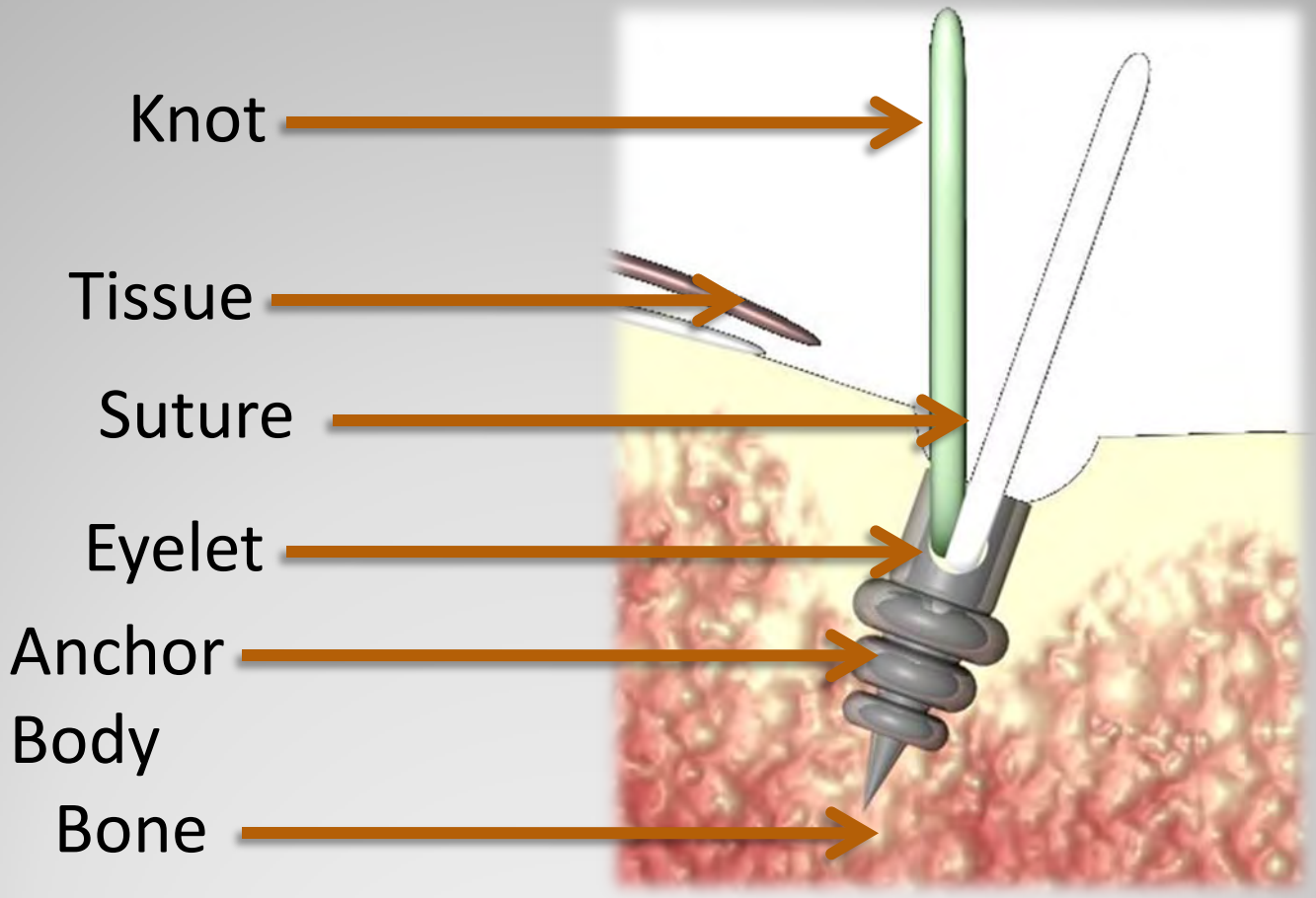
渡 Watanabe
辺 Club

smith&nephew

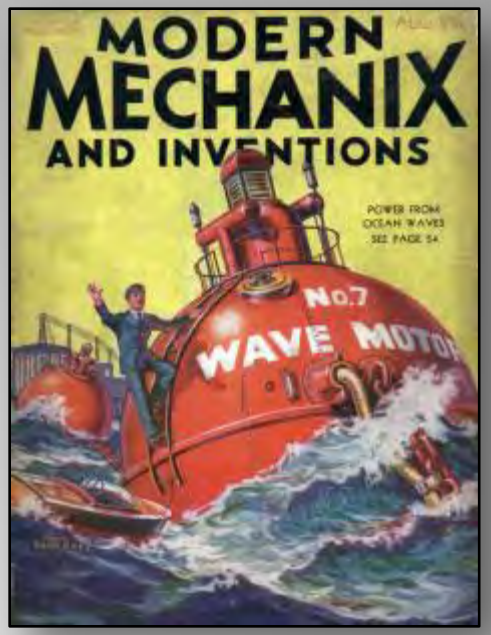
Lennard Funk
Wrightington Hospital & Salford University

Anchors & Sutures

Suture Anchor Anatomy



Aims of an Anchor



1. Fix the suture to the bone
2. Not pull out of the bone
3. Permit easy surgical technique

   (including the ability for arthroscopic knot tying)
4. Prevent long-term morbidity

