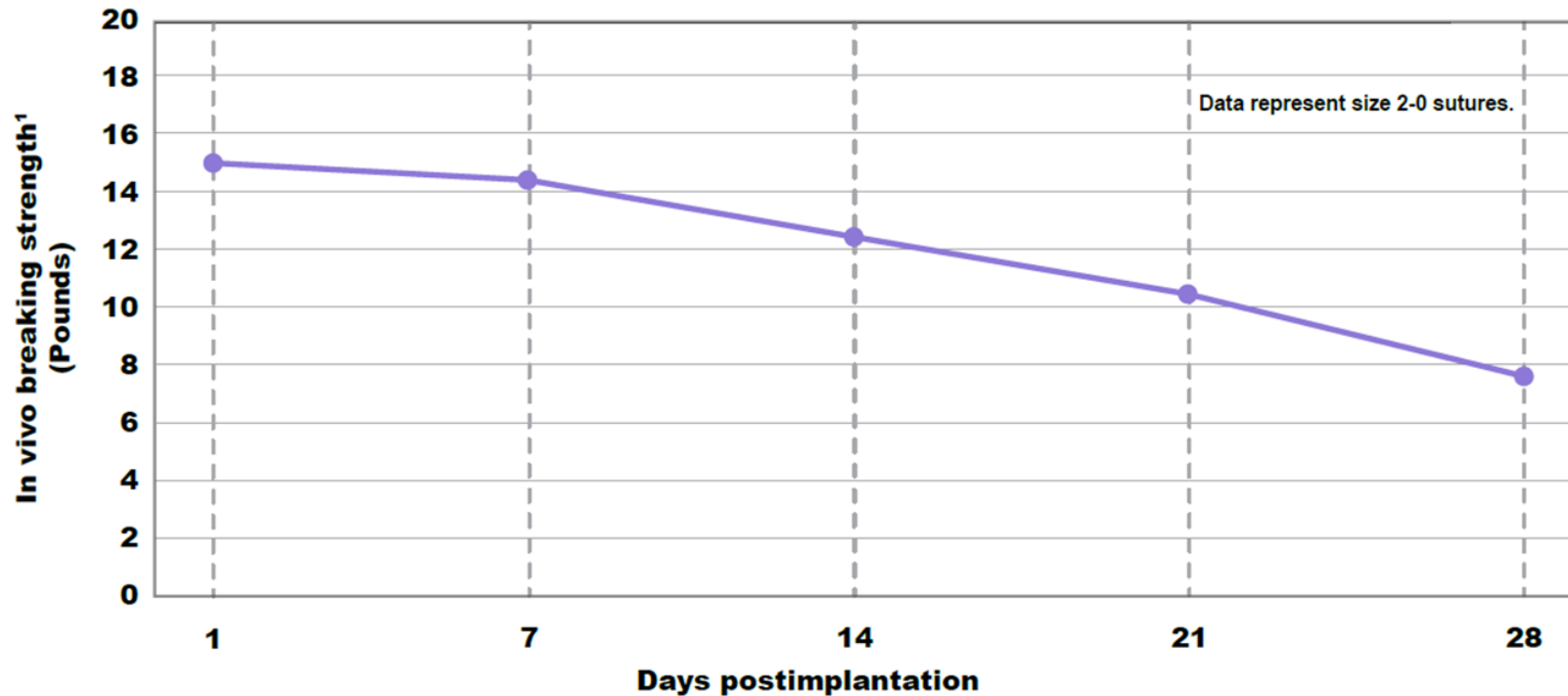
Natural materials are rejected by the body due to allergic reaction



as apposed to synthetic materials witch tend to be inertic

# Tissue Reaction: 3. Absorption

Every absorbable material has an expected and measurable absorption profile



It depends on the type of material and its ability to undergo hydrolysis process



# Absorption Profile of Different Sutures

Suture	Tensile Strength Loss	Absorption in Tissue
Catgut	15 days	60 days
Chromic Catgut	30 days	80-120 days
Polyglyconic acid (Dexon)	30 days	90 days
Polyglactin (Vicryl)	32 days	70 days
Irradiated Polyglactin (Vicryl Rapide)	14-21 days	56-70 days
Polydioxanone	56 days	180 days
Nylon	25% in 2 years	—
Prolene	Indefinite	—

