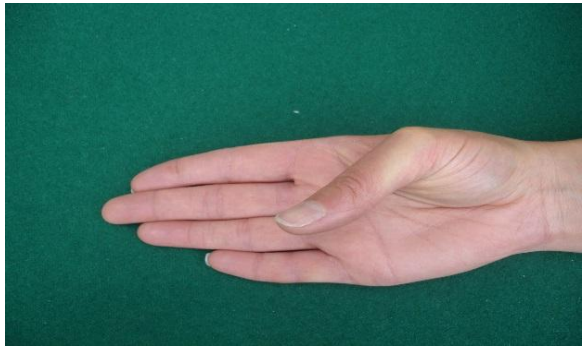
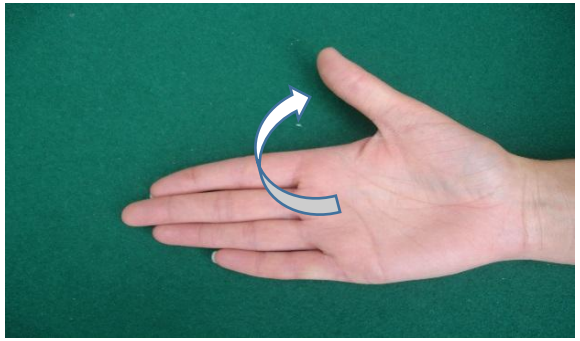
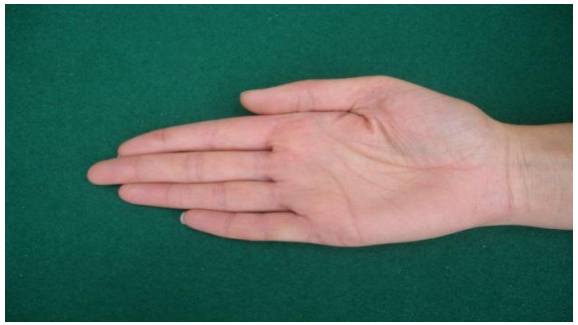


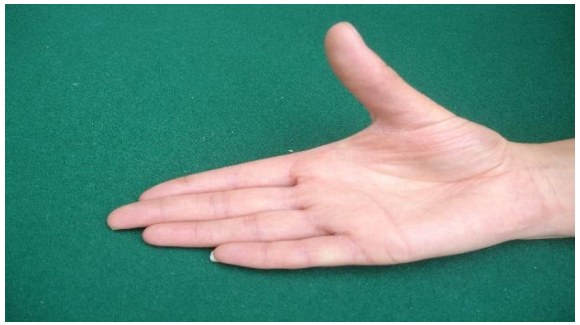
Flexion



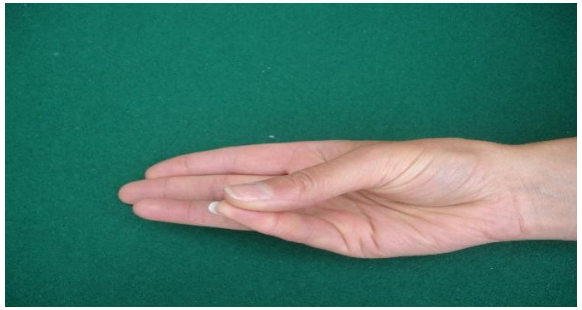
Extension



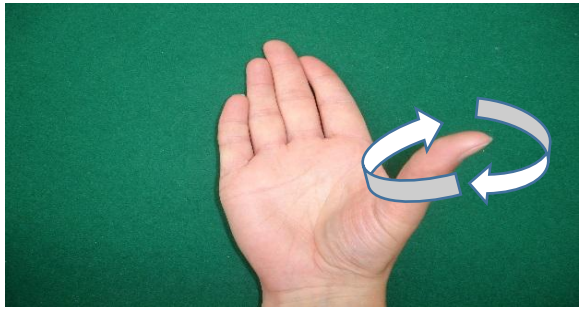
Adduction



Abduction



Opposition



Circumduction

Figure 1.1: Movements of the thumb .

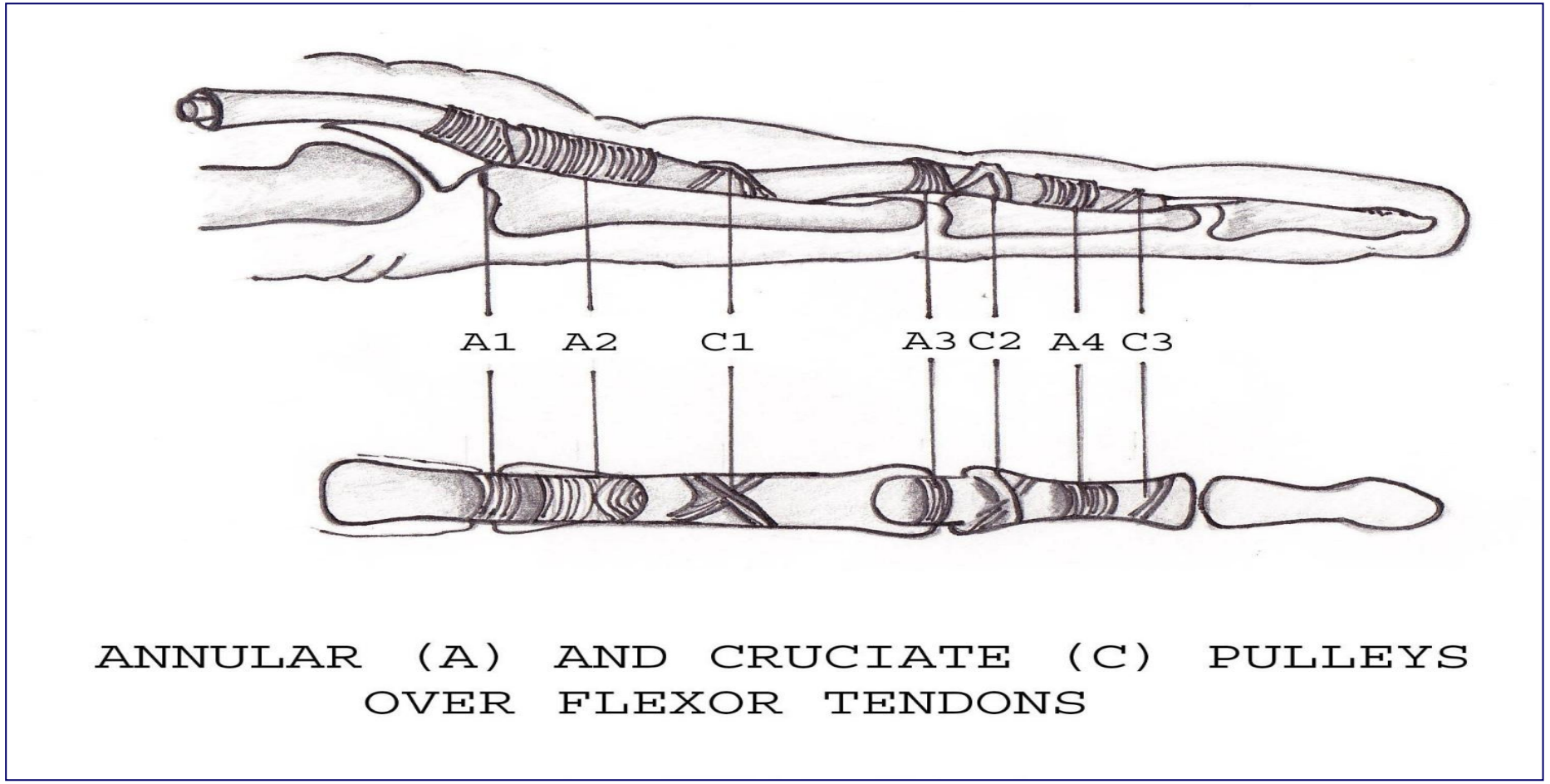


Figure 1.5: Pulley system of the fingers.