Anchor Types

Push-Fit

Drill Hole & Hammer

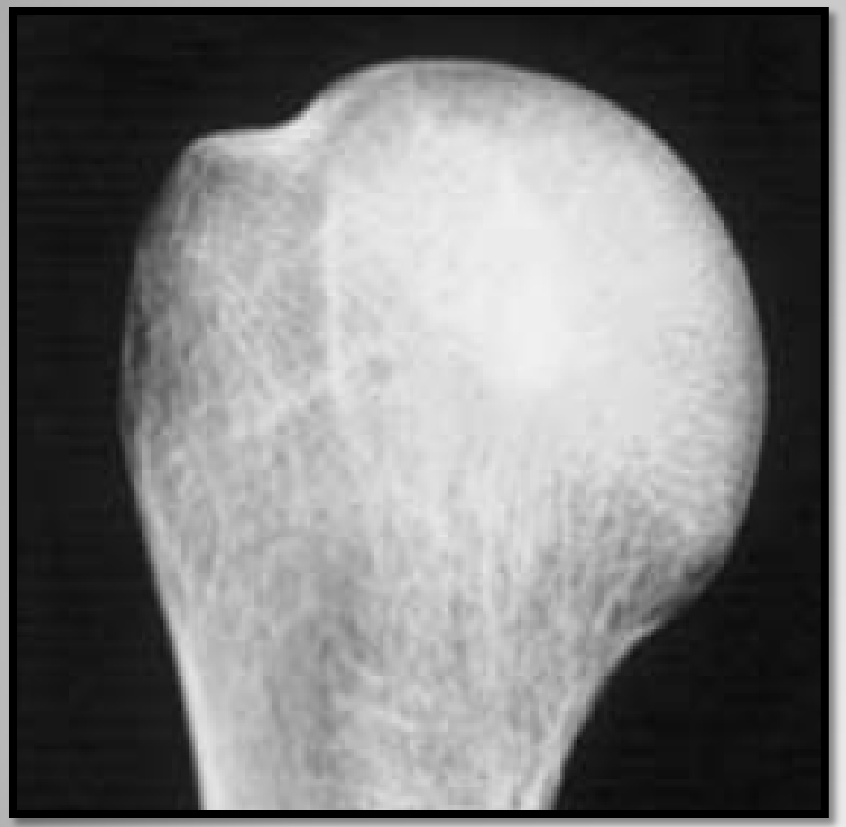
Screw-In

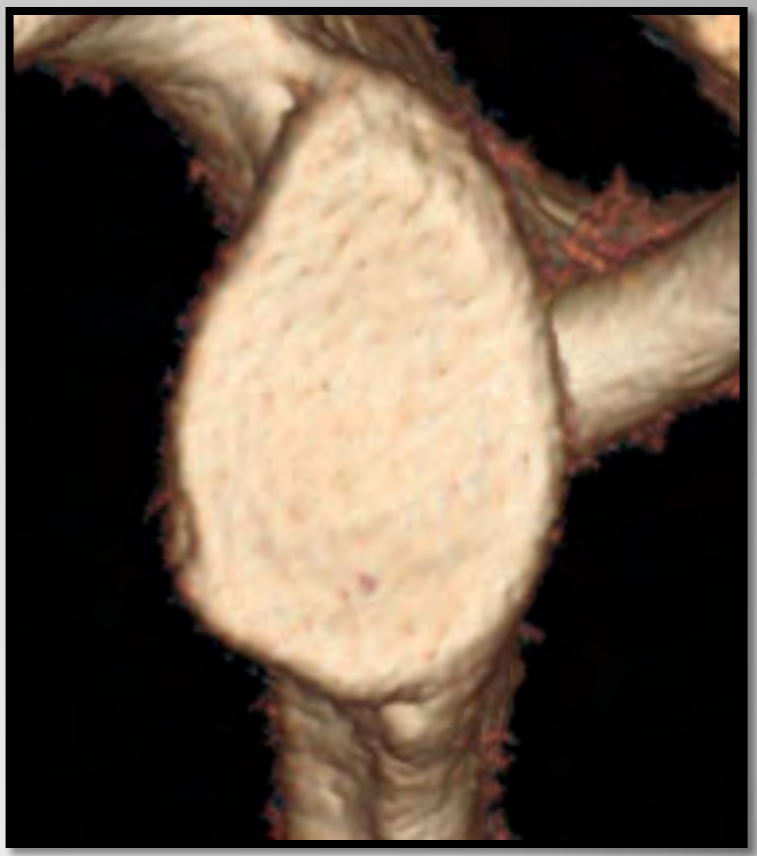
Tap & Screw

Anchor Tips

1. More anchor points increases strength of repair
2. Know your Bone
3. Deadman's Angle
4. Always test the anchor (Pull hard)

Bone Quality





Anchor Material

	Advantages	Disadvantages
Metal (Titanium) 	Easy; Strong; Reliable; Cheap	Proud; Eyelets; Revision; Articular; (Doesn't Biodegrade)
Biodegradable 	Biodegrades (?)	Osteolysis; Synovitis; Doesn't biodegrade; Science Fiction
PEEK 	Strong; Soft; Expands; Revision;	(Doesn't Biodegrade)
Composites	Strong; Biodegrades (?)	Is it better than Biodegradables??

Biodegradables: Degradation Rates

Slow

Fast

PLLA	3-5 years
PLLA/PDLA	3-5 years
PLDLA	2-3 years
PLGA	2 years
PDLA	2 years
PLLA/PGA	1-2 years
PDLGA	1 year

In Vivo ??

