Η ΕΜΒΙΟΜΗΧΑΝΙΚΗ ΣΗΜΑΣΙΑ ΤΟΥ ΠΕΡΙΟΣΤΕΟΥΣΕ ΑΝΕΠΑΦΑ ΜΑΚΡΑΟΣΤΑ

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Πανεπιστήμιο Αθηνών

THE BIOMECHANICAL CAPACITY OF THE PERIOSTEUM IN INTACT LONG BONES

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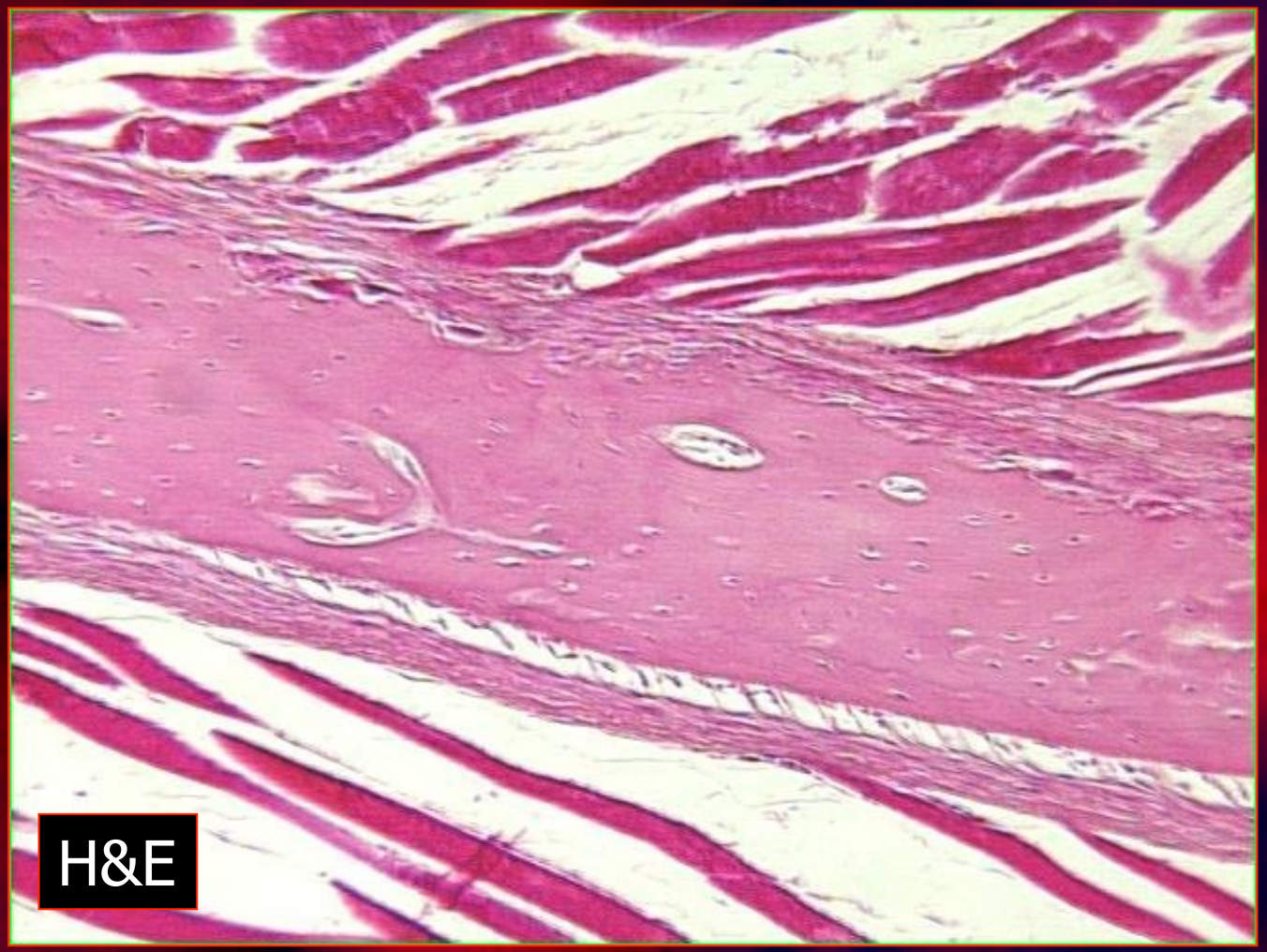
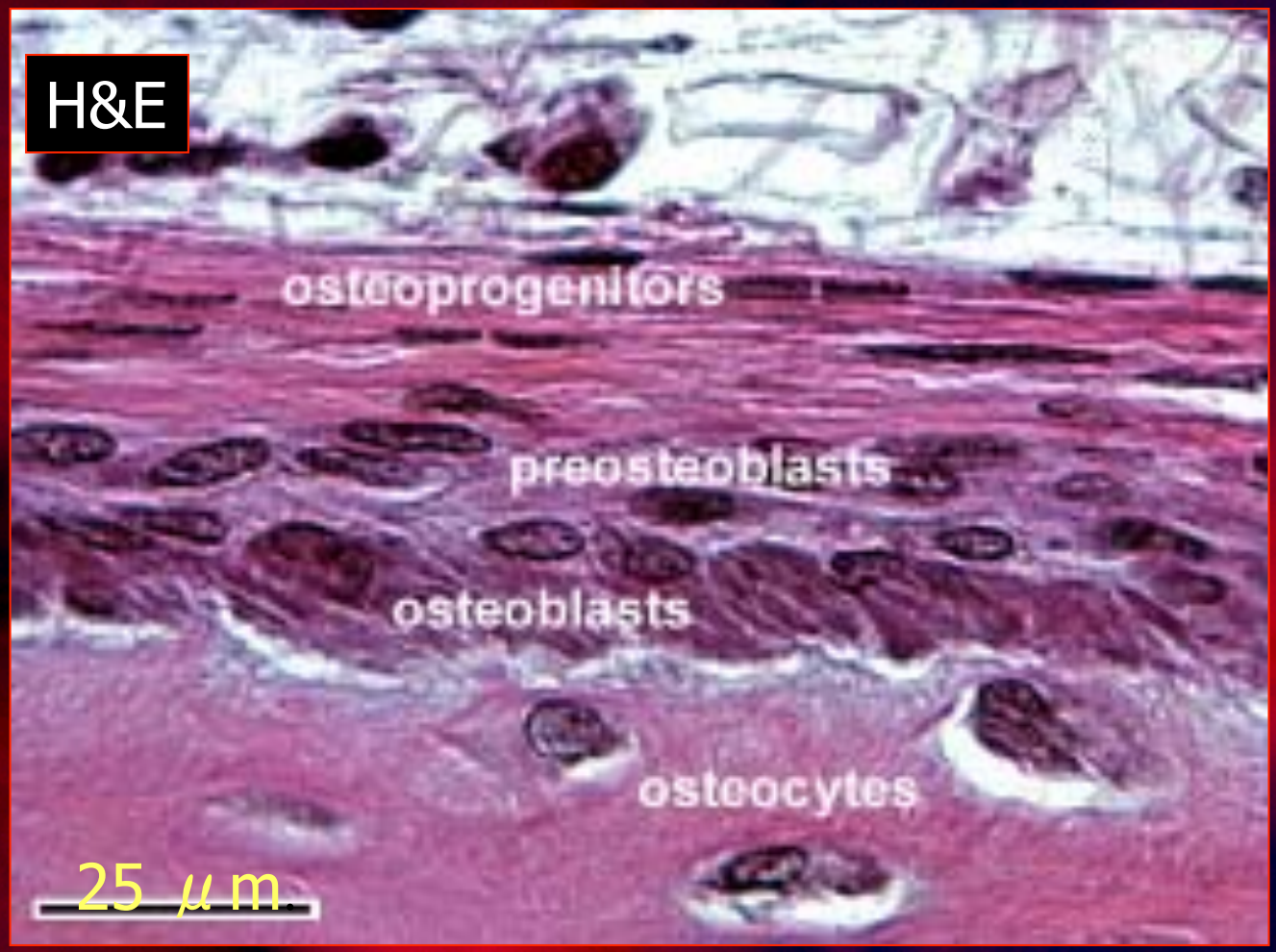
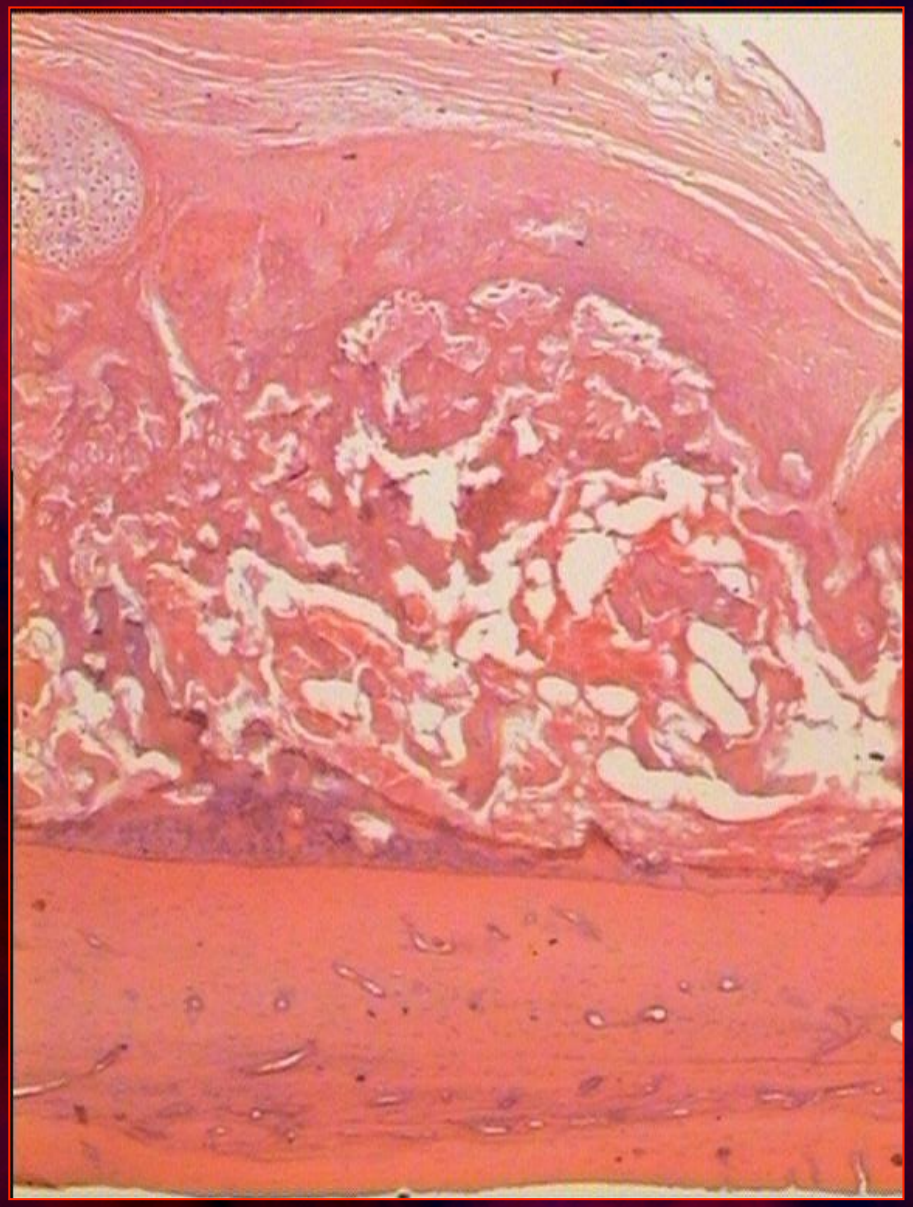


