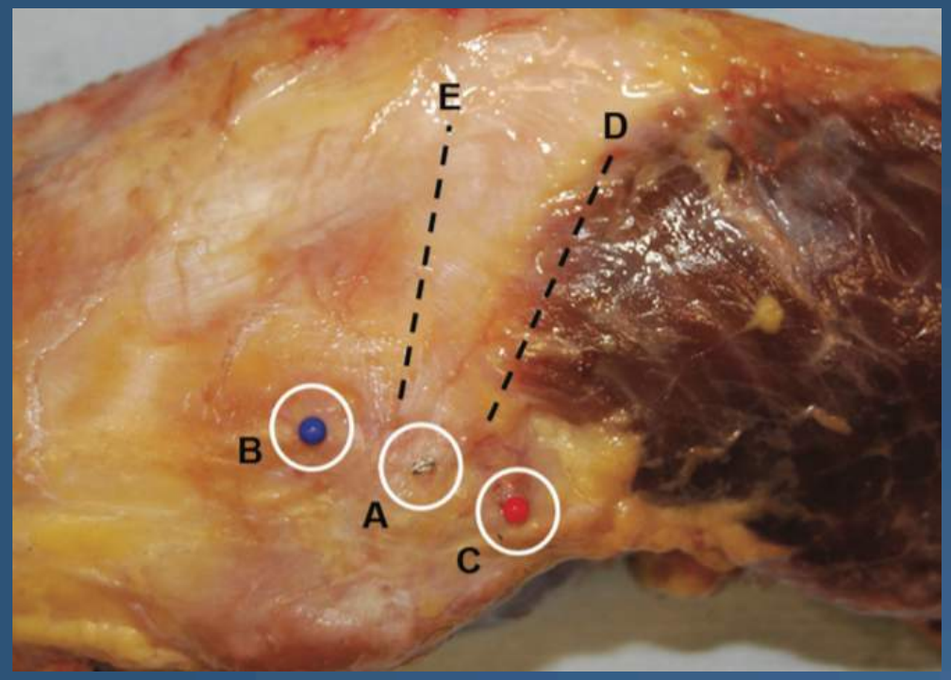
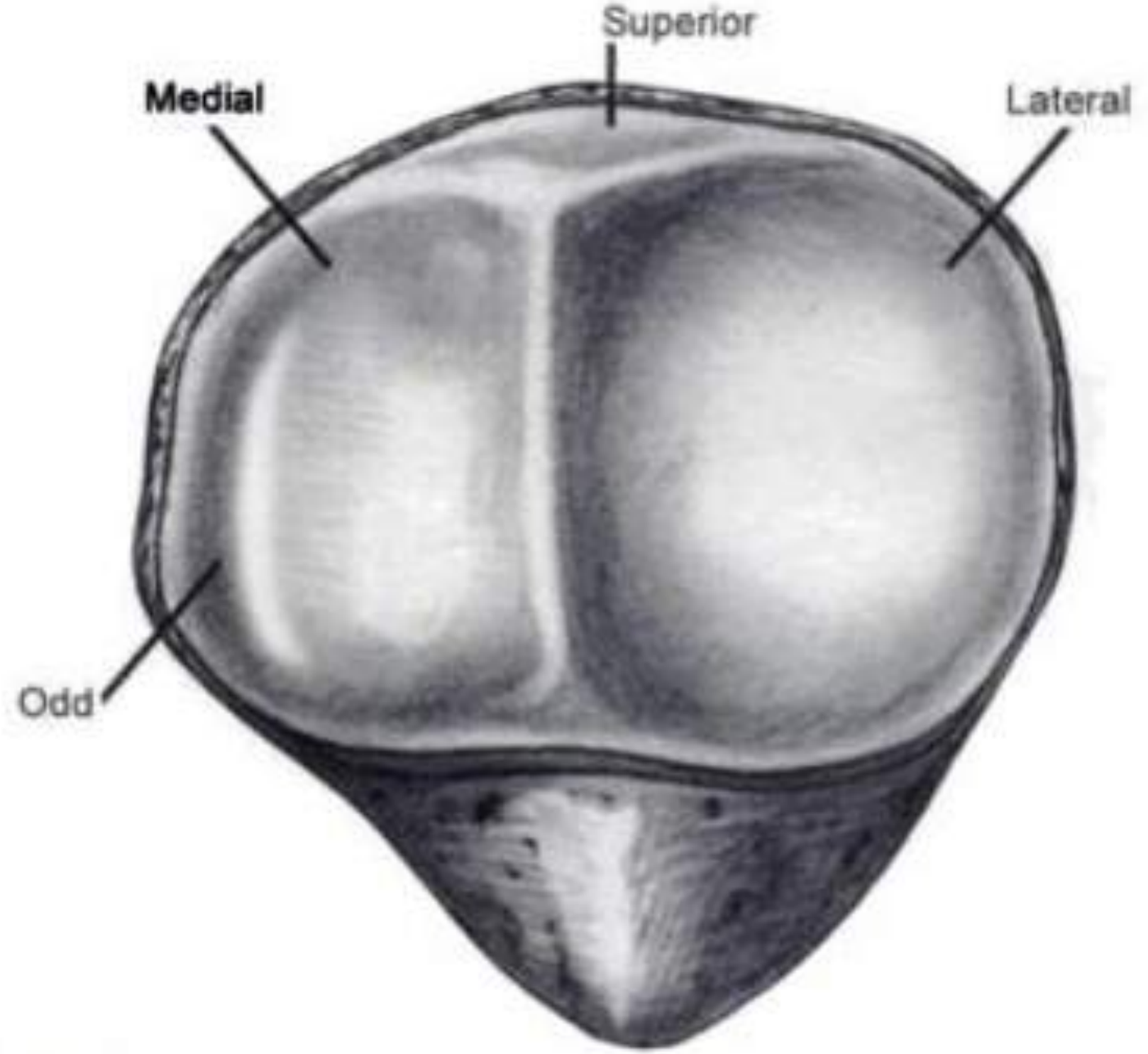
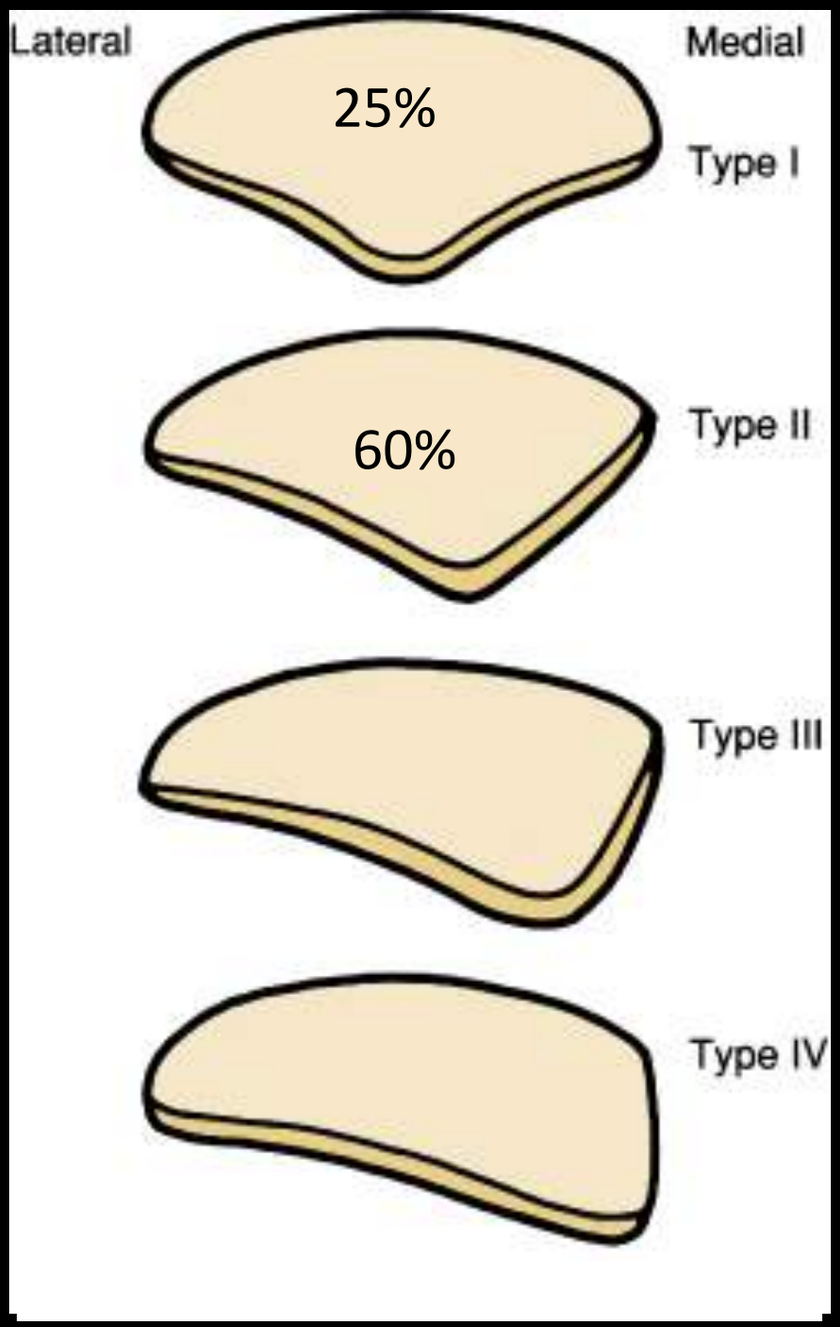
PFJ Anatomy