Acknowledgement: www.orthopaedicprinciples.com

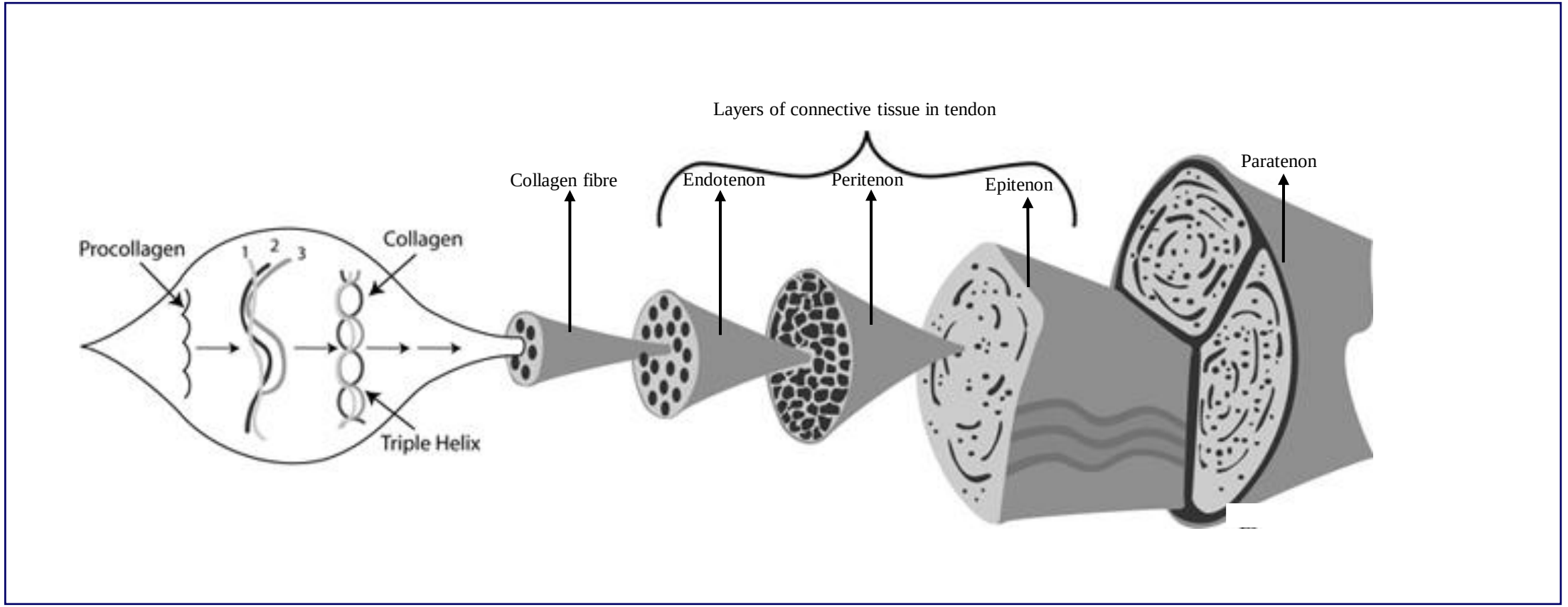


Figure 1.6: Demonstration of structure and layers of connective tissue in tendon.

Acknowledgement: www.frontbiosci.org

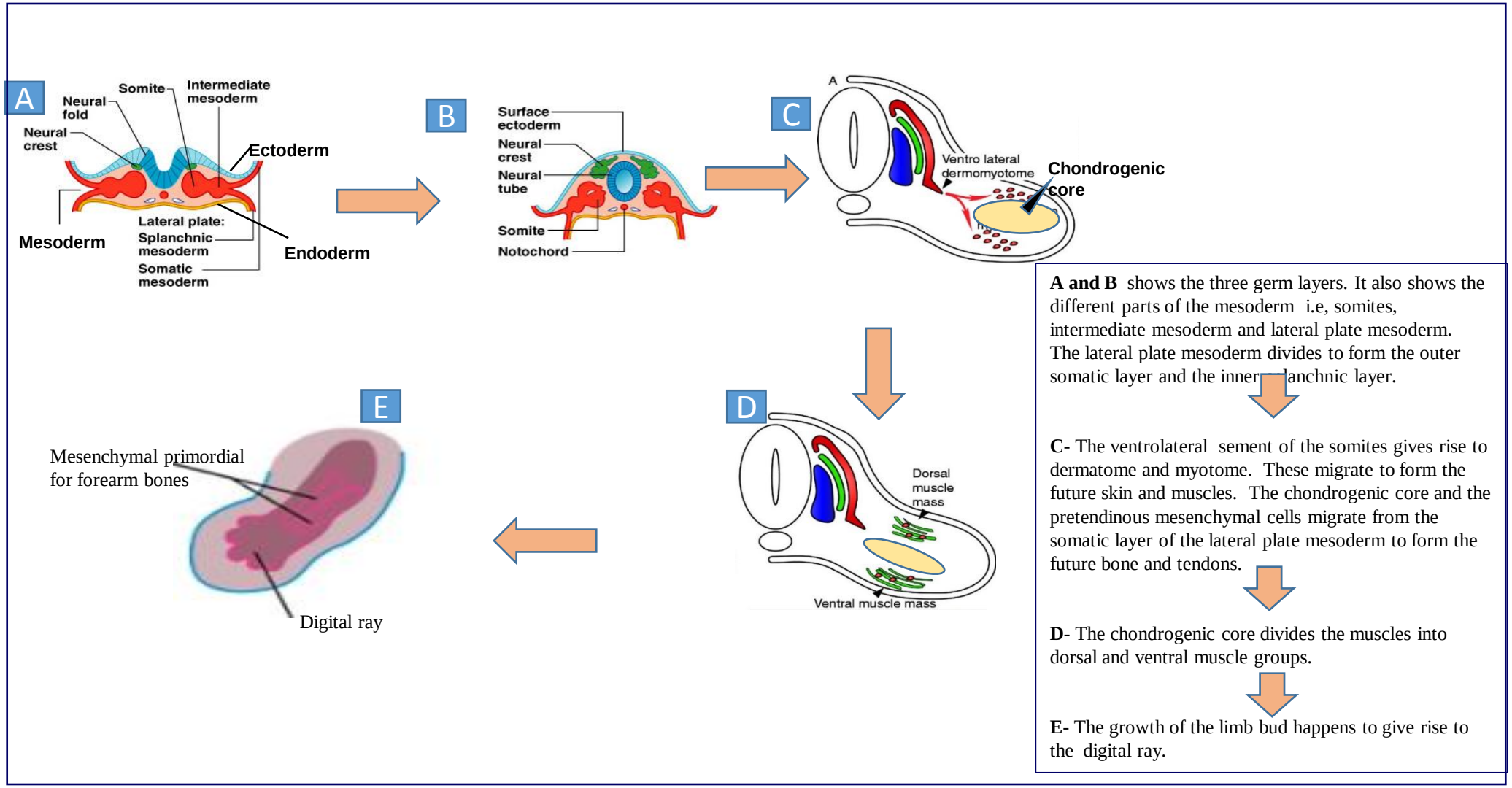
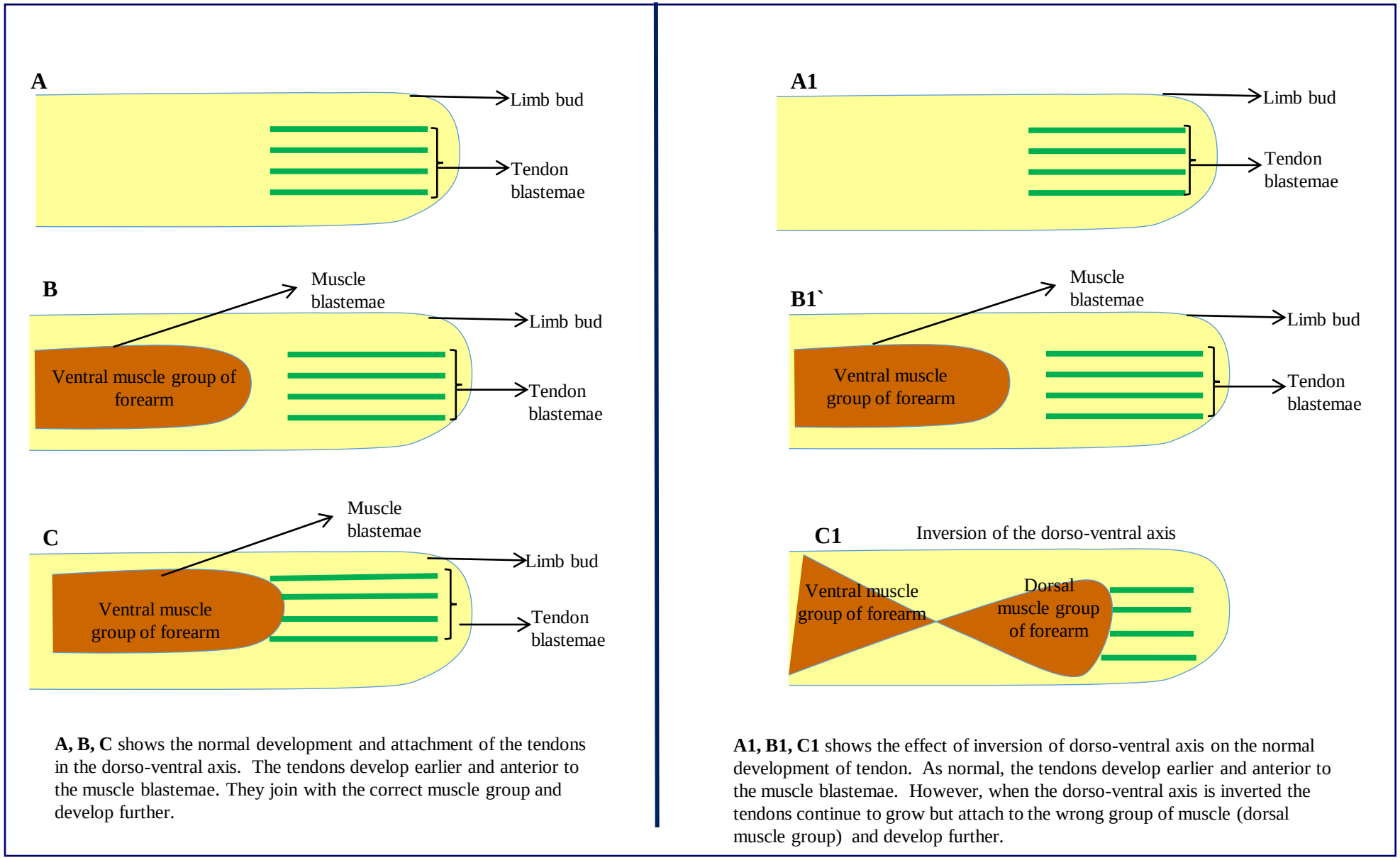