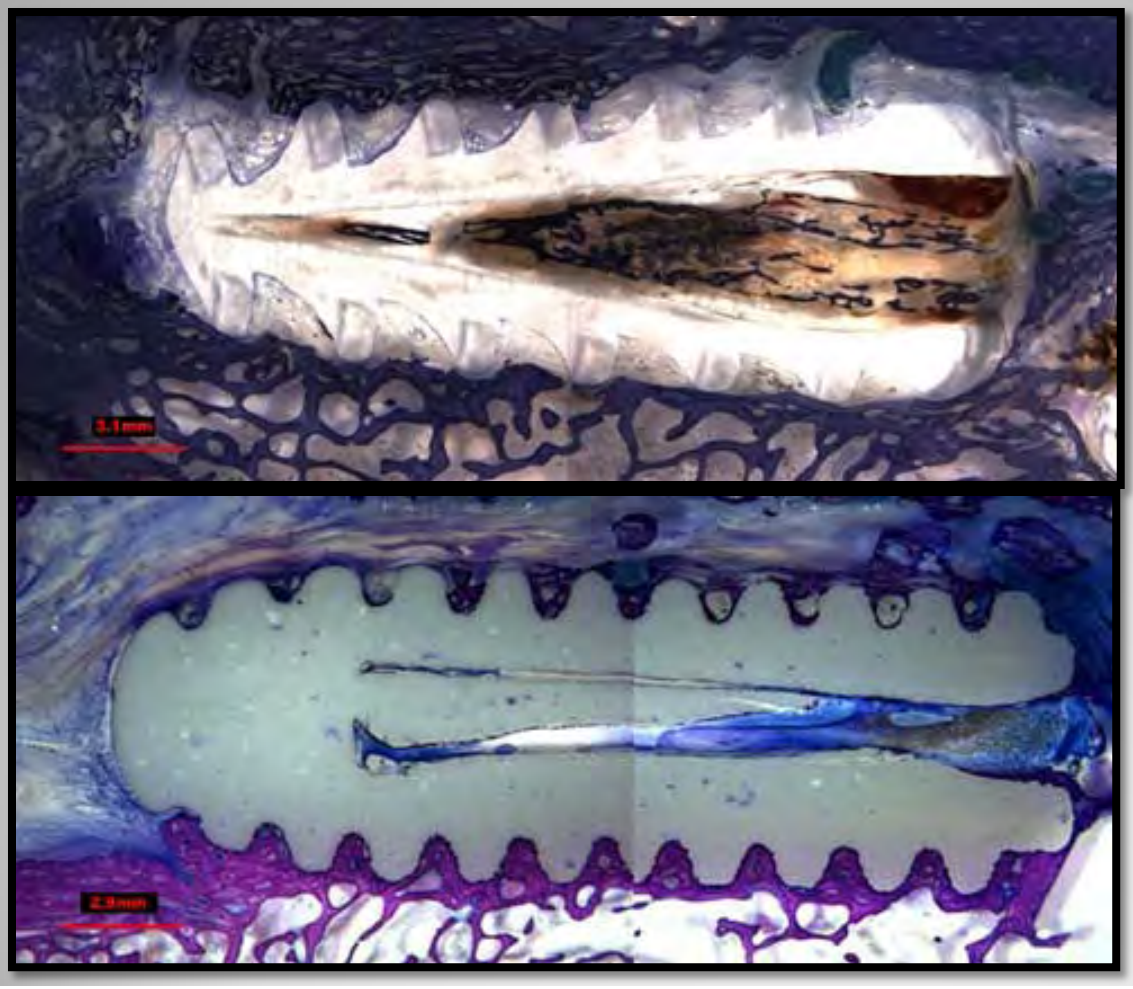
"Unfortunately, only a few studies have investigated the in vivo degradation of the different polymers used in biodegradable implants,
and these have reported vastly different results because of inconsistent test conditions and different implant processing techniques."

Arthroscopy, 2000

Addition of mineral/ceramic to polymer phase. Generally does not effect the degradation rate of the polymer.

- Hydroxyapatite (HA)
  - Calcium phosphate – resorption time 3 years +
- Tricalcium Phosphate (TCP)
  - Calcium phosphate – resorption time 2 years