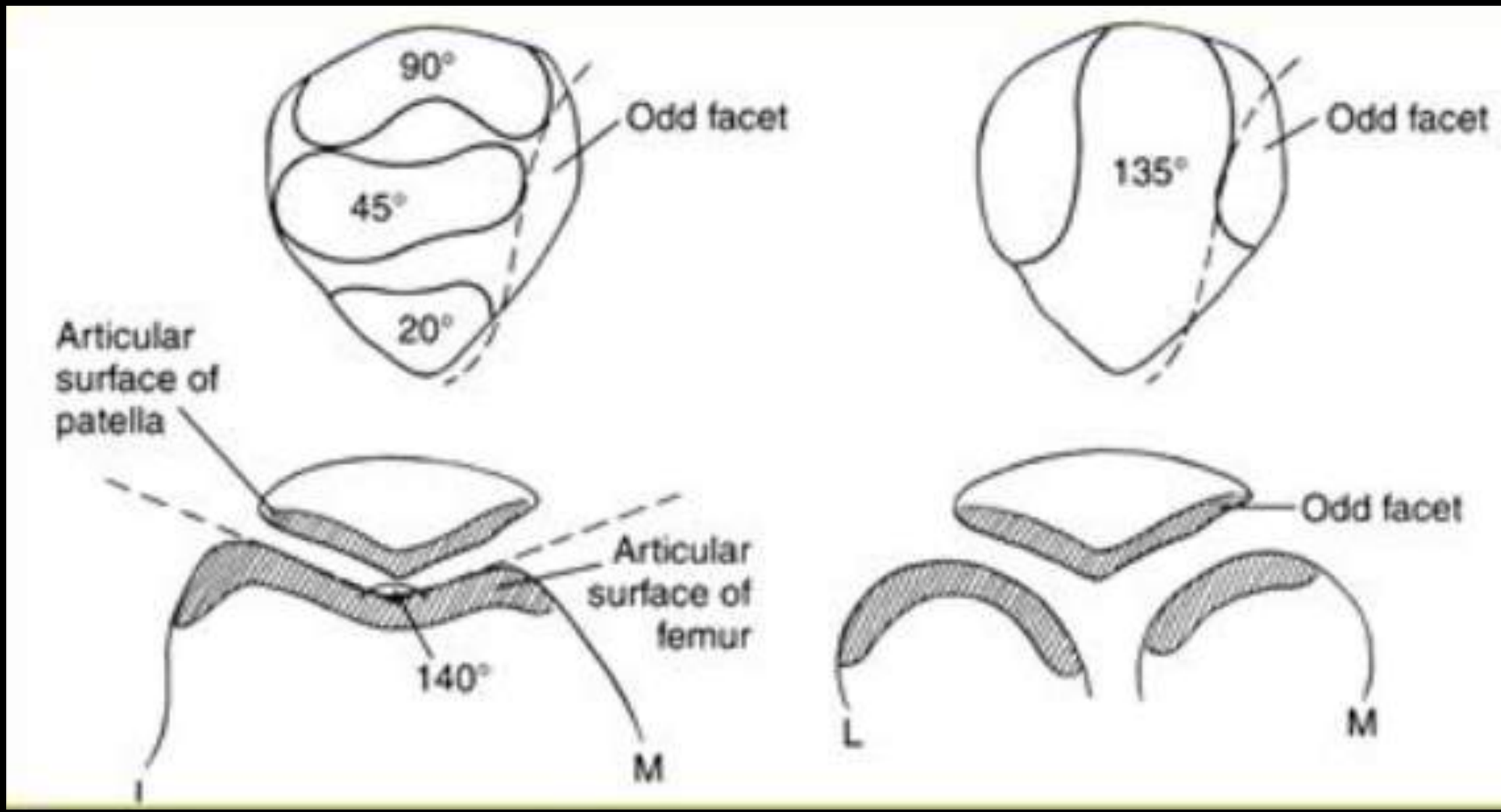


David Elson
Consultant Orthopaedic Surgeon
QEH, Gateshead


Superior
Medial
Lateral
Odd

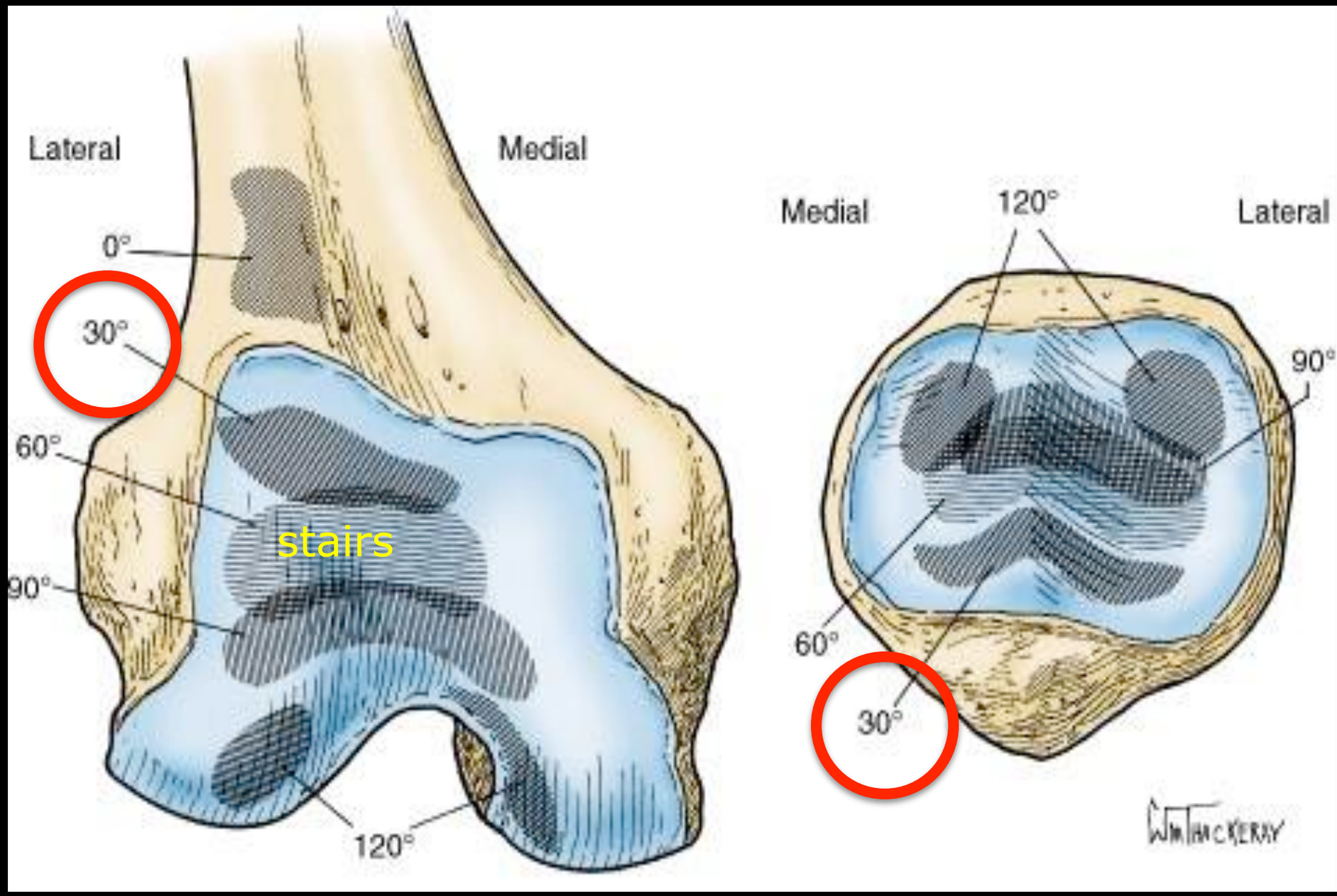
Classification of patella morphology according to Wiberg and Baumgartl



