Linx Sutures

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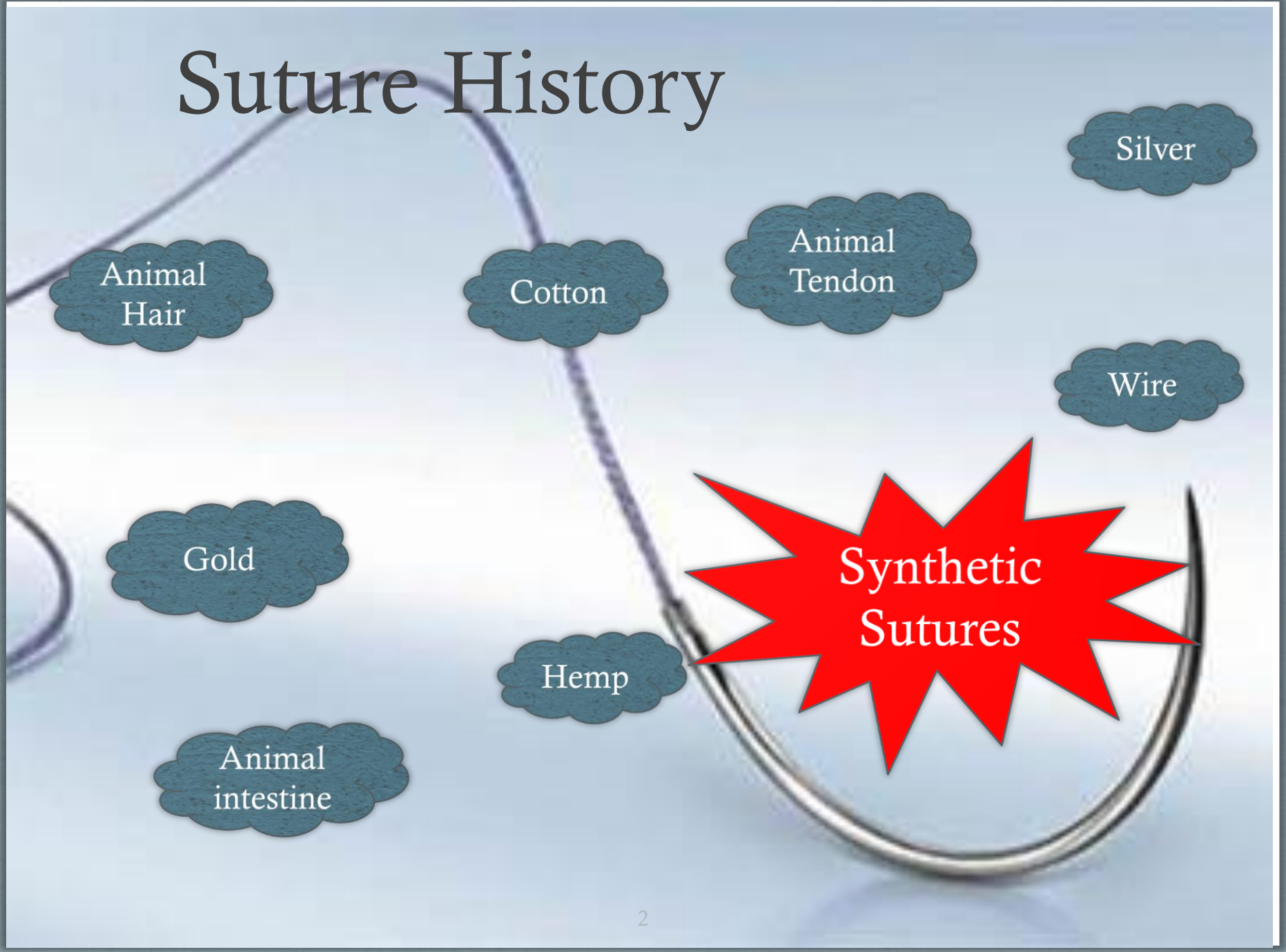