Figure 1.12: Illustrates the embryology of the upper limb.

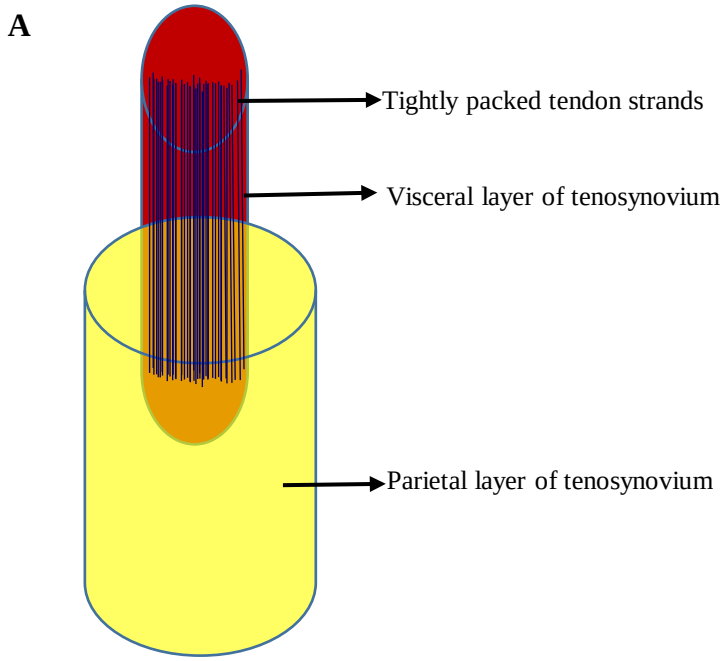
Acknowledgements: A and B- www.apsu.org,
C and D-www.reproduction-online.org,
E- www.embryo.chronolab.com

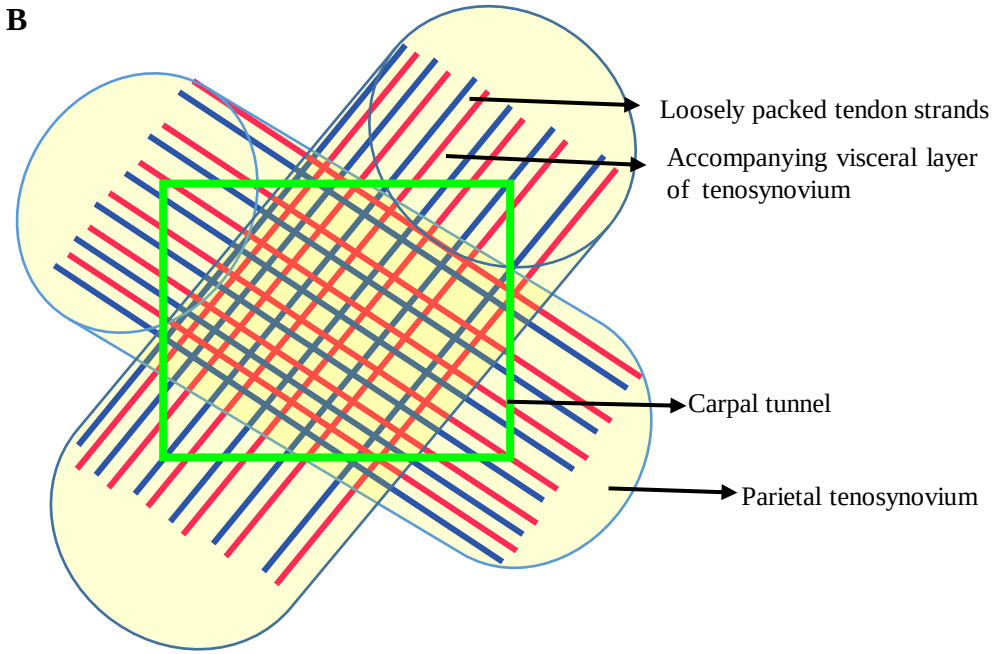


A, B, C shows the normal development and attachment of the tendons in the dorso-ventral axis. The tendons develop earlier and anterior to the muscle blastemae. They join with the correct muscle group and develop further.

A1, B1, C1 shows the effect of inversion of dorso-ventral axis on the normal development of tendon. As normal, the tendons develop earlier and anterior to the muscle blastemae. However, when the dorso-ventral axis is inverted the tendons continue to grow but attach to the wrong group of muscle (dorsal muscle group) and develop further.

Figure 1.13: Illustrates the experiment done by Kieny and Chevallier in 1979.





A: Illustrates the normal structure of a FDS tendon at carpal tunnel

The FDS tendon strands are tightly packed and better organised than the FDP tendons. The FDS tendons are covered by the visceral layer of the tenosynovium which in turn are enveloped by the parietal layer of tenosynovium.

B: Illustrates the normal structure of a FDP tendon at carpal tunnel

The FDP tendon strands are loosely packed. The visceral layer of the tenosynovium recognises each tendon strand to be a tendon and wrap around them. At the carpal tunnel, there is criss crossing of these tendon strands and their accompanying visceral tenosynovium. This arrangement may lead to trapping of the tenosynovium between the tendon strands and could predispose to interconnections.

Figure 1.14: Illustrates the normal arrangement of the tendon strands of FDS and FDP tendons at carpal tunnel.