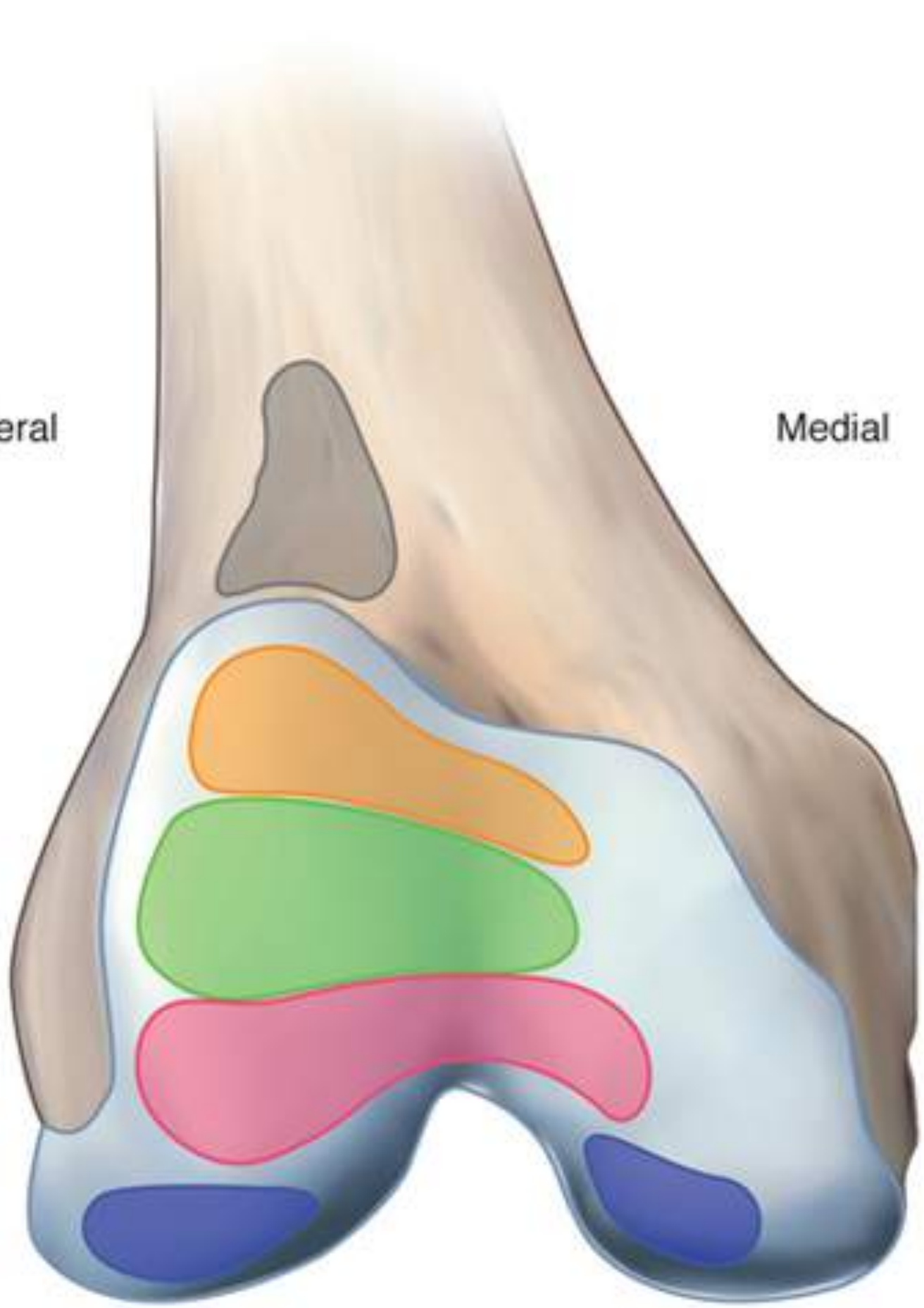

90°
45°
20°
Odd facet
135°
Odd facet
Articular surface of patella
Articular surface of femur
140°
I
M
Odd facet
L
M

Patellofemoral contact zones

Ficat & Hungerford (1977) [cadaver]
Contact forces at full extension = zero
Contact forces at 90^0 flexion = 1.5 X Quads force