- Periosteum is the connective tissue covering of bony tissues
- Occasionally skeletal muscle fibres can be seen attached to it



- Primary bone formation during rapid modeling of growing bone
- 21 day-old rat tibial periosteum
- Osteogenic cell types are indicated in the periosteum



The role of periosteum in long bone healing

Purpose of the Study

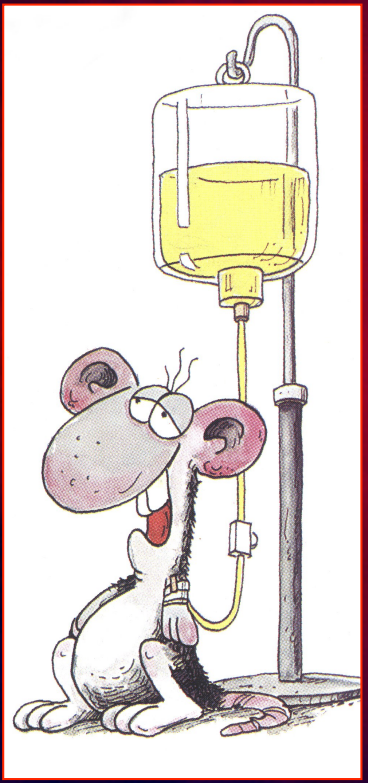
An experimental study was carried out