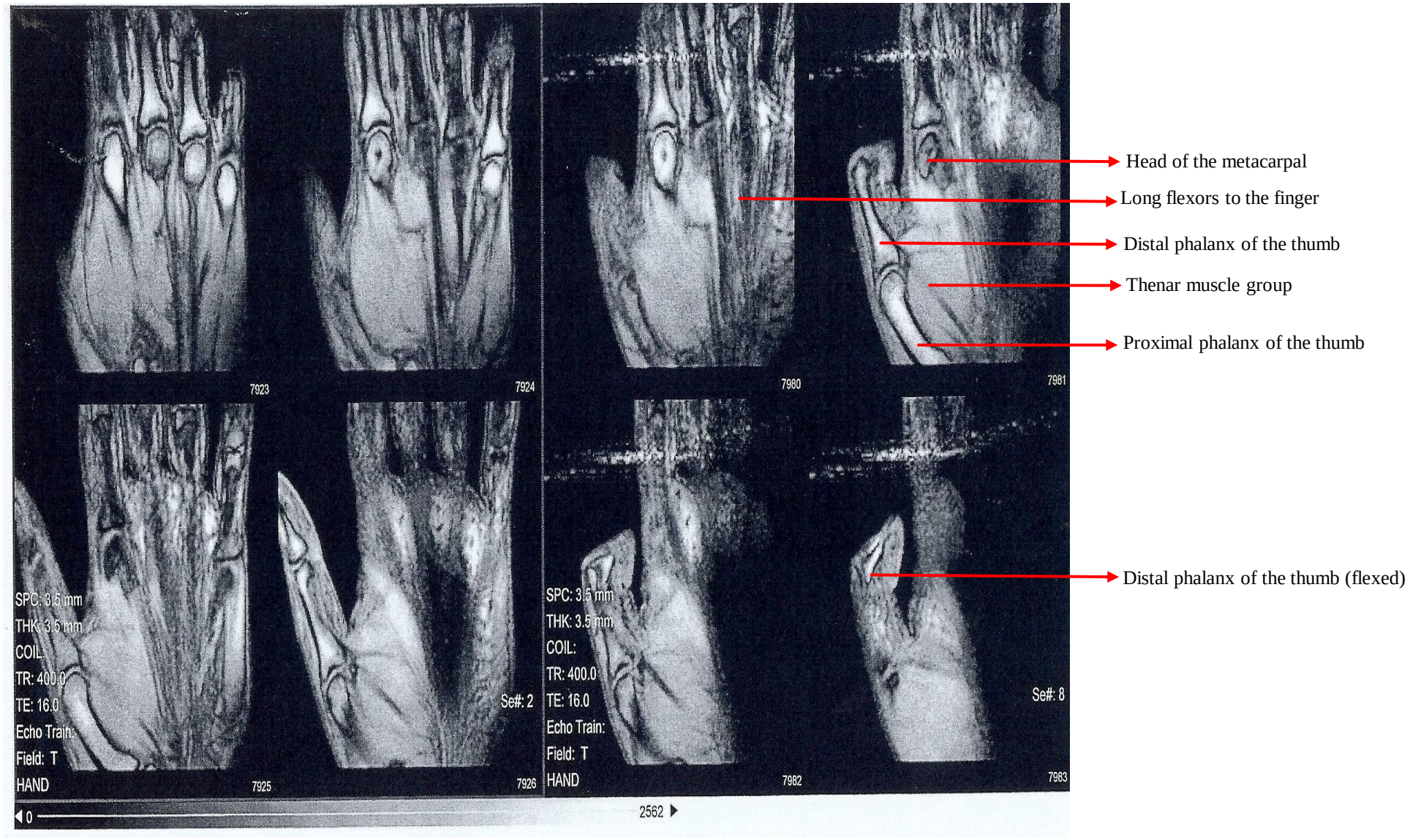


Figure 3.29: Images taken during pilot study.

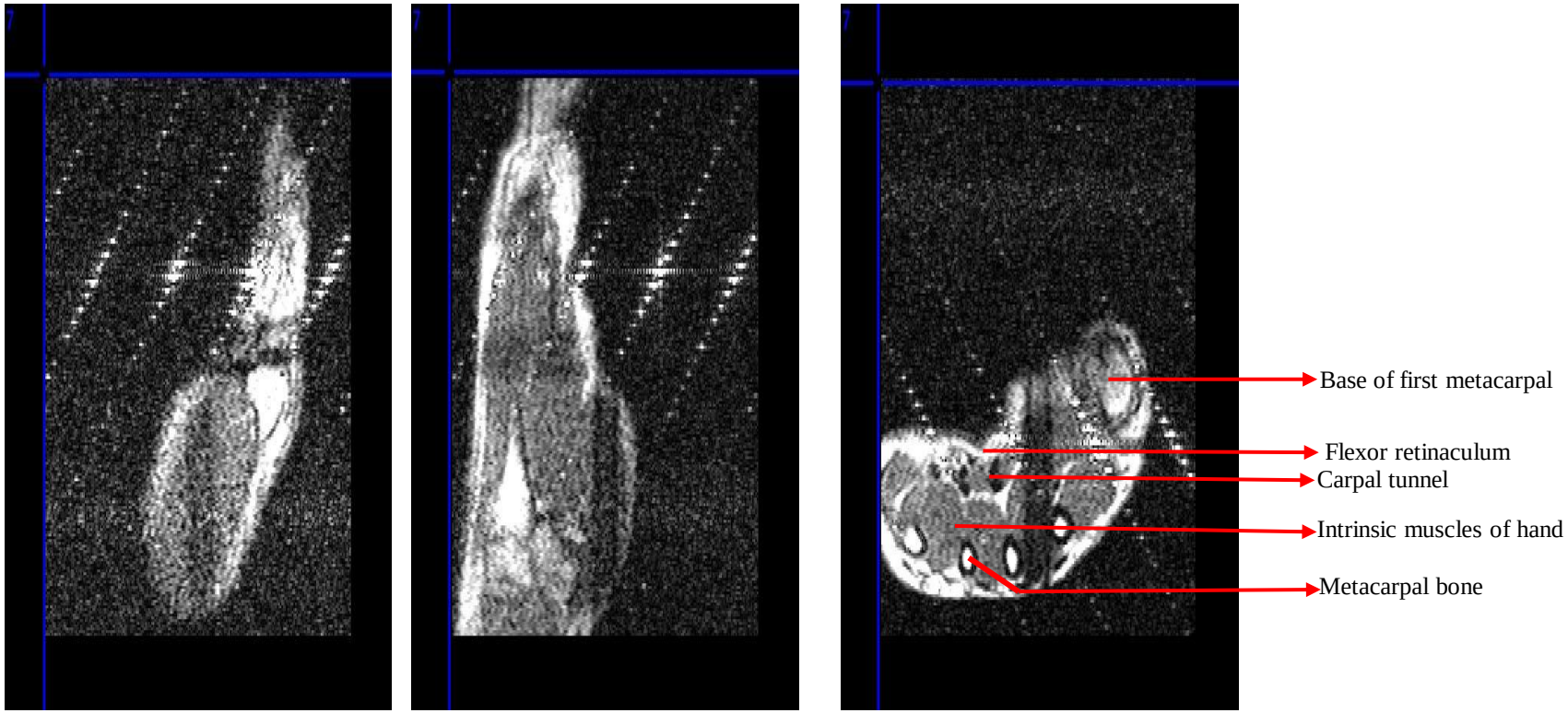


Figure 3.30: Images taken with the volunteer. The image quality is poor with artefacts.

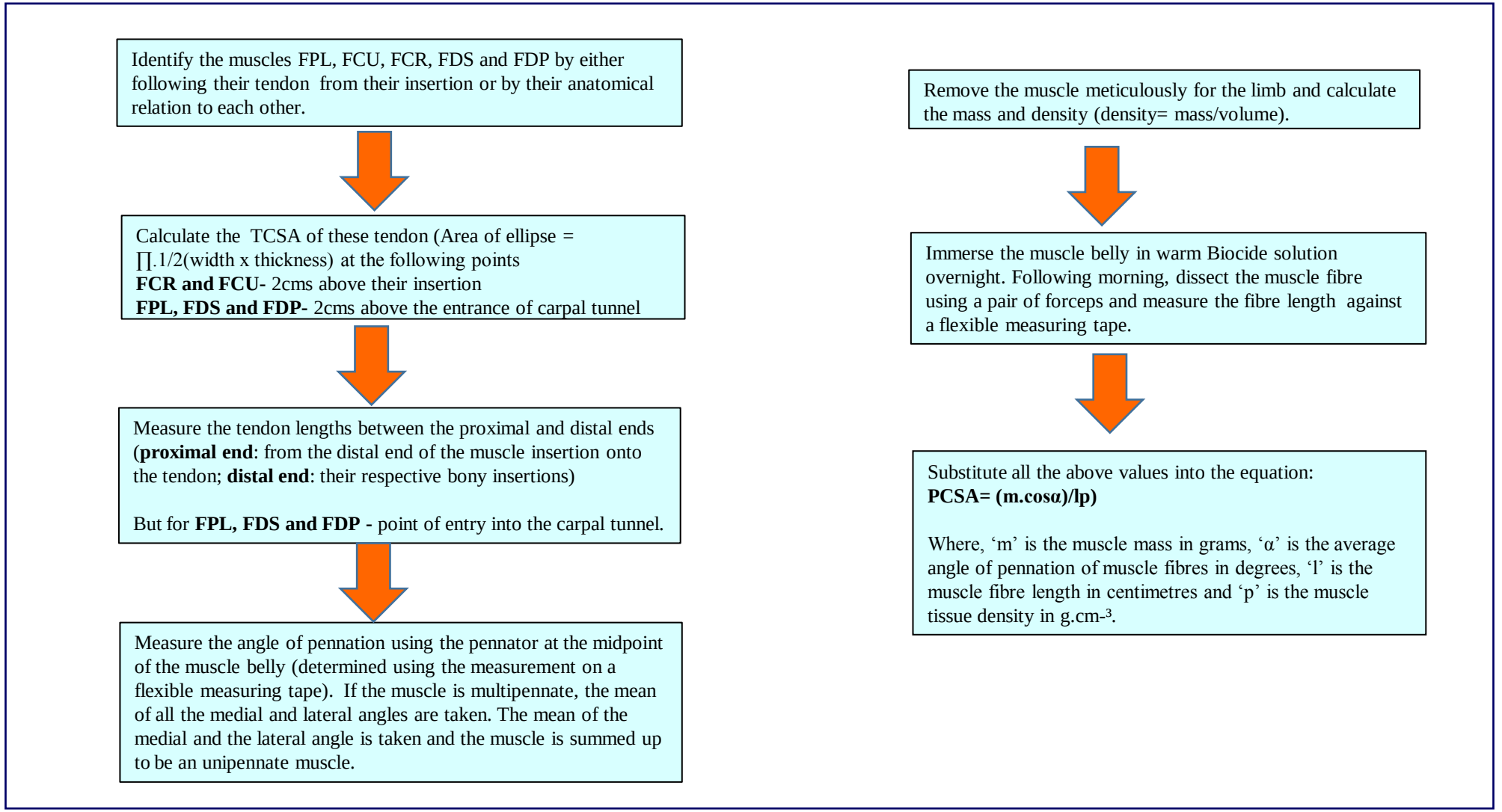


Table 2.1: Summarises the dissection steps undertaken.