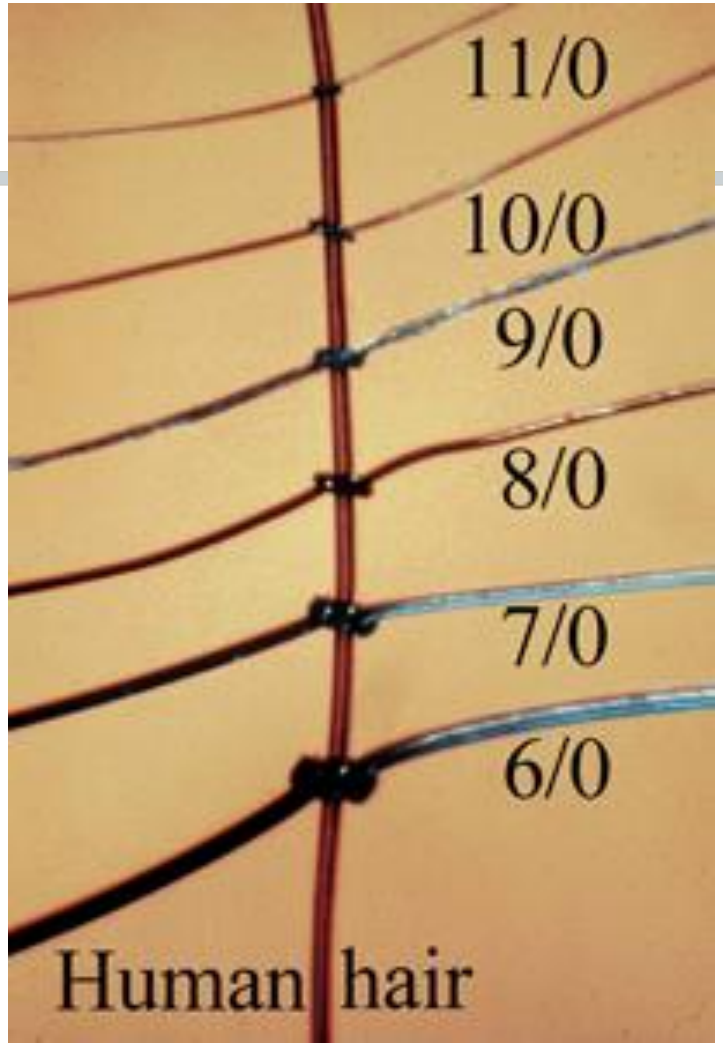
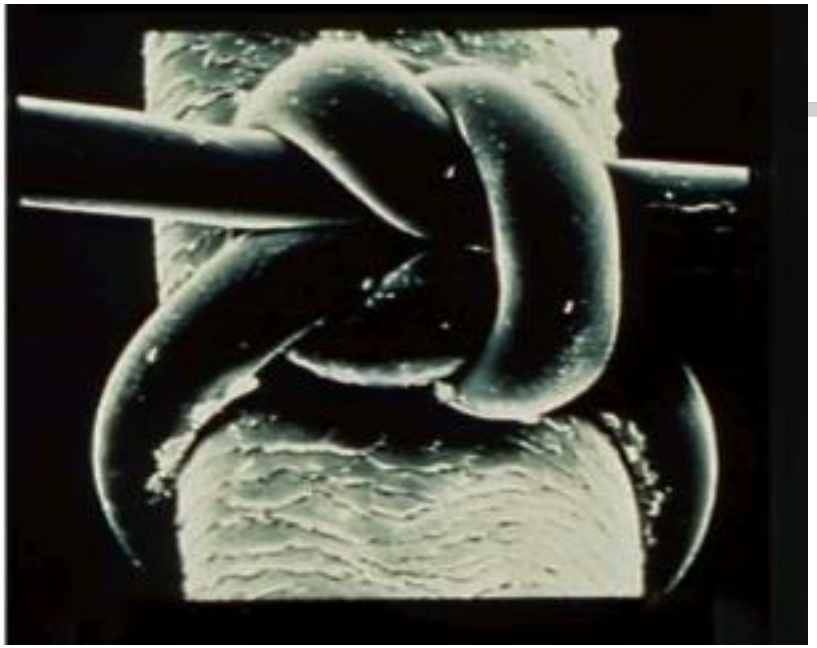
Suture History