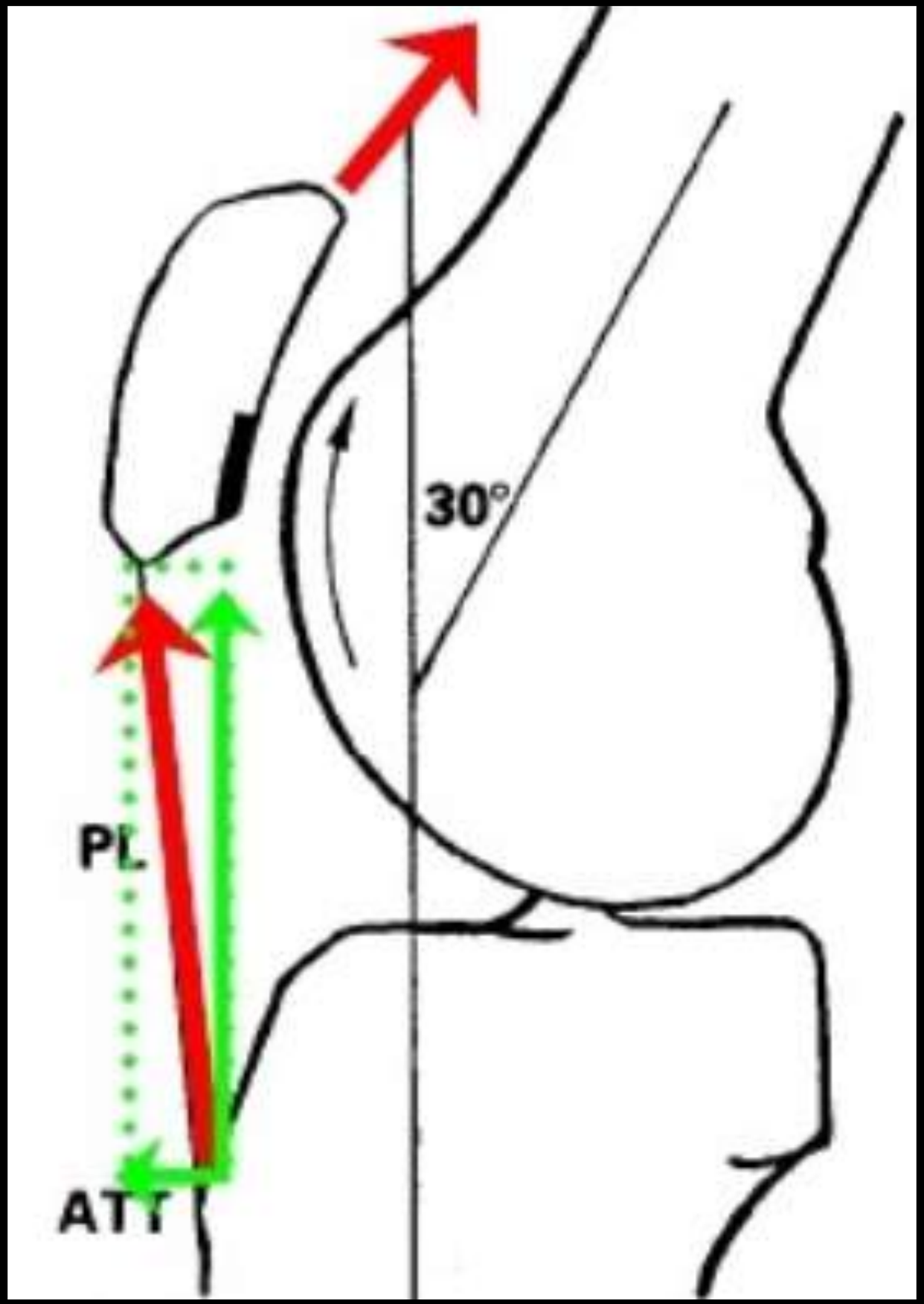
Lateral

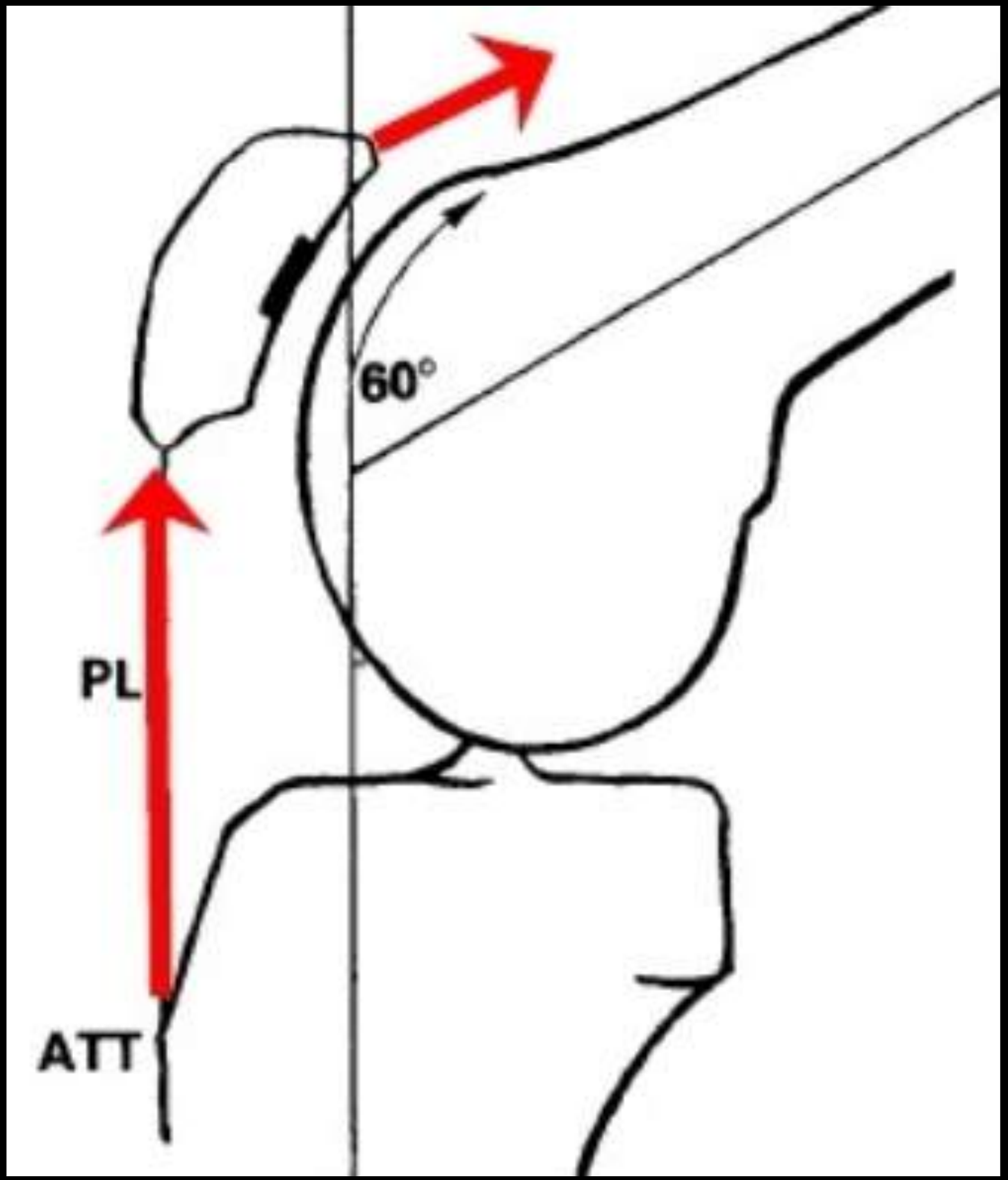


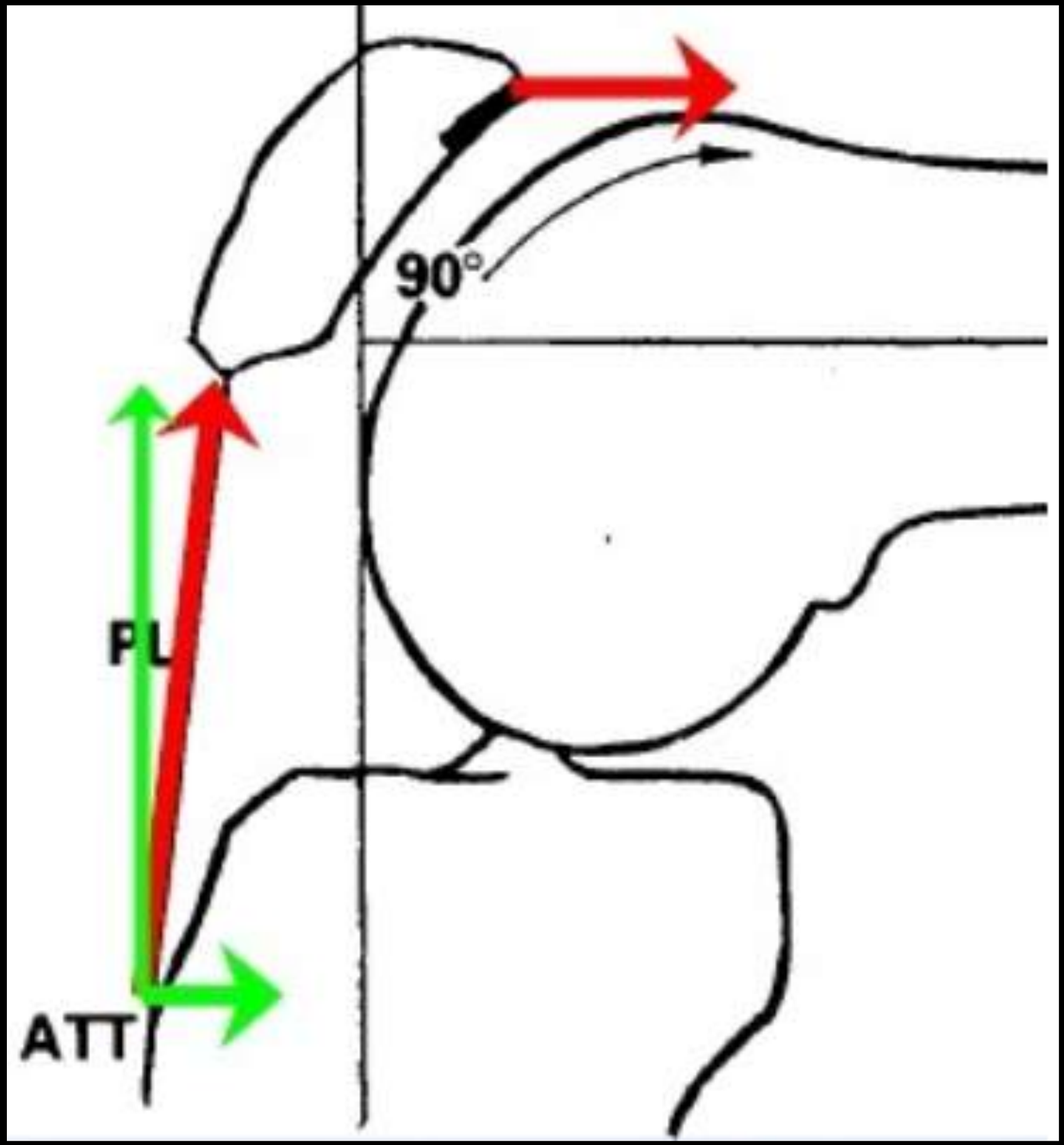
Medial

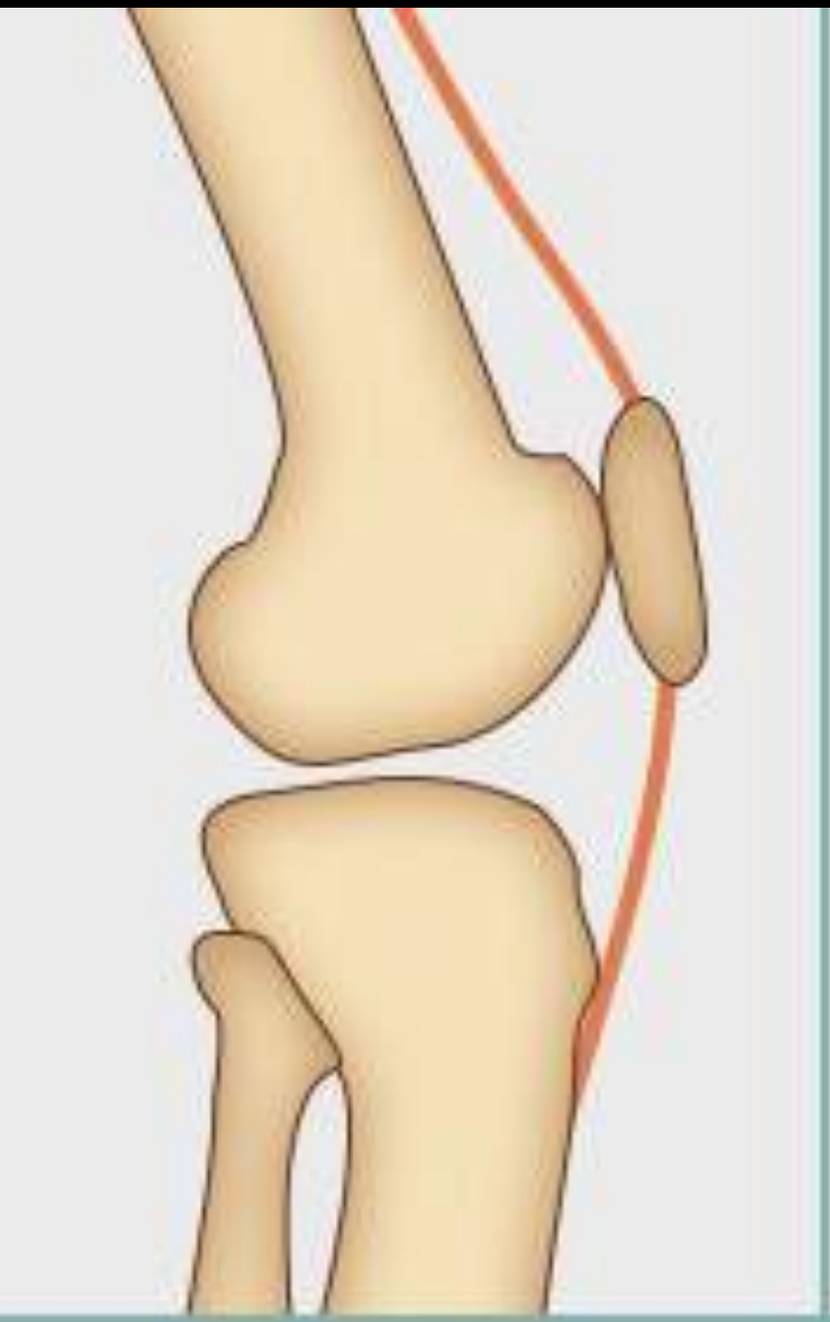
Lateral

0°
30°
60°
90°
120°


30°
PL
ATT


60°
PL
ATT