# Dividing sutures to different categories

Absorbable Vs Non-absorbable

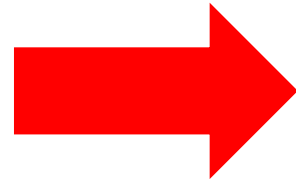
Natural Vs Synthetic

Monofilament Vs Multifilament (Braided)



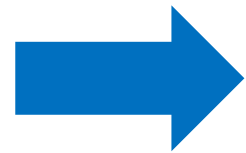
# Industry

ETHICON

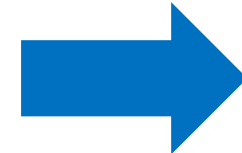


*Johnson & Johnson*

*tyco*



COVIDIEN



Medtronic

# Suture Materials

Silk

Polyglycolic Acid

Nylon

Polydeoxanone

Polyester

Cat-Gut

Polypropylene

Polyglycaprone

# Silk

- Natural material
- Non-Absorbable
- Braided



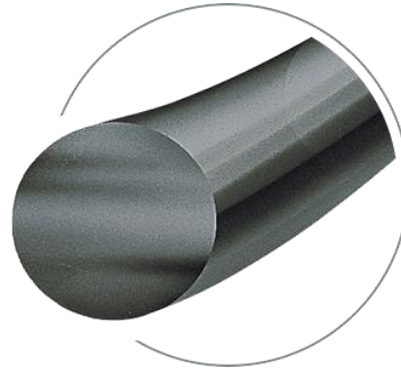
- Brand name: Mersilk, Sofsilik


	Monofilament	Multifilament
Absorbable		
Non-Absorbable		●



# Nylon

- Synthetic
- Non-absorbable
- Monofilament



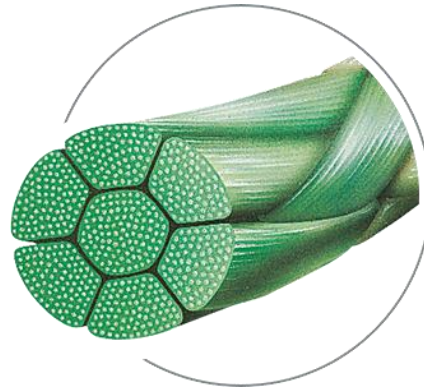
	Monofilament	Multifilament
Absorbable		
Non-Absorbable		




- Brand name: Ethilon, Nurolon, Dermalon, Monosof

# Polyester

- Synthetic
- Non-absorbable
- Braided



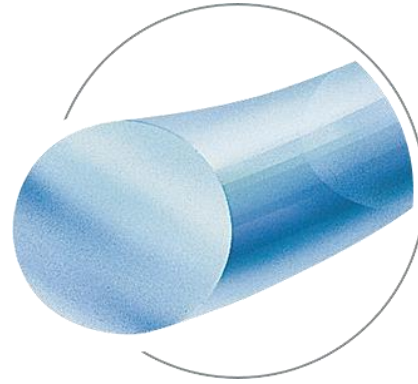
	Monofilament	Multifilament
Absorbable		
Non-Absorbable		




- Brand name: Mersilene, Ethibond, Ti-Cron.

# Polypropylene

- Synthetic
- Non-absorbable
- Monofilament



	Monofilament	Multifilament
Absorbable		
Non-Absorbable		

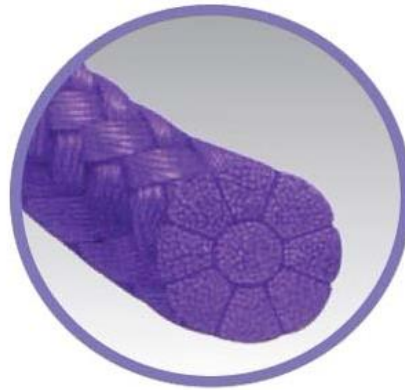


- Brand names: Prolene, Surgipro, Surgilene.