THE IDEAL SUTURE

- MONOFILAMENT
- USE FOR ANY PROCEDURE
- EASY TO HANDLE
- MINIMAL TISSUE REACTION
- HIGH BREAKING STRENGTH
- HOLDS KNOTS SECURELY
- STERILE





Nylone 10/0
Knotted around human hair

CLASSIFICATION OF SUTURES

Absorbable	**Non absorbable**
Monofilament	**Multifilament**
Synthetic	**Biological**

Absorbable

- The body **breaks down** these materials after implantation.
- The main advantage of an absorbable material is that **no foreign** body is left permanently in the patient to give rise to long-term problems. This is always quoted as a desired feature when the ideal suture is being described.
- The time during which an absorbable suture retains its strength must be a long enough time to provide wound support until the healing tissue is capable of surviving without extra support, therefore its **absorption** must be **predictable**.
- Strength retention of sutures is measured by recording the amount of linear strain it can take up to its breaking point. This is done at various times during the absorption process to produce information on the behavior of the suture. This is referred to as its **tensile strength r**etention characteristics

Non Absorbable

- These are materials that are **not broken down** by the body, remaining in place permanently. It should be noted that although the term non-absorbable is used, some materials are included in this category that can be eventually broken down, gradually losing tensile strength. For example, although a non-absorbable suture material, **Nylon** absorbs water over time and is weakened by this process, but the mass of the material is not being absorbed or destroyed by the body. Silk is broken down by the body over a period of years but is still considered to be non-absorbable.

- The advantage of non-absorbable materials is that they can be used to suture tissues which need **long term support** i.e. they provide permanent wound support. Critical areas like the closure of the abdominal wall have in the past demanded the use of non-absorbable materials. Implanting of prosthetic **heart valves** that are sutured into place must obviously be held in position by a suture that will never lose its strength.

- The disadvantage of non-absorbables is that a **foreign body** is left in the patient. When a foreign body has been identified, our natural protective systems will attempt to eliminate the foreign body thus a suture material can be rejected long after the surgery has taken place.

Multifilament(braided)

- The advantage of multifilament materials is their **strength** and **good handling** characteristics.

- The disadvantage of these materials is that the minute spaces between the individual strands (interstices) can provide a **hiding place** where bacteria can avoid the body's macrophages - large cells that would normally destroy bacteria. These spaces are referred to as bacterial harbors. In addition, the spaces can provide a route for fluid to travel along the length of the suture, a characteristic known as **capillary** action that can permit the transfer of infection.

- Another disadvantage of multifilaments is that by the nature of their construction the **surface is rougher** than that of a monofilament. This results in more friction when the suture is pulled through tissue. This is known as tissue drag. Rough multifilament materials can even exert a cutting effect on tissues.

- These problems can be overcome by **coating** the surface of multifilament materials. Coatings can seal off the interstices thus preventing the presence of bacterial harbors. Also, adding an antiseptic to the coating of a braided suture can prevent bacterial colonization in the interstices of the suture. Suture coatings can also improving the performance of the suture by reducing friction and drag as it is pulled through tissue.

Monofilament

- The suture is formed from a single strand of the material. This tends to mean that the surface of the suture is **very smooth**.

- The advantage of a monofilament is that the smooth surface means that the material can be pulled through tissue with a **minimum** of **resistance** due to friction. The surgeon will feel very little drag from the suture as it is pulled through either at insertion or during removal. In addition, the smooth surface means that there are no spaces in the material that can **harbor bacteria** to provide a long term potential for bacterial growth.

- The disadvantage of monofilaments is that of **handling** and **knotting** which can be more awkward than that of multifilament materials. This is due to the wire like properties of many of the single strand materials. The **cut ends** of a monofilament can be an irritant if present for a long time, therefore knots should be carefully buried in tissue and suture ends kept to a minimum with the use of continuous suturing techniques.

Natural (Biological)

- Natural materials are those derived from naturally occurring sources such as animal or plant tissues, so they are often called biological materials. The advantage of natural sutures is that they tend to be **easy to handle** and knot and are relatively cheap.

- The disadvantage is that being natural, they are recognized as being foreign substances (**proteins**) by the body's immune system, which tries to eliminate them. This **reaction** is the cause of instances of **pain** and discomfort in the wound while the suture is in place.

Synthetics

- These are substances that are man-made, produced by industrial processes. Absorbable materials can be produced chemically that closely resemble naturally occurring body substances. These can be absorbed with **minimum the reactions**.

- Other synthetic non-absorbable substances are inert and when implanted induce only a response by the body which results in encapsulation of the material without adverse reactions. **Encapsulation** means that the material is isolated by the body with the production of a substance to surround the foreign material.

- The advantage of synthetics is that they tend to be very **strong** materials that minimize the risk of adverse reactions because **finer gauges** can be used which have the same strength as weaker natural materials that are thicker. In addition, those that are absorbable, have very predictable absorption profiles.

- The disadvantage of synthetic materials is that they can be **more difficult to handle** in the monofilament presentation and occasionally encapsulation can result in the suture being extruded or expelled by the body.

