

## Suture and Suture Materials

by Kelly K. Park, MD, MSL

### Physical Properties

Configuration	Monofilament versus multifilament (twisted or braided)
Coating	May improve coefficient of friction or have antimicrobial or antitumor properties
Capillarity	Ability to absorb and transfer fluid
Coefficient of Friction	Ease of suture to move through tissue
Tensile Strength	Weight to break suture ÷ suture cross-sectional area (increased tensile strength: larger suture, synthetic > natural; greatest tensile strength: stainless steel)
Size	Number denoting tensile strength
Knot Strength	Security of knot (increased knot strength: increased coefficient of friction)
Memory	Property of suture to revert to previous shape after bending deformation (increased memory → poor handling)
Elasticity	Property of suture to revert to original size and shape after stretching deformation
Plasticity	Property of suture to retain new shape after stretching deformation
Handling	Manageability and ease of working with a particular suture
Tissue Reactivity	Degree of inflammatory response to suture (increased with larger caliber, multifilament, absorbable, natural sutures)

### Selected Absorbable Suture Characteristics

Suture	Configuration	Composition	Knot Strength	Tissue Reactivity	Absorption Rate	Pros	Cons
Surgical gut, plain	Twisted multifilament	Natural	☹	↑	70 days		↓ tensile strength
Fast-absorbing gut	Twisted multifilament	Natural	☹	↑	21-42 days	Usage in graft attachment	Can have true allergy
Chromic surgical gut	Twisted multifilament	Natural	☺	↔ / ↑	90 days	Chromium salt added to maintain strength	↑ COF, can have true allergy
Polyglycolic acid	Braided multifilament	Synthetic	☺	↔ / ↓	60-90 days	↑ knot security	↑ suture spitting
Polyglactin 910	Braided multifilament	Synthetic	☺	↔ / ↓	56-70 days	↑ handling	↑ COF
Polydioxanone	Monofilament	Synthetic	☹	↓	90-180 days	↑ tensile strength	↓ handling, ↓ knot security
Polytrimethylene carbonate/ Polyglyconate	Monofilament	Synthetic	☺☺	↓↓	60-180 days	↑ tensile strength	
Poliglecaprone 25	Monofilament	Synthetic	☺☺	↓↓	90-120 days	↑ tensile strength, ↓ COF, ↑ elasticity	



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COF = coefficient of friction

☹ = Poor, ☺ = Intermediate, ☺☺ = Good, ☺☺☺ = Excellent

↑ = Increased, ↔ = Intermediate, ↓ = Decreased

### Note:

Natural suture is degraded by proteolysis with high rates of tissue reaction.  
Synthetic suture is degraded by hydrolysis with low rates of tissue reaction.

## Suture and Suture Materials (cont.)

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Selected Nonabsorbable Suture Characteristics							
Suture	Configuration	Composition	Knot Strength	Tissue Reactivity	Memory	Pros	Cons
Silk	Braided multifilament	Natural	😊😊	↑	↓	↑ pliability	↓ tensile strength, ↑ COF
Nylon	Multifilament	Synthetic	😞	↓	↔	↑ tensile strength, ↑ elasticity	↑ memory, ↓ handling
Polyester, uncoated	Braided multifilament	Synthetic	😊😊	↔	↔	↑ tensile strength	↑ COF
Polypropylene	Monofilament	Synthetic	😞	↓	↑	↑↑ tensile strength, ↑ resistance to infection, ↑ plasticity	↓ elasticity
Nylon	Monofilament	Synthetic	😞	↓	↑	↑ tensile strength, ↑ elasticity	↑ memory, ↓ handling
Polybutester	Monofilament	Synthetic	😊	↓	↓	↑ tensile strength, ↑ elasticity ↓ COF	

COF = coefficient of friction

😞 = Poor, 😞 = Intermediate, 😊 = Good, 😊😊 = Excellent

↑ = Increased, ↔ = Intermediate, ↓ = Decreased

### Note:

Natural suture is degraded by proteolysis with high rates of tissue reaction.

Synthetic suture is degraded by hydrolysis with low rates of tissue reaction.

Suture Needle*	
Part	Description
Tip	Most distal portion of the needle
Point	Area from the needle tip to the largest diameter portion of the body
Body	Between the point and shank/swage; strongest portion of the needle
Shank/Swage	Where suture attachment occurs; determines suture tract size

\*In dermatologic surgery, the 3/8 circle needle is most commonly used.

### References

1. Srivastava D, Taylor RS. Suturing Technique and Other Closure Materials. In: Surgery of the Skin: Procedural Dermatology. 3rd ed. Philadelphia, PA: Saunders/Elsevier; 2015: 193-213.
2. Yag-Howard C. Sutures, Needles, and Tissue Adhesives. *Dermatologic Surg.* 2014;40:S3-S15.

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