# Polyglycolic Acid

- Synthetic
- Absorbable
- Braided



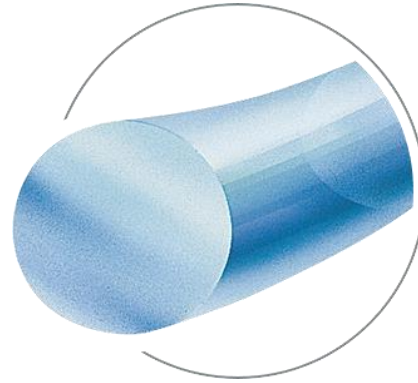
	Monofilament	Multifilament
Absorbable		●
Non-Absorbable		




- Brand Names: Vicryl, Polysorb, Dexon

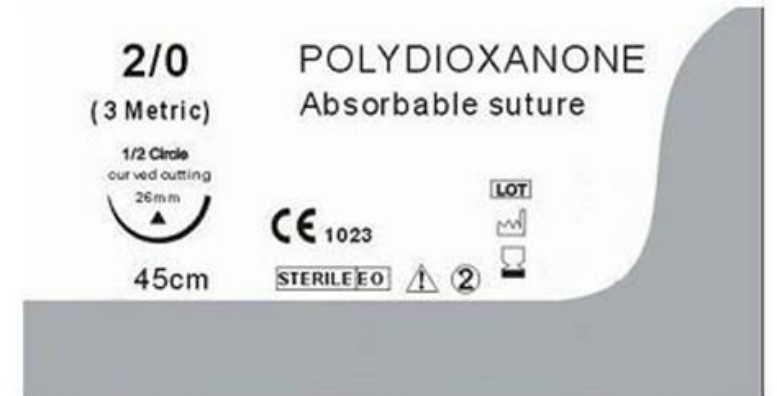
# Polydioxanone

- Synthetic
- Absorbable
- Monofilament



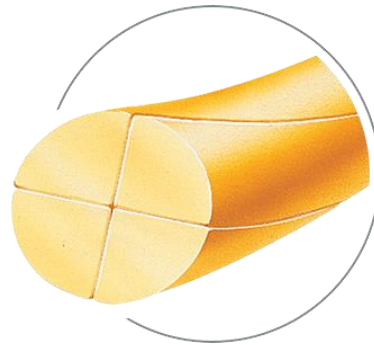
	Monofilament	Multifilament
Absorbable		
Non-Absorbable		


- Brand names: PDS



# Cat-Gut

- Non-Synthetic
- Absorbable
- Monofilament



	Monofilament	Multifilament
Absorbable		
Non-Absorbable		




- Brand names: Surgical Gut, SurgiGut

# Poliglecaprone

- Synthetic
- Absorbable
- Monofilament



	Monofilament	Multifilament
Absorbable		
Non-Absorbable		



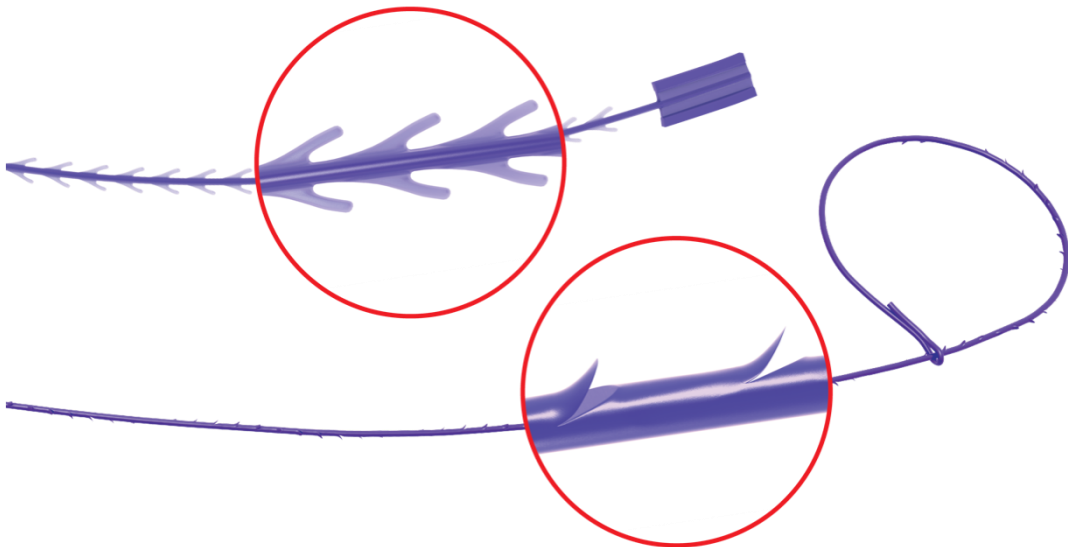
- Brand Names: Monocryl, Caprosyn, Biosyn