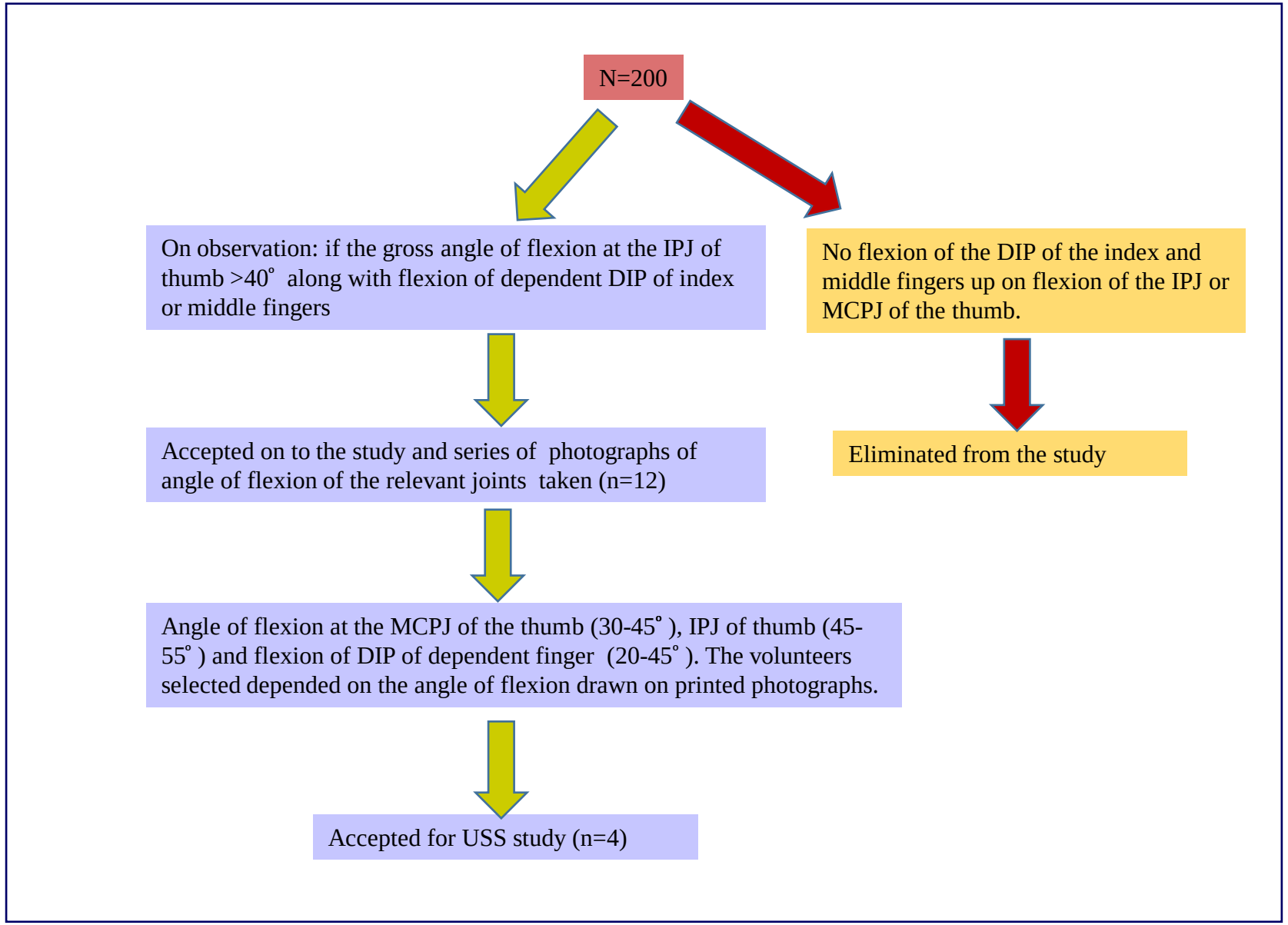
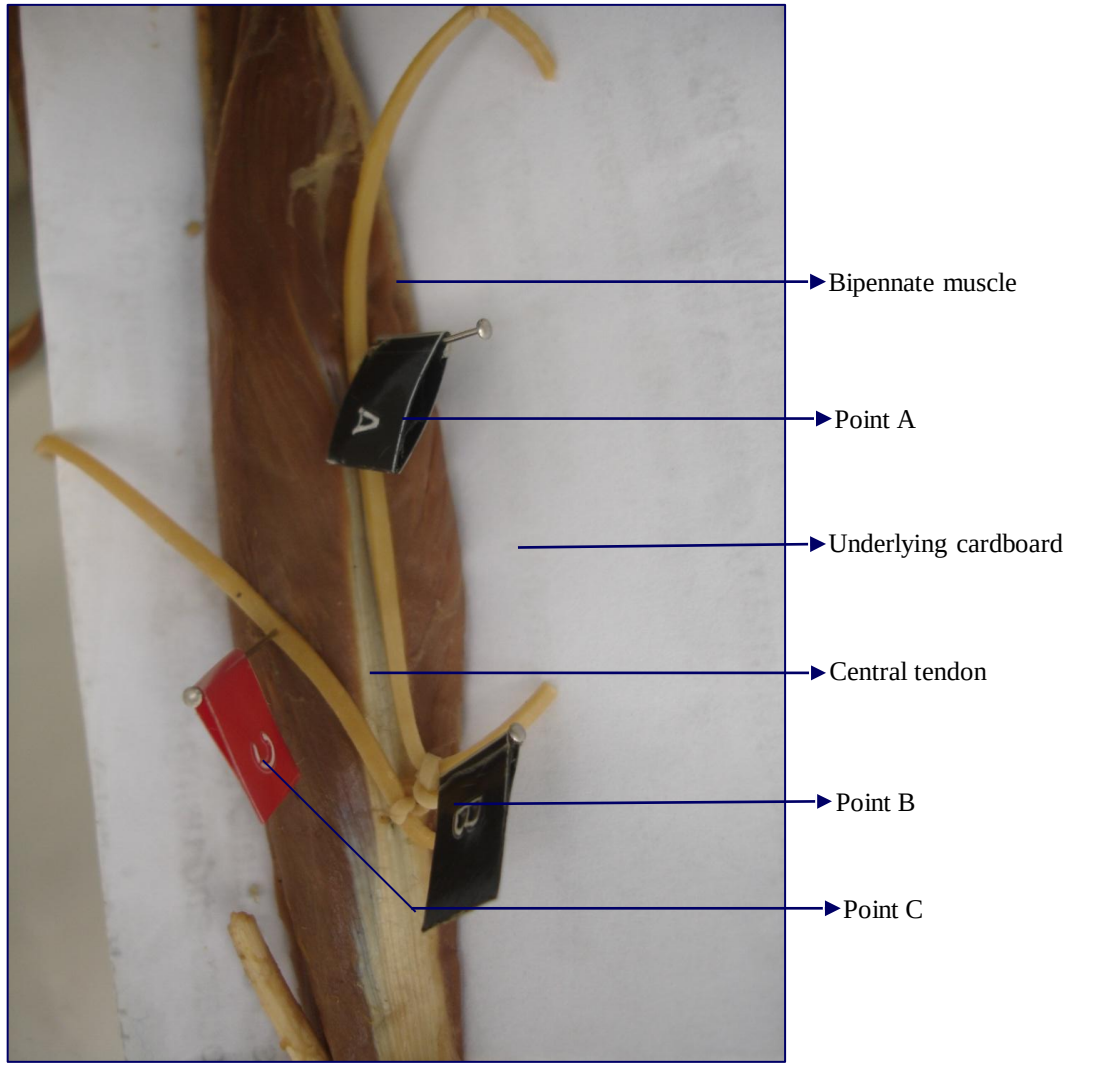
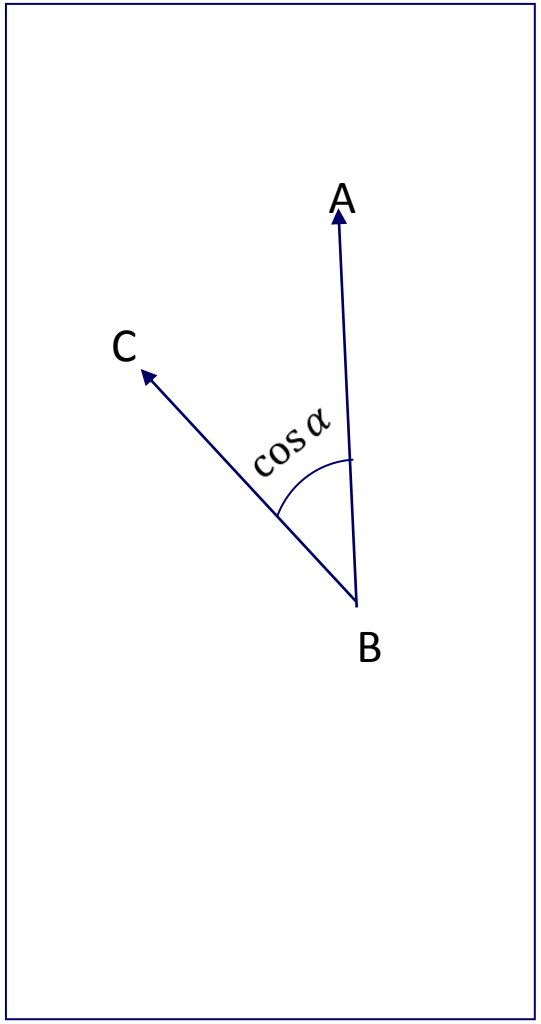