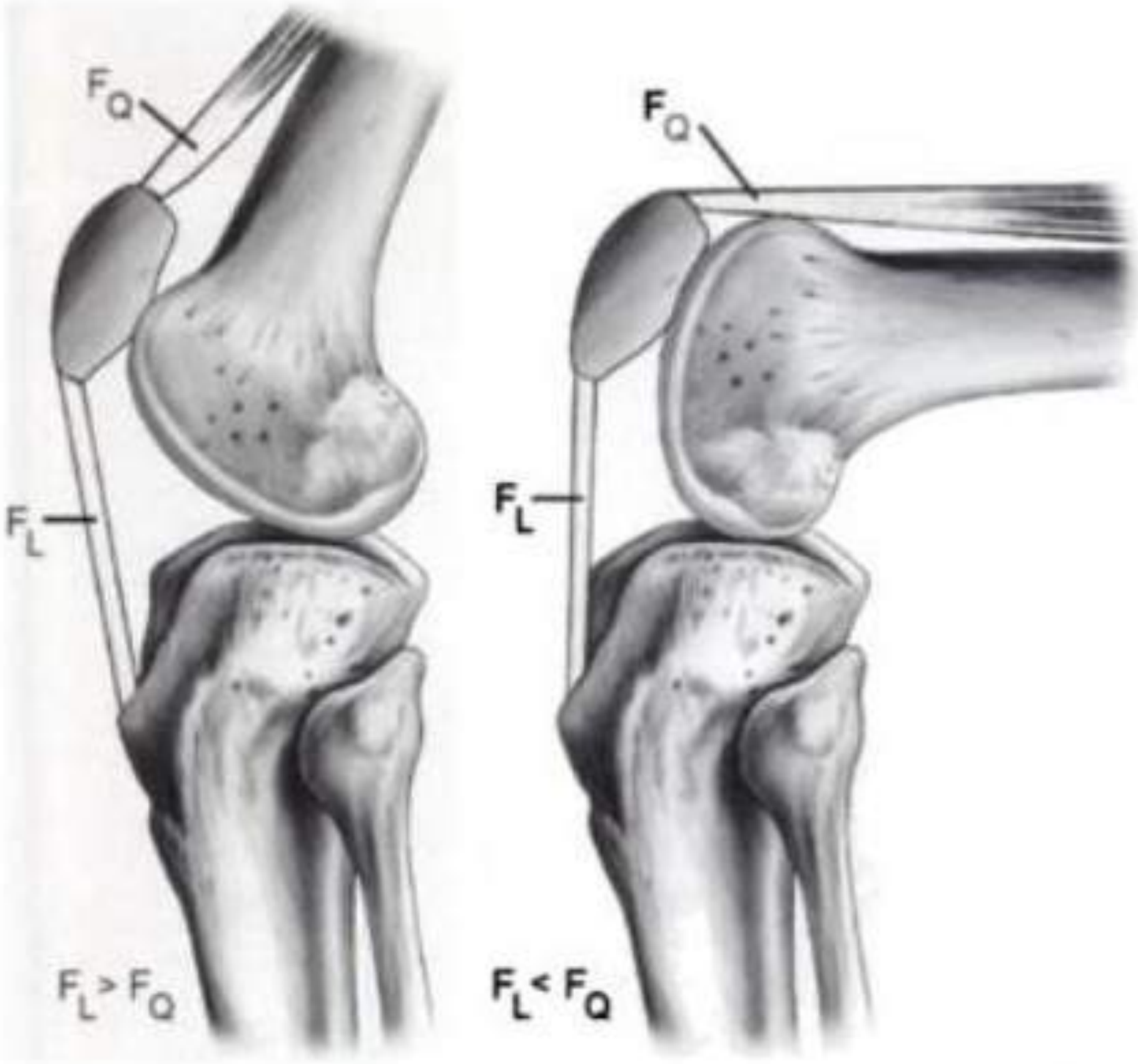

90°
PL
ATT

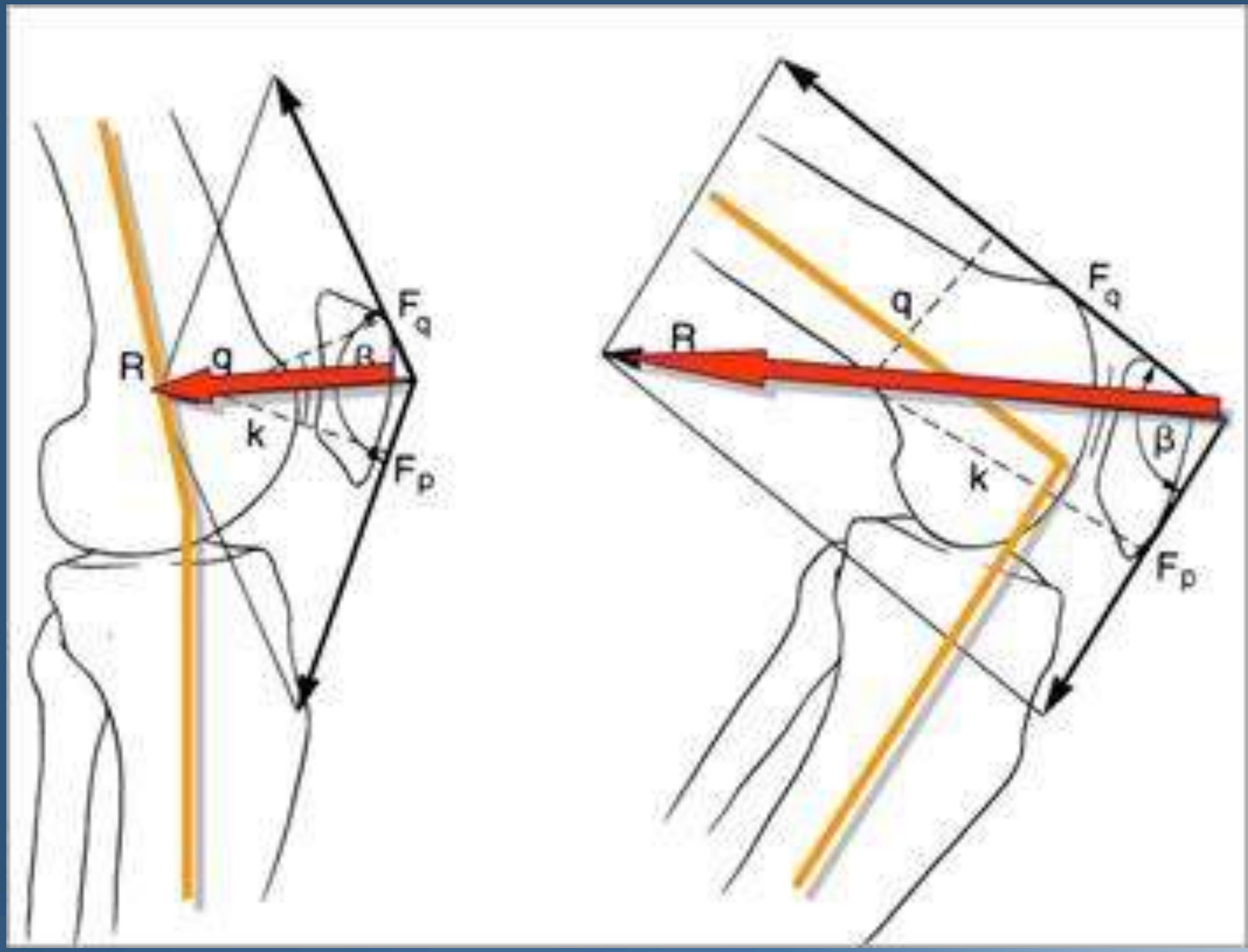


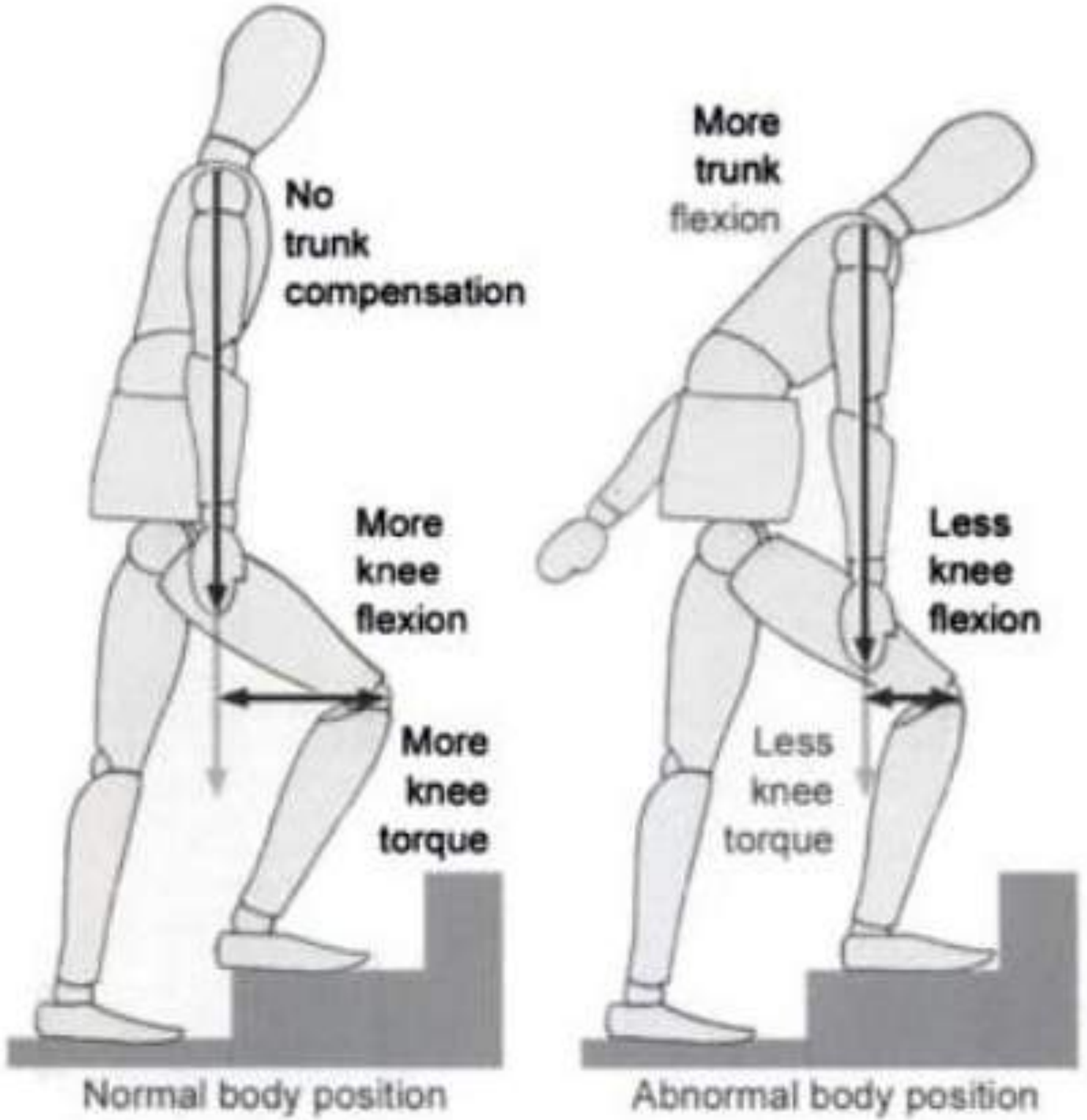
Normal

Patella Baja

Patella Alta


F_Q
F_L
$F_L > F_Q$
F_Q
F_L
$F_L < F_Q$


R
q
k
β
F_q
F_p
R
q
k
β
F_q
F_p

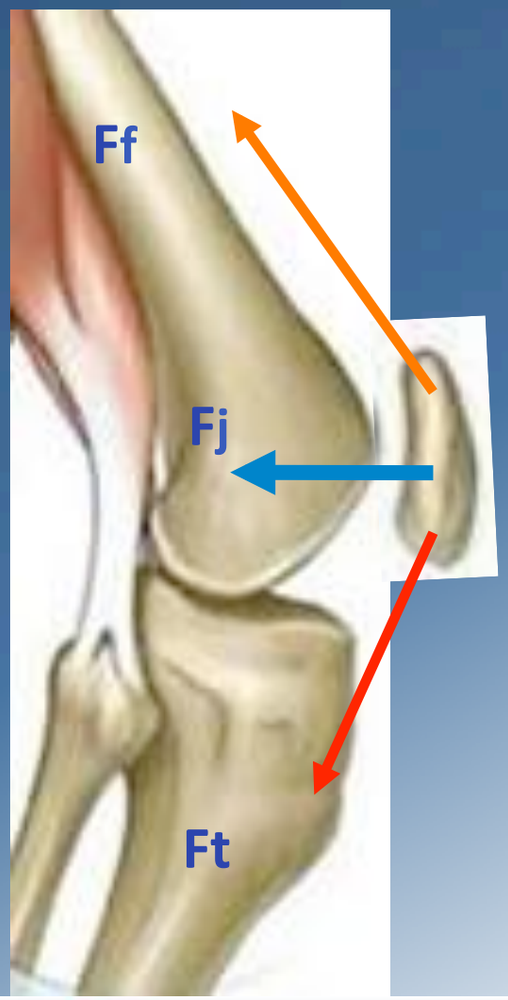