# Barbed Sutures

Sutures with self locking mechanism

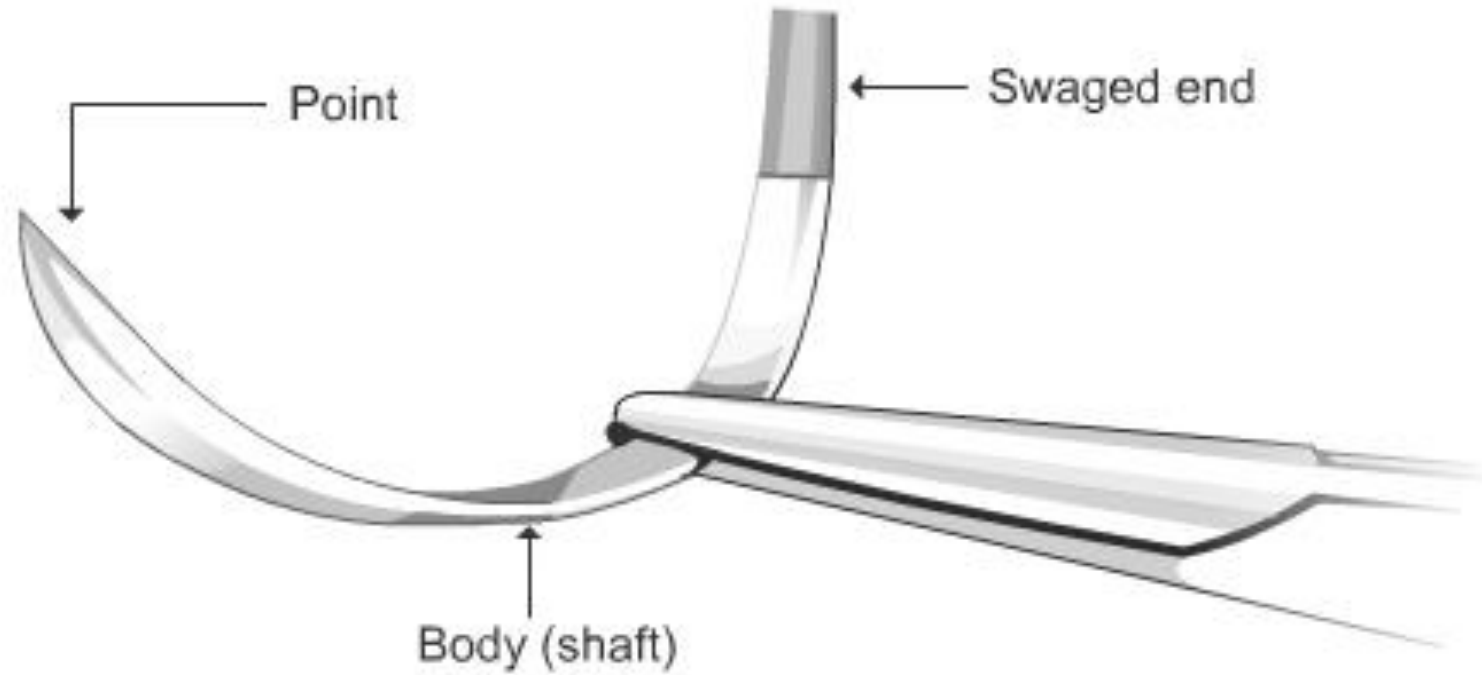
**Advantage:** no need for tying the sutures