Table 2.2: Summarises the criterion used for volunteer selection.

Figure 2.3: Showing the relations of the median nerve at the wrist.

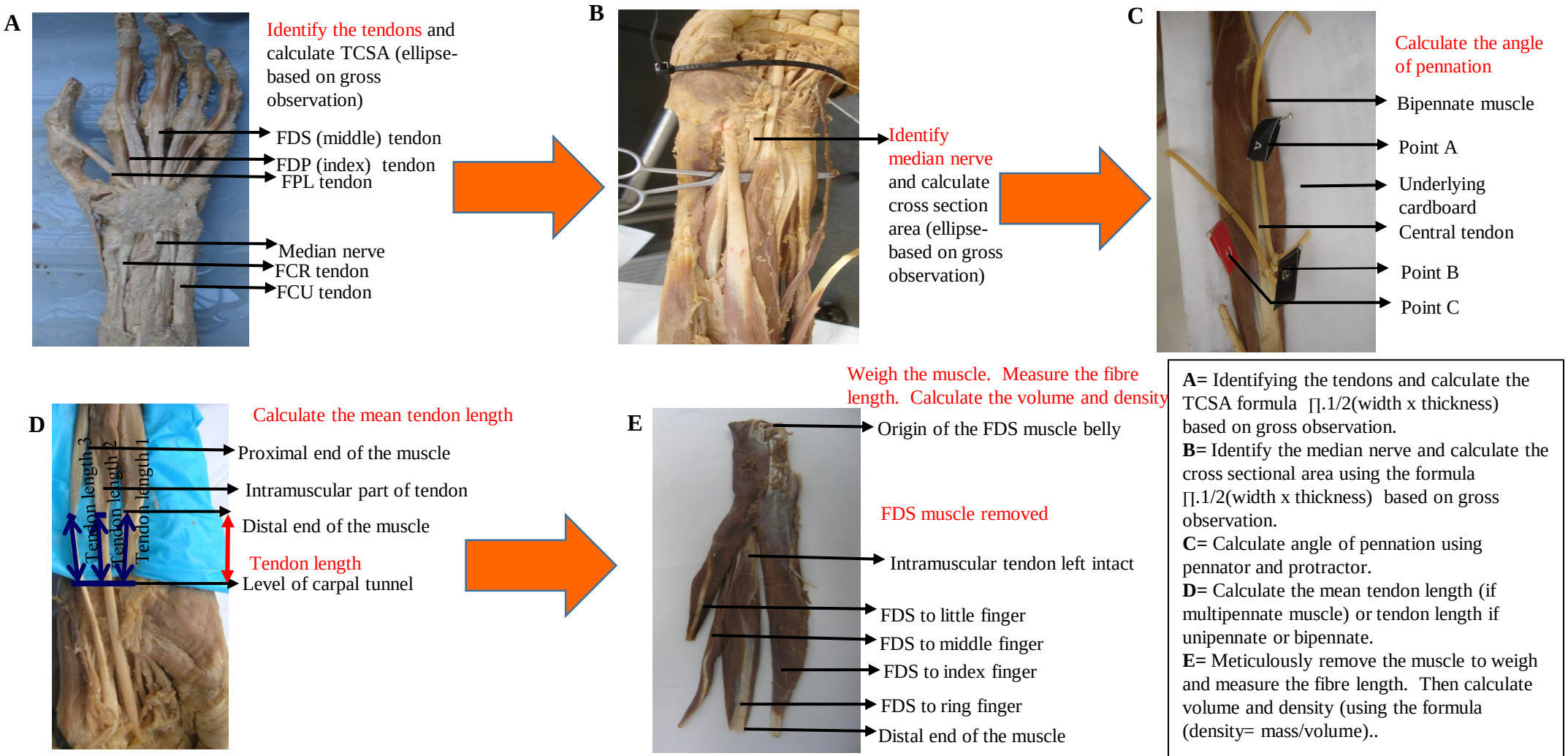


Pennator



Joining points A, B and C forms the angle of pennation.

Figure 2.7: llustrate the pennator and how the angle of pennation was plotted and calculated.



A= Identifying the tendons and calculate the TCSA formula ∏.1/2(width x thickness) based on gross observation.
B= Identify the median nerve and calculate the cross sectional area using the formula ∏.1/2(width x thickness) based on gross observation.
C= Calculate angle of pennation using pennator and protractor.
D= Calculate the mean tendon length (if multipennate muscle) or tendon length if unipennate or bipennate.
E= Meticulously remove the muscle to weigh and measure the fibre length. Then calculate volume and density (using the formula (density= mass/volume)..

Substitute these value into **PCSA= (m.cosα)/lp)**
Where, 'm' is the muscle mass in grams, 'α' is the average angle of pennation of muscle fibres in degrees, 'l' is the muscle fibre length in centimetres and 'p' is the muscle tissue density in $g.cm^{-3}$.

Figure 2.9: Shows the different steps undertaken to calculate the PCSA, TCSA and the area of median nerve.