Absorption Terminology

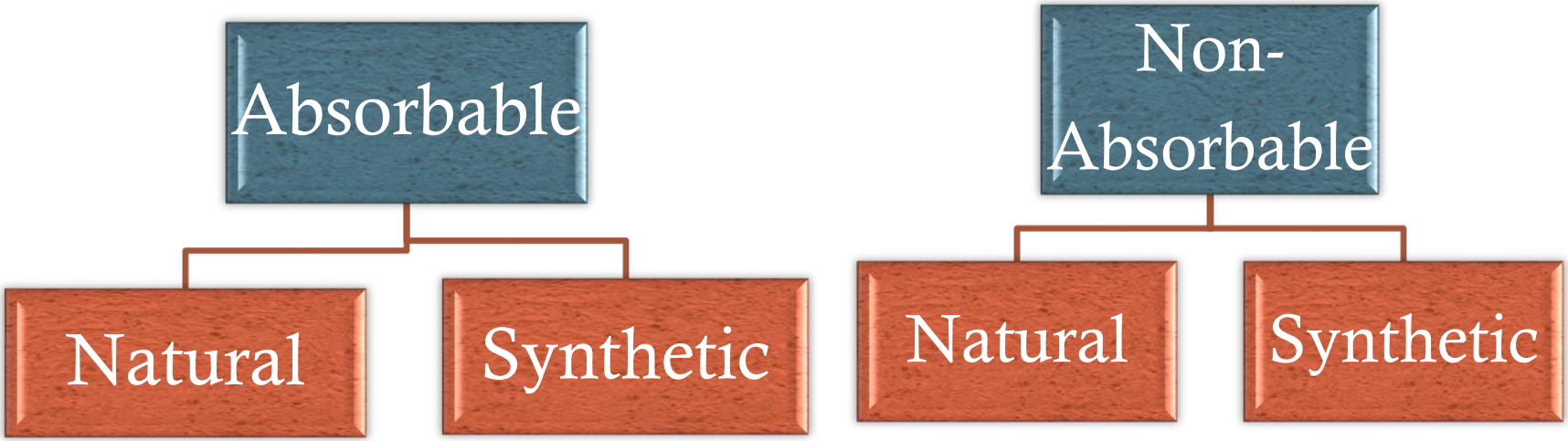
- Loss of Tensile strength
  - Suture can keep wound closed for this period of time

- Mass Absorption
  - Suture only has no strength and stays in the tissue till total absorption