**Disadvantage:** can not regret a single move....

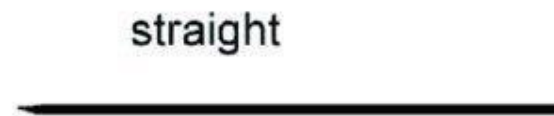
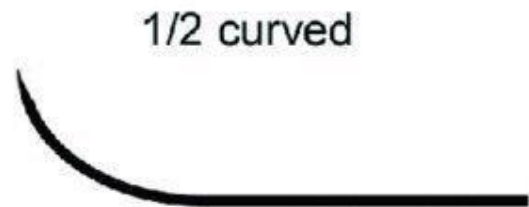
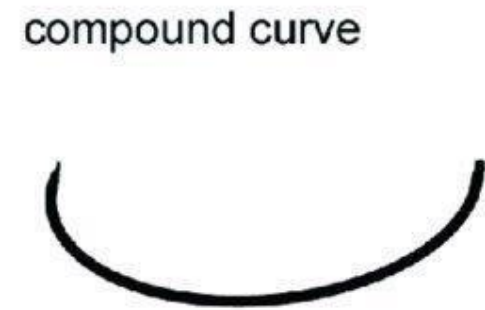
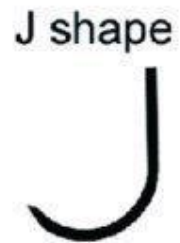
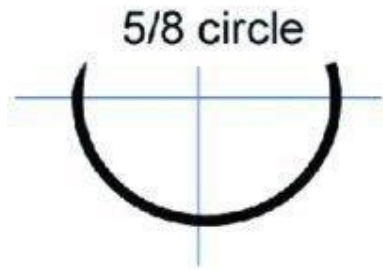
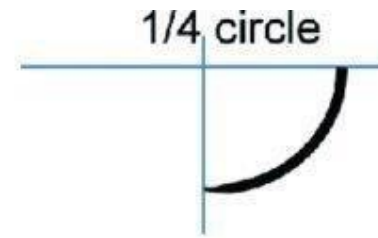
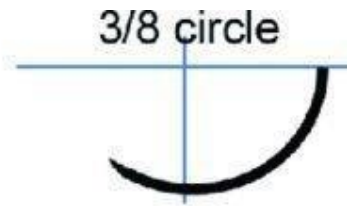
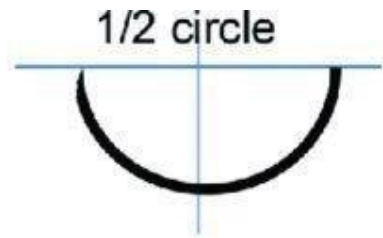