No
trunk
compensation
More
knee
flexion
More
knee
torque
More
trunk
flexion
Less
knee
flexion
Less
knee
torque
Normal body position
Abnormal body position

PFJ Biomechanics

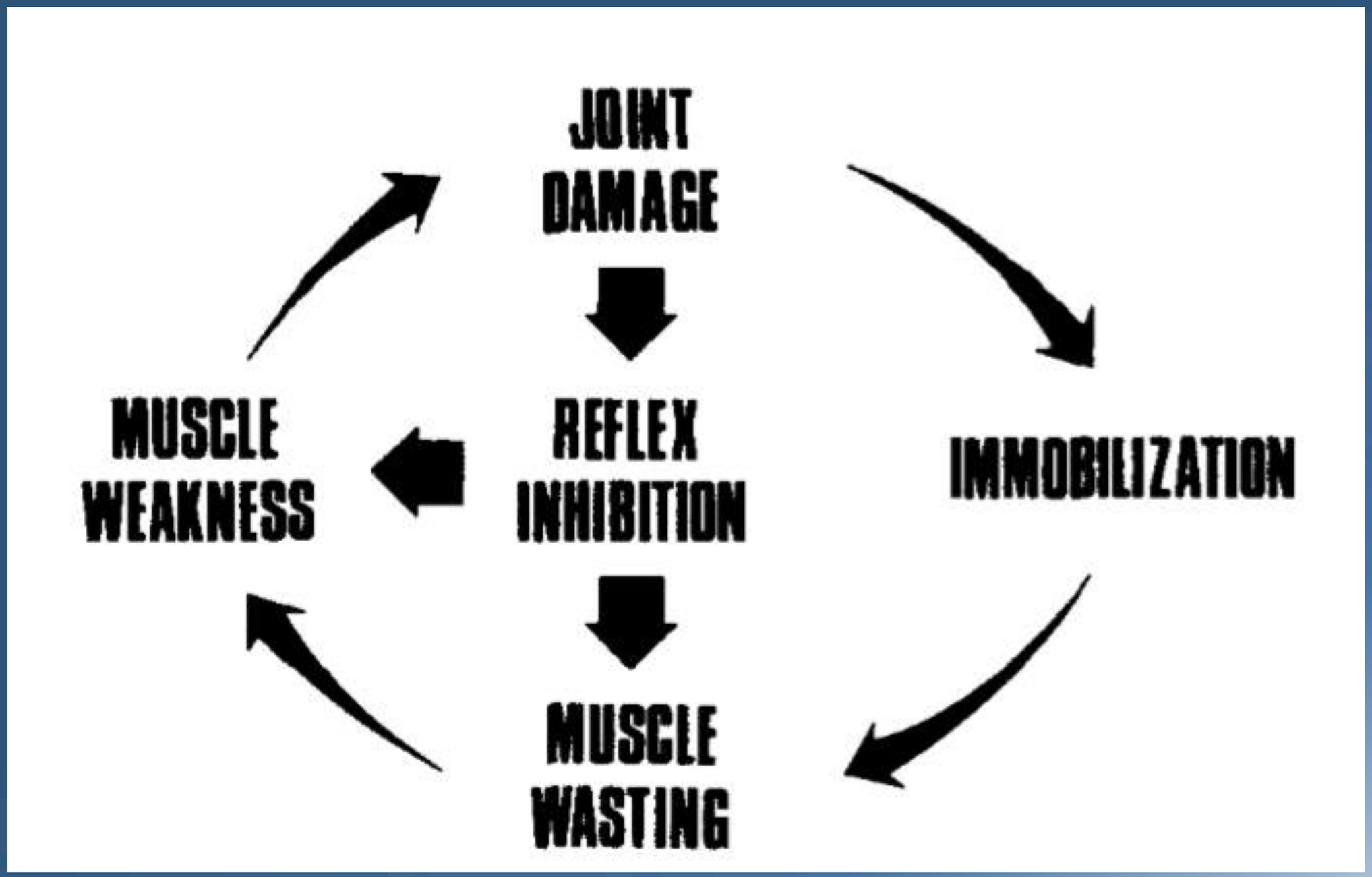
Patellofemoral joint reaction force

- WALKING 0.5xBW
- STRAIGHT LEG RAISE 0.5xBW 0 DEG
- CYCLING: 1.2 × BW
- RISING FROM A CHAIR w ARMS: <3 × BW
- STAIRS (UP OR DOWN) 3.3xBW 60 DEG
- JOGGING & SQUAT–RISE 6xBW at 140 deg
- SQUAT–DESCENT 7.6x BW at 140 deg
- JUMPING UP TO 12 × BW