Other terms

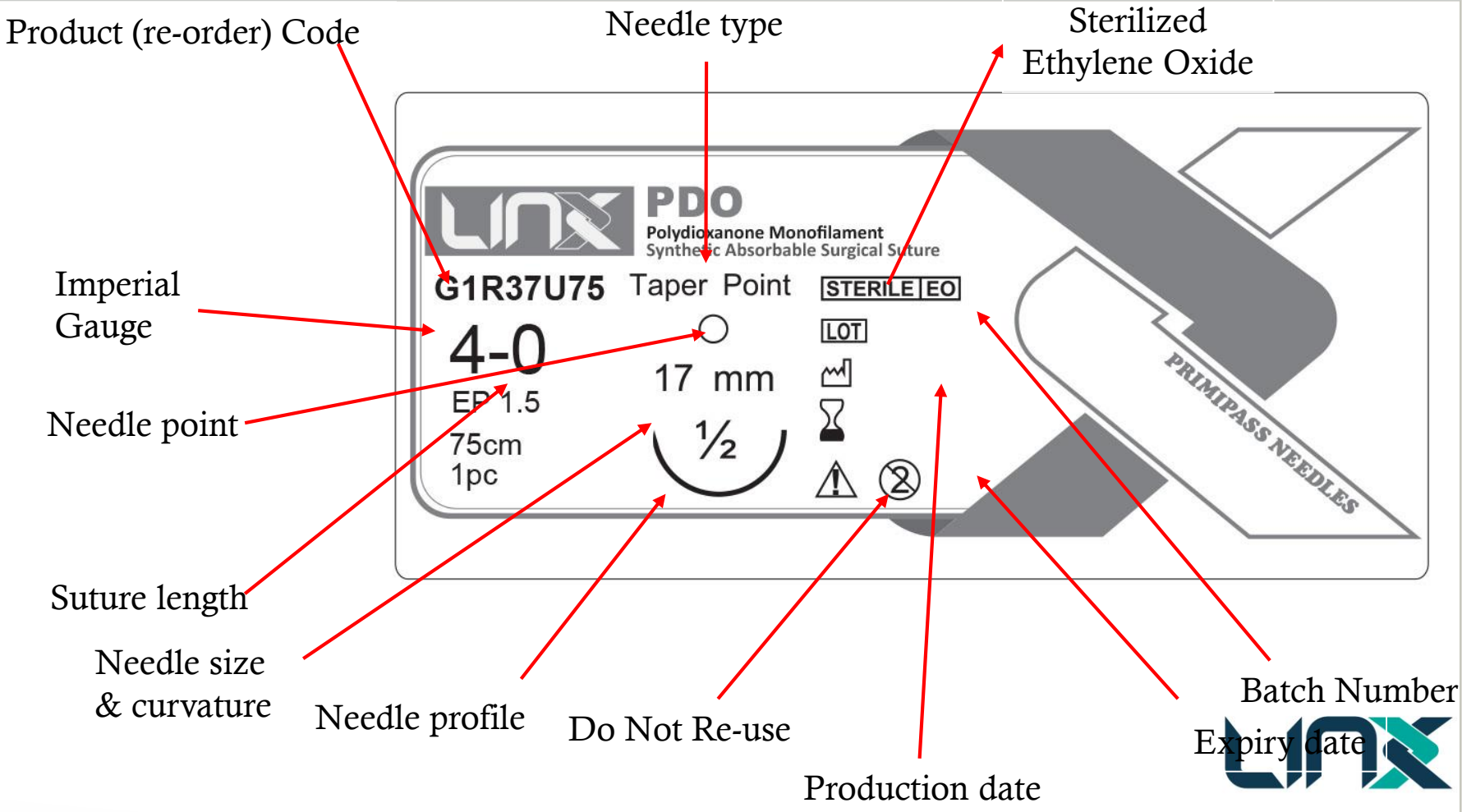
- **Sterilization**
  - Usually Ethylene Oxide(EO)
- **Shelf life**
  - **Normally 5 years**
- **Storage**
  - Below 77^0 F/25^0 C
  - away from moisture and direct heat.
- **Precautions**
  - Avoid handling damage
  - Single use

Sutures Classifications



Catgut plain	VIPRONE RAPID VIPRONE MONOPRONE PDO	SILK	NYLONE CARDIOPELEN X-Bond

Package Information



VIPRONE

- **Material :** polyglycolic acid
- **Coting:** calcium stearate and Polycaprolactone
- **Type :** Braided
- **Color :** violet and undyed
- **Wound Support:** 30 days
- **Mass absorption:** 60-90 days
- **Specialties :** gynecologist, general surgery, laparotomy, orthopedic, cardiac

Rapid Viprone

- **Material :** polyglycolic acid
- **Coting:** calcium stearate and Polycaprolactone
- **Type :** Braided
- **Color :** violet and undyed
- **Wound Support:** 10 days
- **Mass absorption:** 30-45 days
- **Specialties :** Skin, Pediatric surgery, gynecologist, general surgery, laparotomy, orthopedic

Monoprone

- **Material:** Poliglecaprone 25
- **Type:** monofilament
- **Color:** undyed
- **Wound Support:** 30 days
- **Mass absorption:** 60-90 days
- **Specialties:** skin, general surgery, Gynecologists, urologists, pediatric surgery

PDO

- **Material:** Polydioxanone
- **Type:** monofilament
- **Color: Violet**
- **Wound Support:** 50 days
- **Mass absorption:** 210 days
- **Specialties:** General Surgery, Orthopedics, Fascia,

Nylon

- **Material:** Polyamide 6 & 66
- **Type:** Monofilament
- **Color:** Blue
- **Wound Support:** 2-3 years
- **Specialties:** ophthalmic surgery, general surgery, Plastic Surgery, Laparotomy,

Silk

- **Material:** 100% silk fiber
- **Type:** Braided
- **Coating:** Silicon
- **Color:** Black
- **Wound Support:** 6 Months
- **Specialties:** General surgery, Ophthalmic Surgery, Tie and ligation,

Cardiopelen

- **Material:** Polypropylene
- **Type:** Monofilament
- **Color:** Blue
- **Wound Support:** Life time

- **Specialties:** Cardiac Surgery, Plastic Surgery, Laparotomy

Other products

- X-Bond
- Steel Wire
- Bonewax

And many other coming soon…


Thanks for your attention!
Questions/Comments?