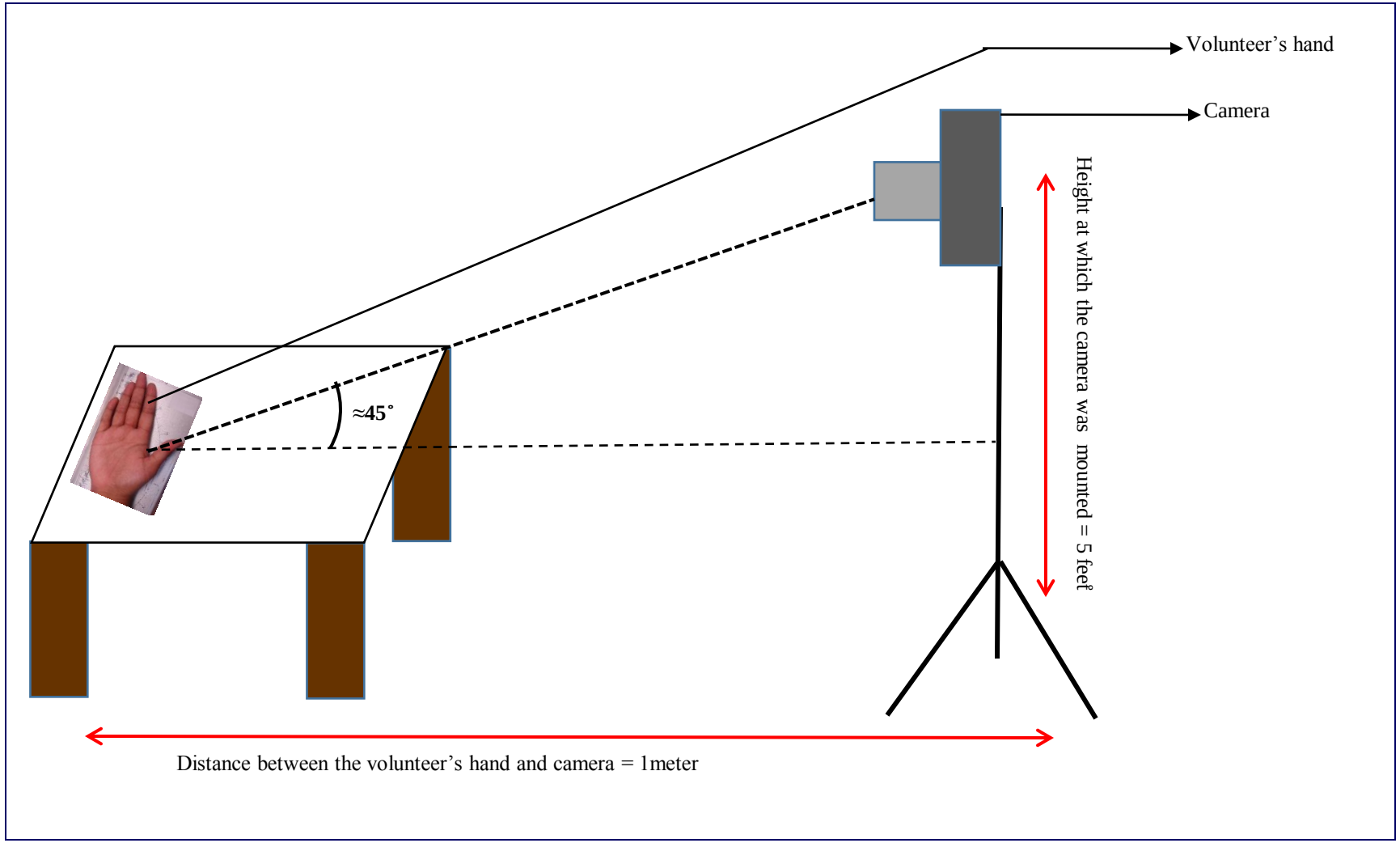


Figure 2.10: Illustrates the height, distance and angle at which the camera was set.

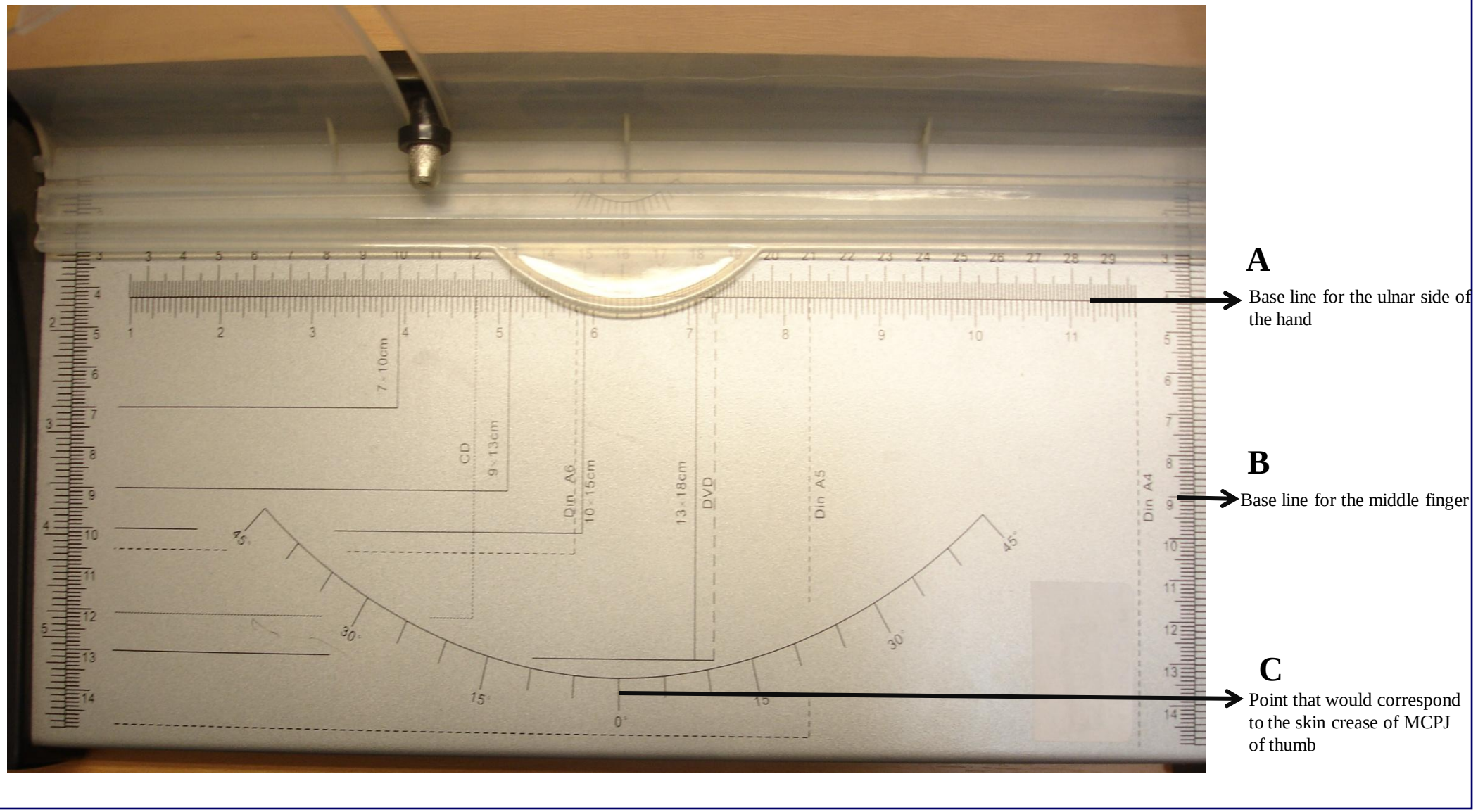


Figure 2.15: Shows the graduated background that was used for repeatability and reliability study. Note the reference points A, B, and C.

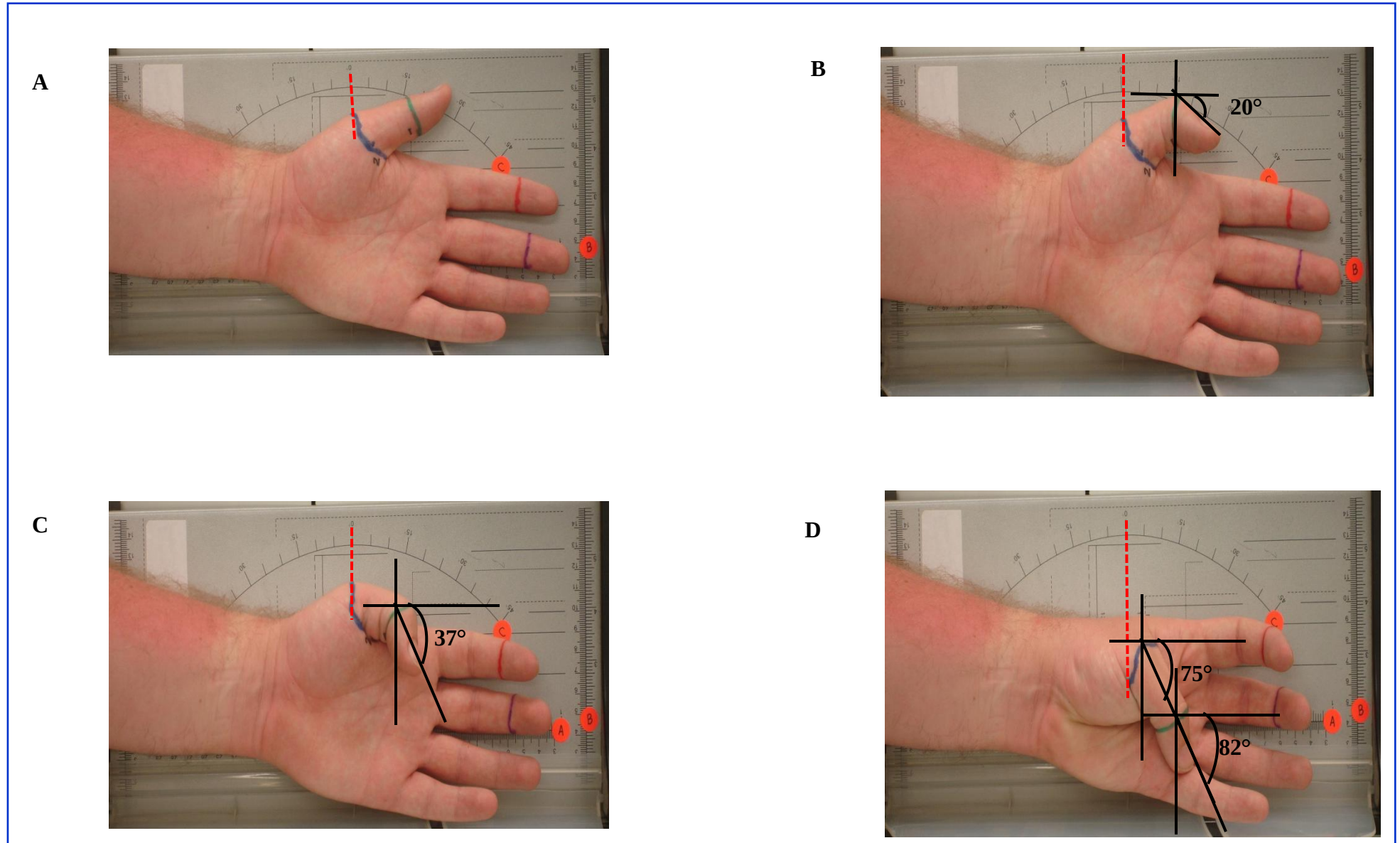


Figure 2.16: Demonstrating the angle of flexion of the thumb and the dependent fingers (A) at rest, (B) initial movement, (C) mid position and (D) fully flexed at mid prone position of volunteer 1. Taken during reliability and repeatability study.