Needels

# Anatomy of A-traumatic Surgical Needle



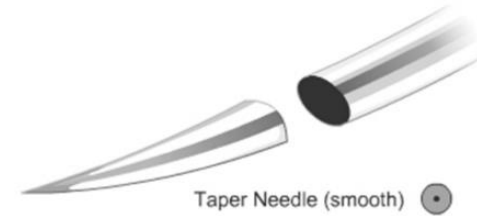
# Geometry of Surgical Needle





# Types of Surgical Needles

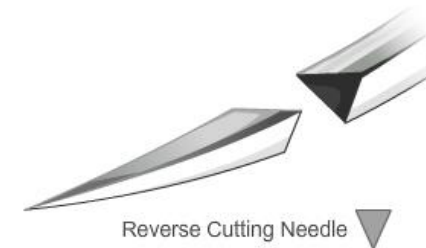
Taper



Conventional Cutting



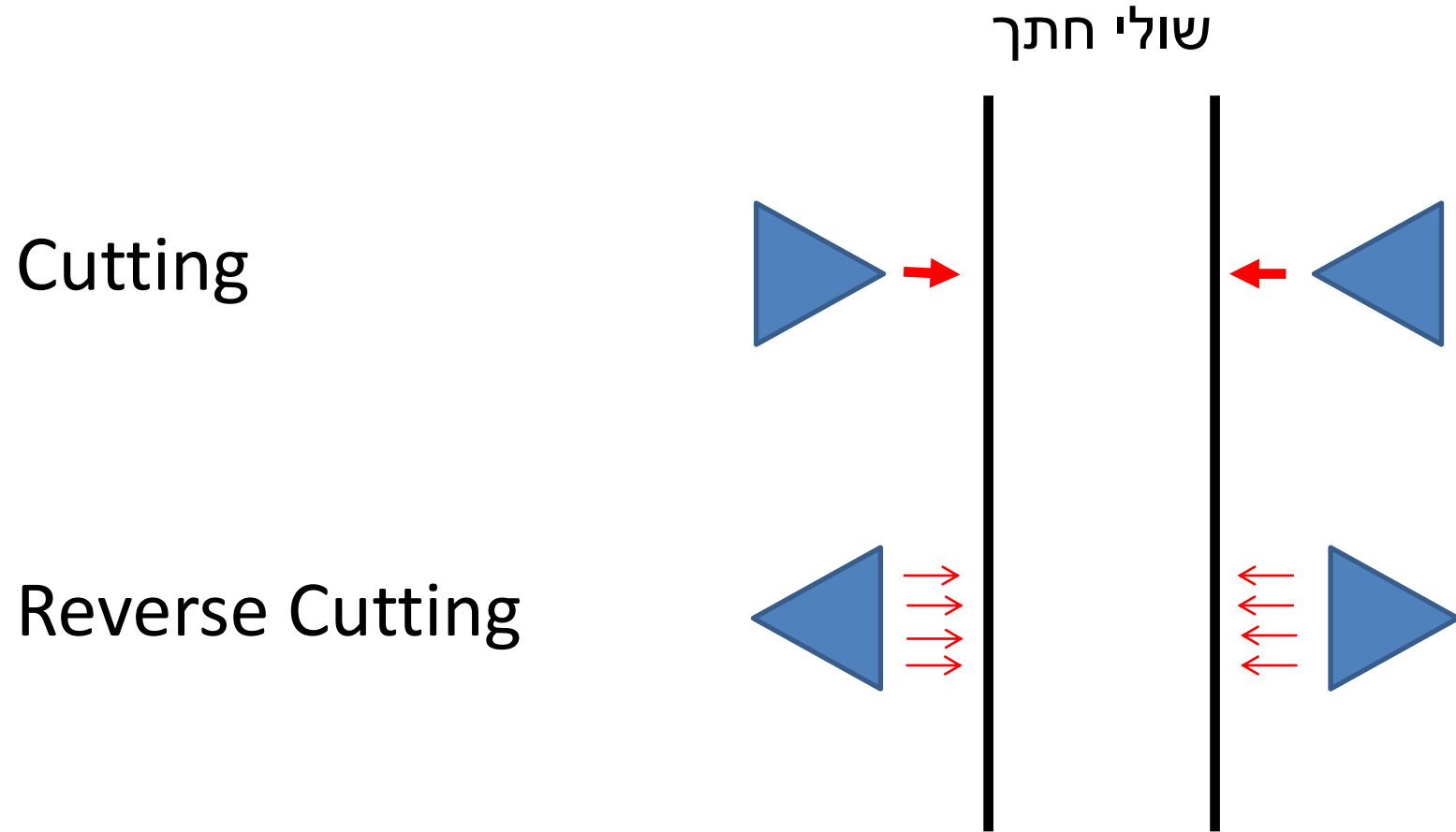
Reverse Cutting



Taper-cut



# Cutting Vs. Reverse Cutting



# What's in the box?

The diagram shows a suture box label with the following text and features:

- Thread size:** 3-0 (2 Ph. Eur.)
- Needle size:** X-1 (22mm 1/2c)
- Needle edge:** CUTTING
- Needle size (actual size):** 45cm
- Thread length:** 45cm
- Enterprise:** ETHICON
- Brand name:** Coated VICRYL\* rapide
- Material:** Polyglactin 910
- Description:** W9935 undyed braided absorbable suture incolore tressé sutura resorbable sutura absorvível Incolor entrançada
- Lot:** AM2GRDM0
- Expiration:** 2013-12
- Manufacturer:** Johnson & Johnson Intl 4

Annotations on the left side of the label:

- Thread size → 3-0 (2 Ph. Eur.)
- Needle size → X-1 (22mm 1/2c)
- Needle edge → CUTTING
- Needle size (actual size) → 45cm
- Thread length → 45cm

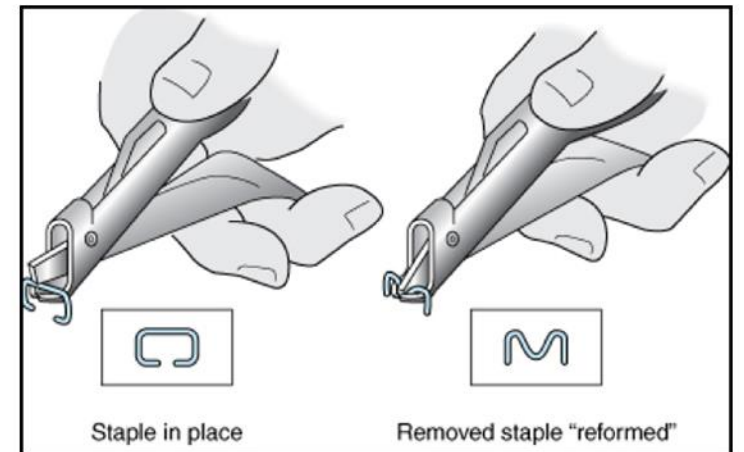
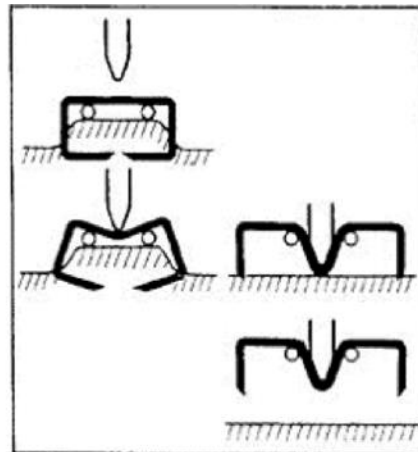
Annotations on the right side of the label:

- Enterprise → ETHICON
- Brand name → Coated VICRYL\* rapide
- Material → Polyglactin 910
- Description → W9935 undyed braided absorbable suture incolore tressé sutura resorbable sutura absorvível Incolor entrançada

# Skin Staples

# Skin staples - advantages

- Easy to use
- Fast – saves time!
- Easy to remove



# Skin staples - disadvantages

- Demands accuracy
- Foreign body reaction
- Unpleasant feeling by patient





# Skin staples – Cosmetic outcome



Staples size is greater than most sutures, hence the “Frankenstein” pattern on skin



Surgical Glue



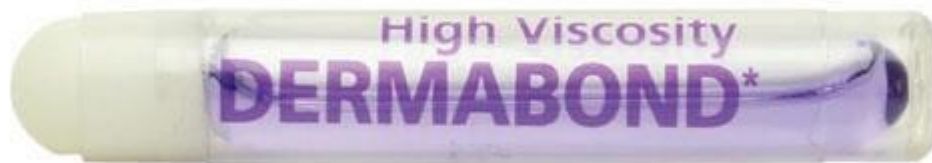
# Surgical Glue

- Main material is **Cyanoacrylate**
- There are two isomers:  
2-octyl cyanoacrylate & n-butyl cyanoacrylate
- Can replace the need for sutures or serve as an additive (after sub-cutaneous or sub-cuticular)
- Creates an exo-thermic reaction (“burn” sensation)
- Keep skin dry for 24-48 hours



# 2-octyl cyanoacrylate

Brand names: Dermabond, SurgiSeal



# n-butyl cyanoacrylate

Brand names: Histoacryl, LiquiBand