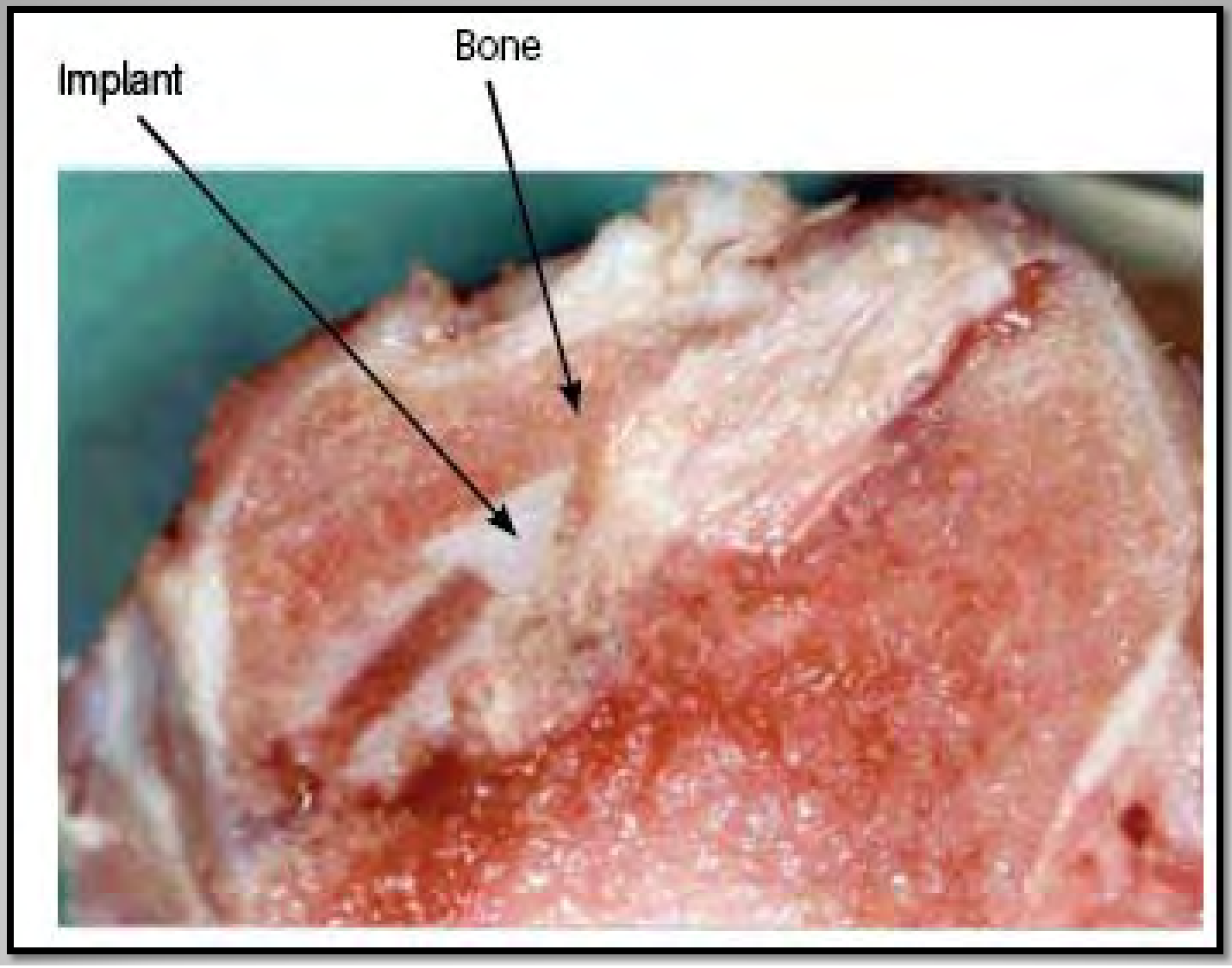
Tissue Reaction

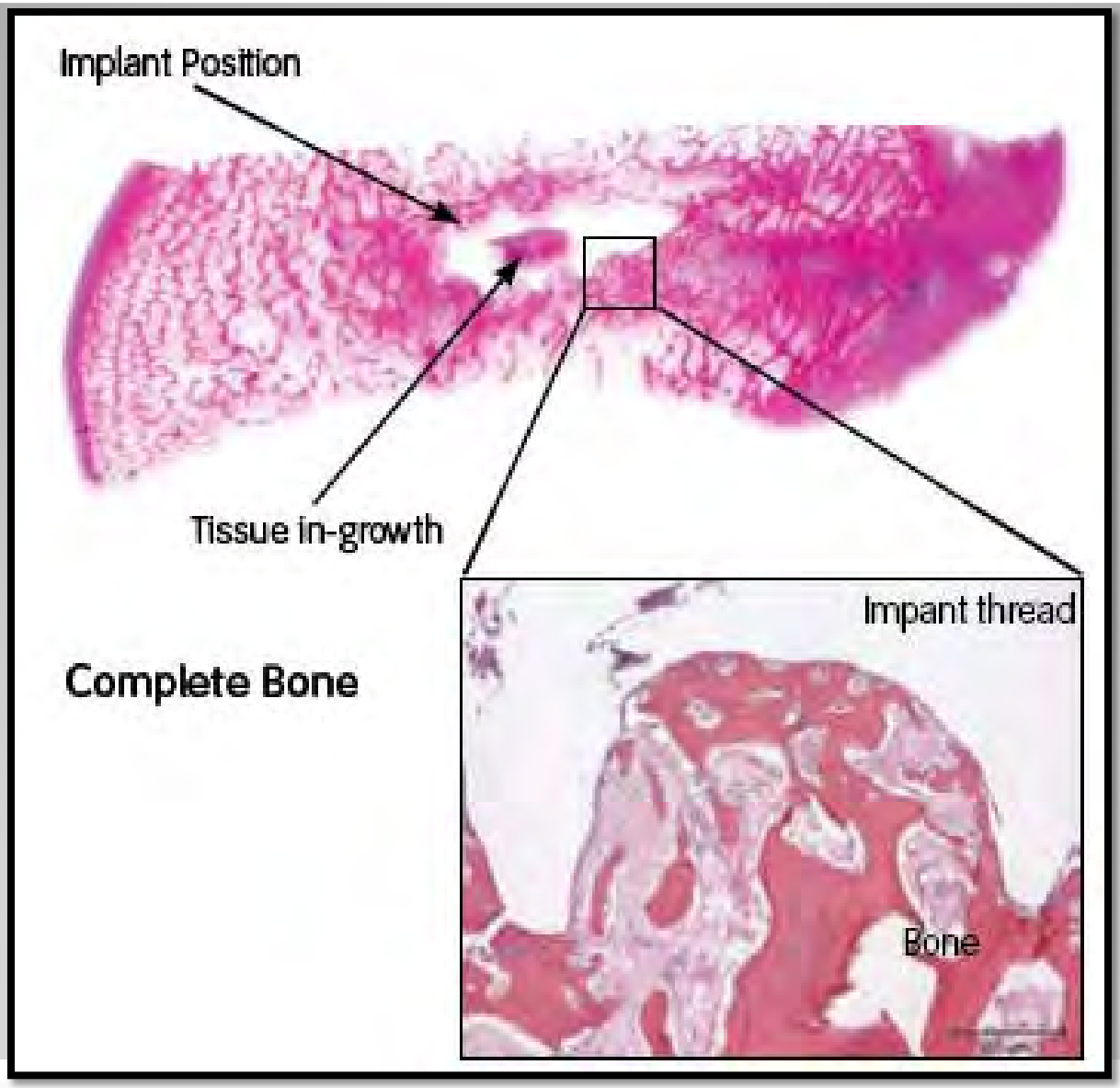


PLLA

HA-PLLA

Hunt & Callaghan, Knee Surg Sports Traumatol Arthrosc 2008


Implant
Bone


Implant Position
Tissue in-growth
Impant thread
Bone
Complete Bone

Makes Sense
...But...does it make a difference?

- ? Biodegradability
- ? Osteolysis

Suture Material

Monofilament PDS	"Memory"; loses 40% strength by 6wks; Dissolves 9wks *Load to Failure = 50N*	Capsular Plication
Multifilament Ethibond	Braided polyester; Cheap *Load to Failure = 91N*	Historical
High Strength Ultrabraid	UHMPE; complex braid *Load to Failure = 270N*	Strong!
… The future		

Is it just Strength??

… Orthobiologics

Growth Factors

- Timed Release

- on the Suture
- Anchor Reservoir
- In the Tissue

Suture Management

1. Tie suture through same portal as anchor
2. Use cannula or 'virtual cannula' for knot tying
3. No more than two suture limbs out any portal at a time (park sutures)
4. Know your knot and material well
5. Have a 'plan B' for everything (double/triple loaded anchors)
6. Practice on Alex model