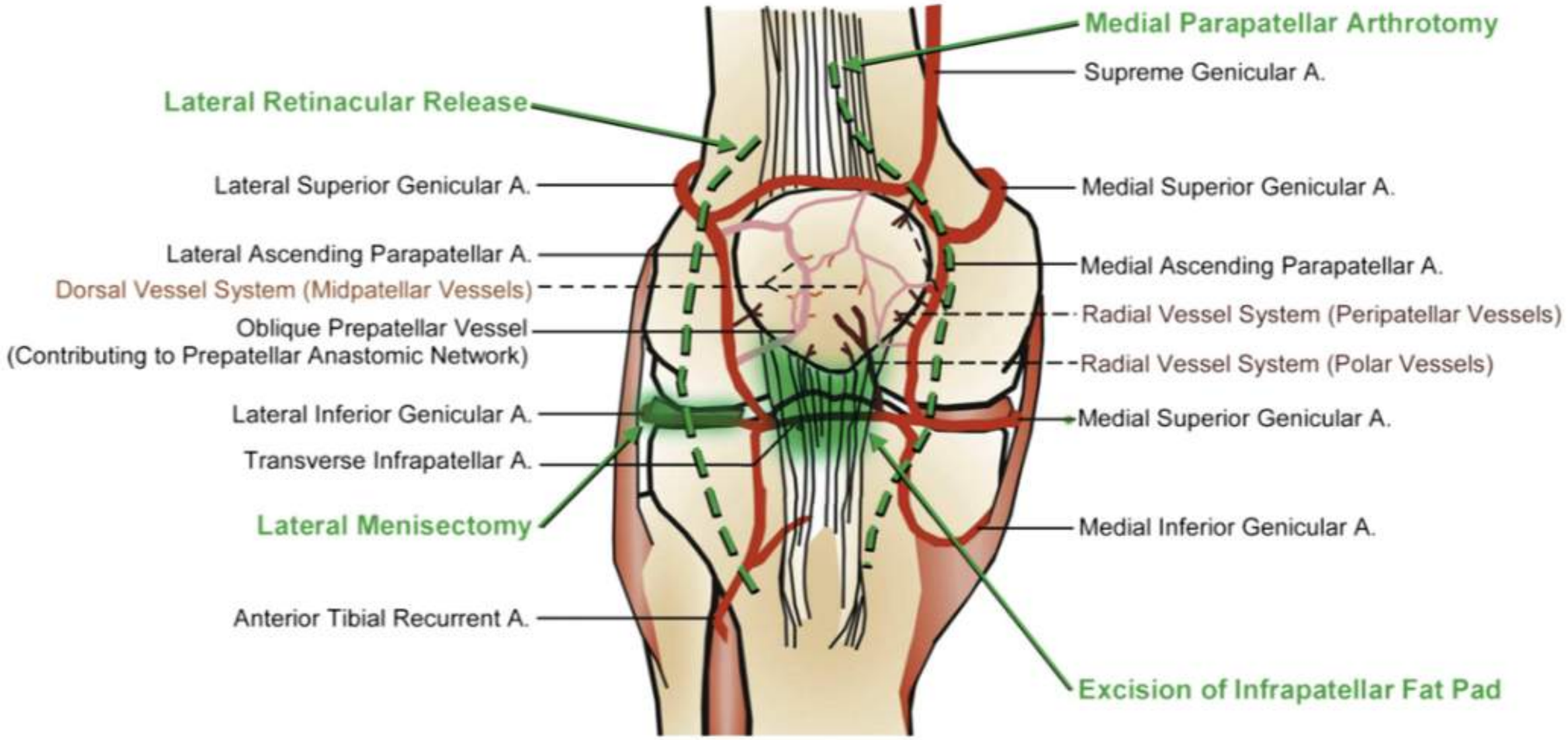
Trigonometry
Fjf=Ff cos(angle/2)

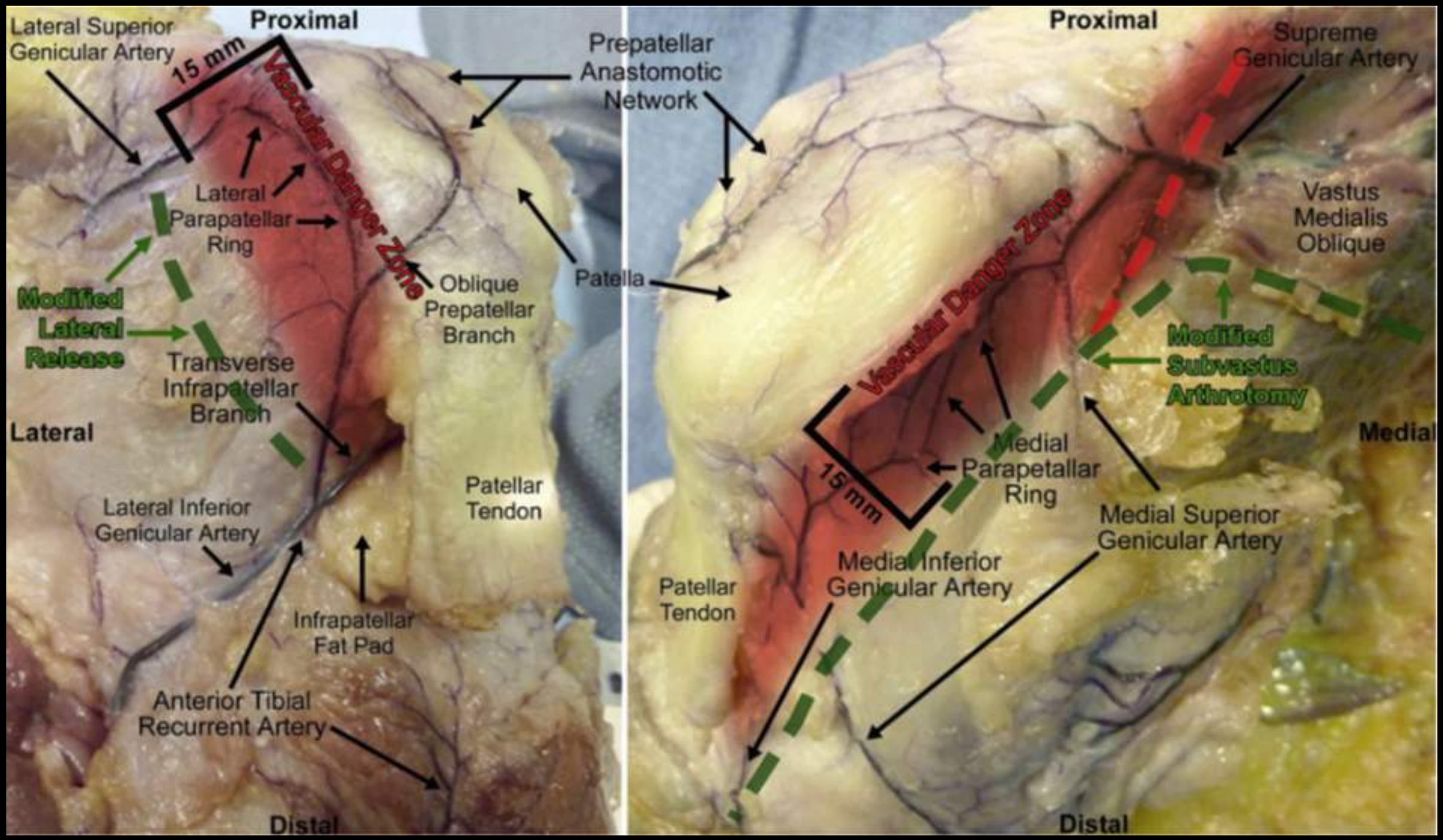


Reflex Quads Inhibition



SOLUTION


Medial Parapatellar Arthrotomy
Supreme Genicular A.
Lateral Retinacular Release
Lateral Superior Genicular A.
Medial Superior Genicular A.
Lateral Ascending Parapatellar A.
Medial Ascending Parapatellar A.
Dorsal Vessel System (Midpatellar Vessels)
Radial Vessel System (Peripatellar Vessels)
Oblique Prepatellar Vessel
(Contributing to Prepatellar Anastomic Network)
Radial Vessel System (Polar Vessels)
Lateral Inferior Genicular A.
Medial Superior Genicular A.
Transverse Infrapatellar A.
Lateral Menisectomy
Medial Inferior Genicular A.
Anterior Tibial Recurrent A.
Excision of Infrapatellar Fat Pad



Lazaro, Cross, Lorich. The knee 2014; 21 (3): 656-660