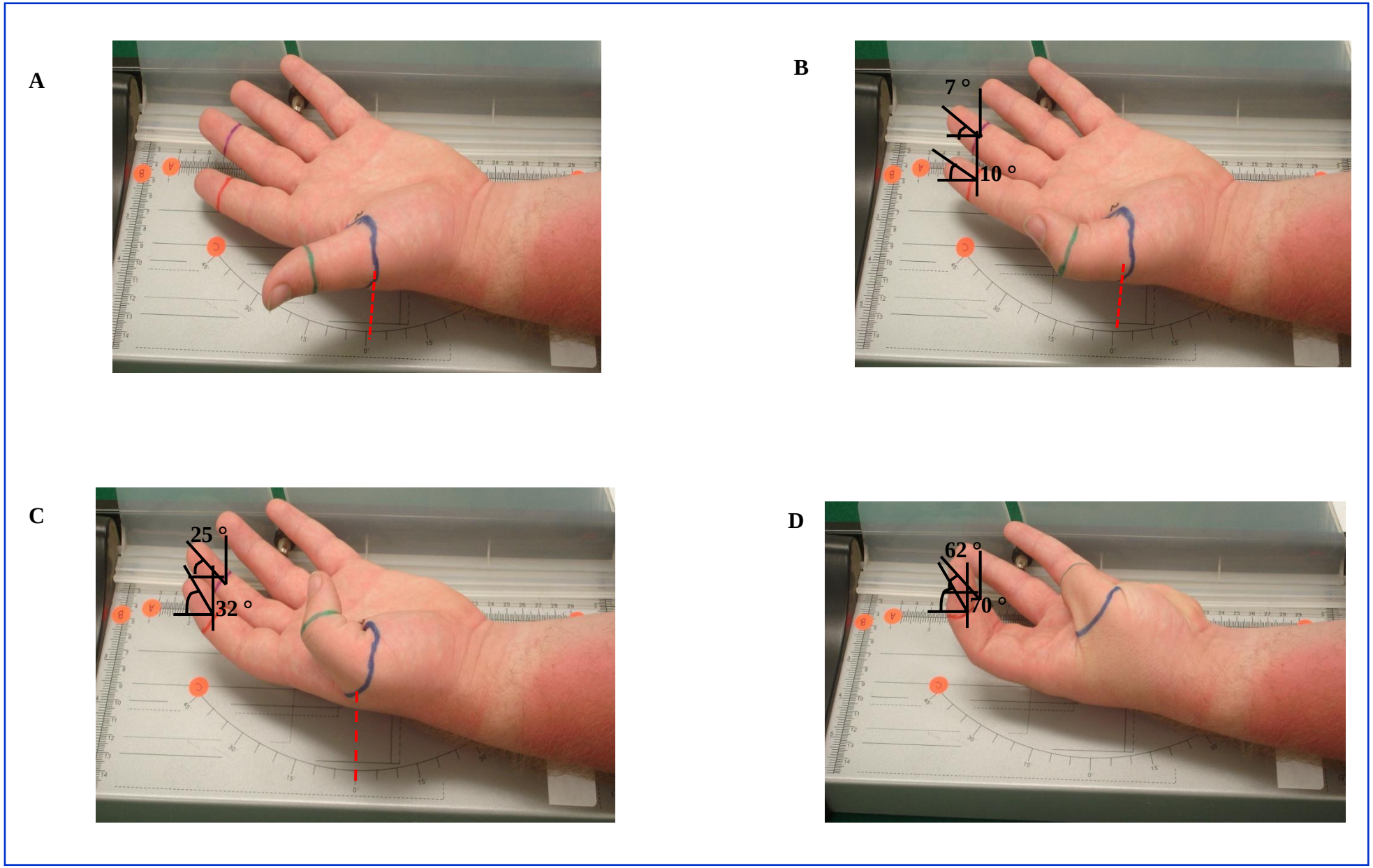


Figure 2.17: Demonstrating the angle of flexion of the thumb and the dependent fingers (A) at rest, (B) initial movement, (C) mid position and (D) fully flexed at supine position of volunteer 1. Taken during reliability and repeatability study.

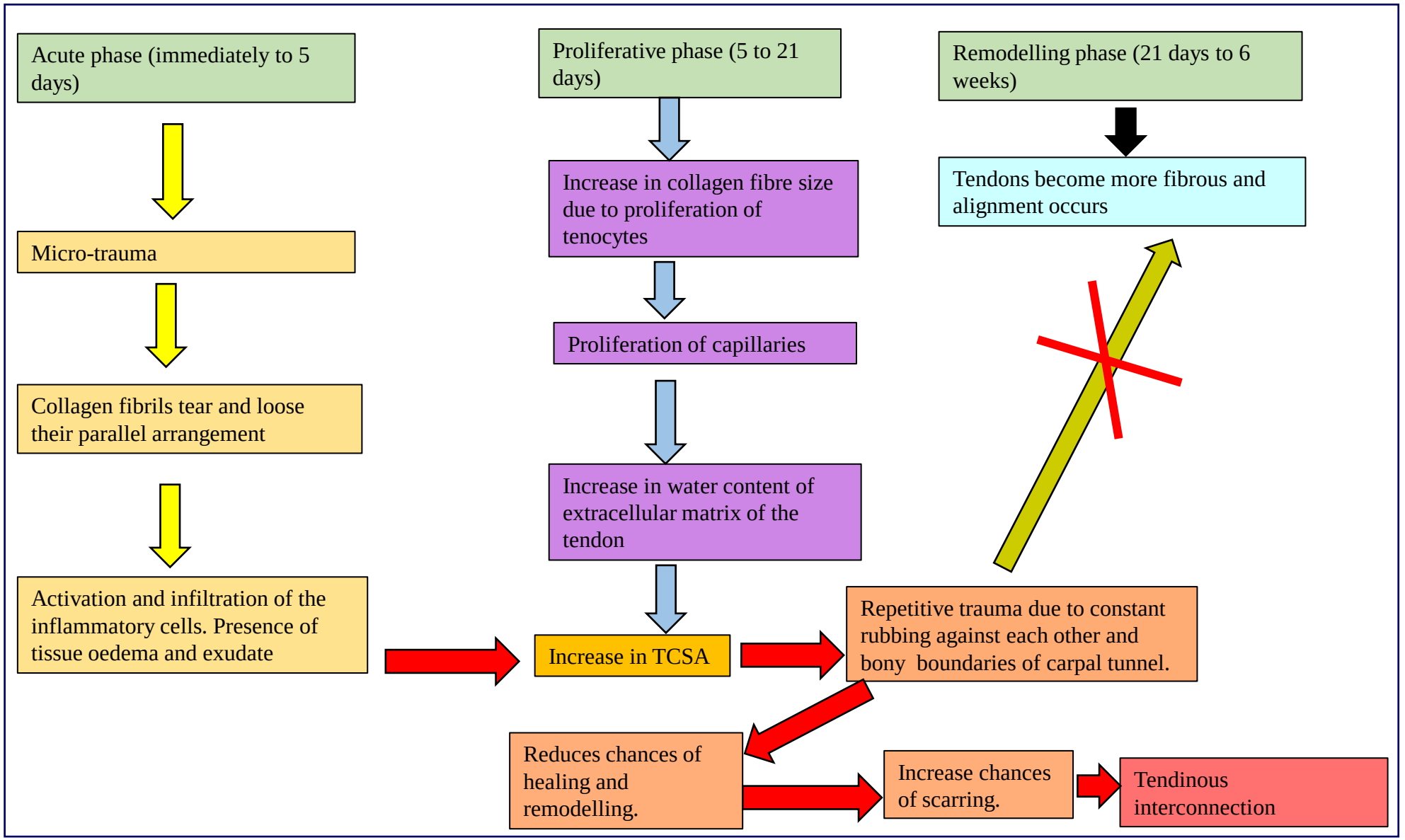


Table 4.1: Illustrates the pathophysiology of tendon healing, scarring and tendinous interconnections.