to evaluate the effect of the

intact periosteum on the

biomechanical properties

of intact long bones



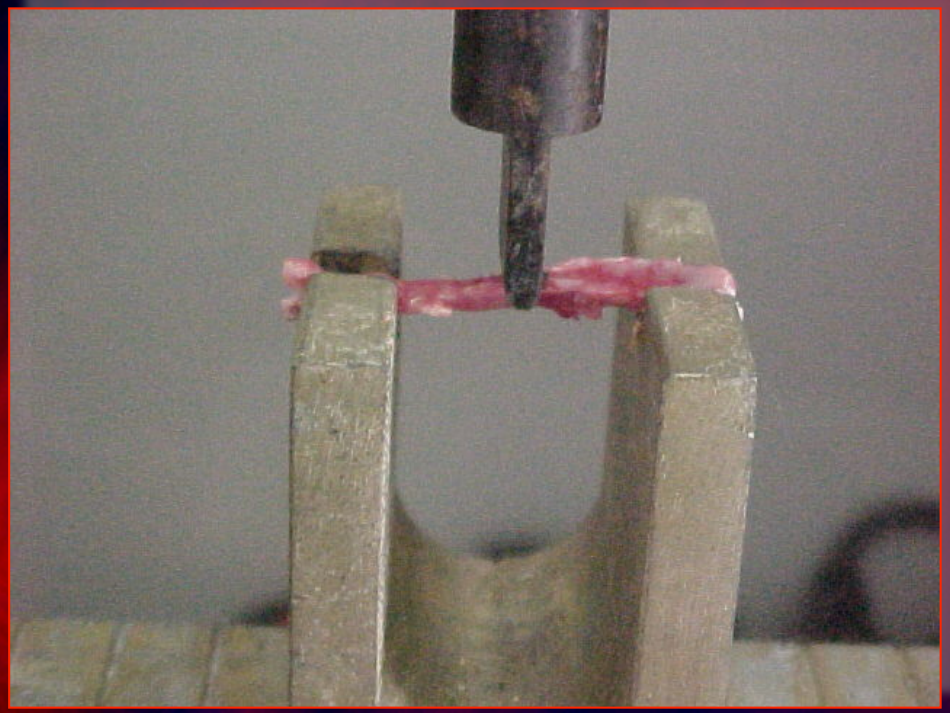
Materials - Methods

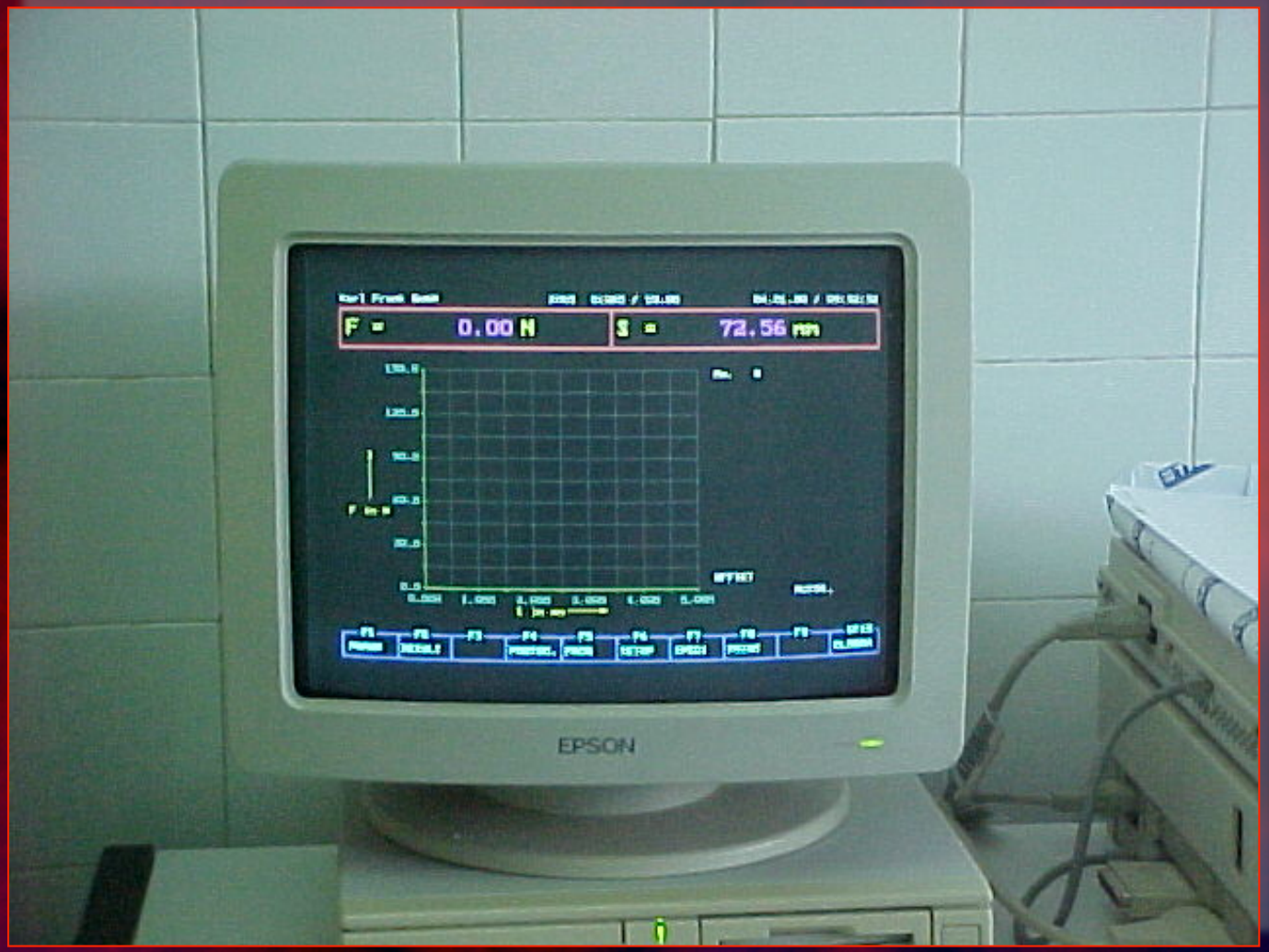
- ✓ 30 male, 4-month-old Wistar rats
- ✓ Bilateral harvesting of tibiae and femora
- ✓ GROUP A + B (preserved periosteum)
- ✓ GROUP C + D (stripped periosteum)
- ✓ 30 bones were included in each group

Biomechanical Testing

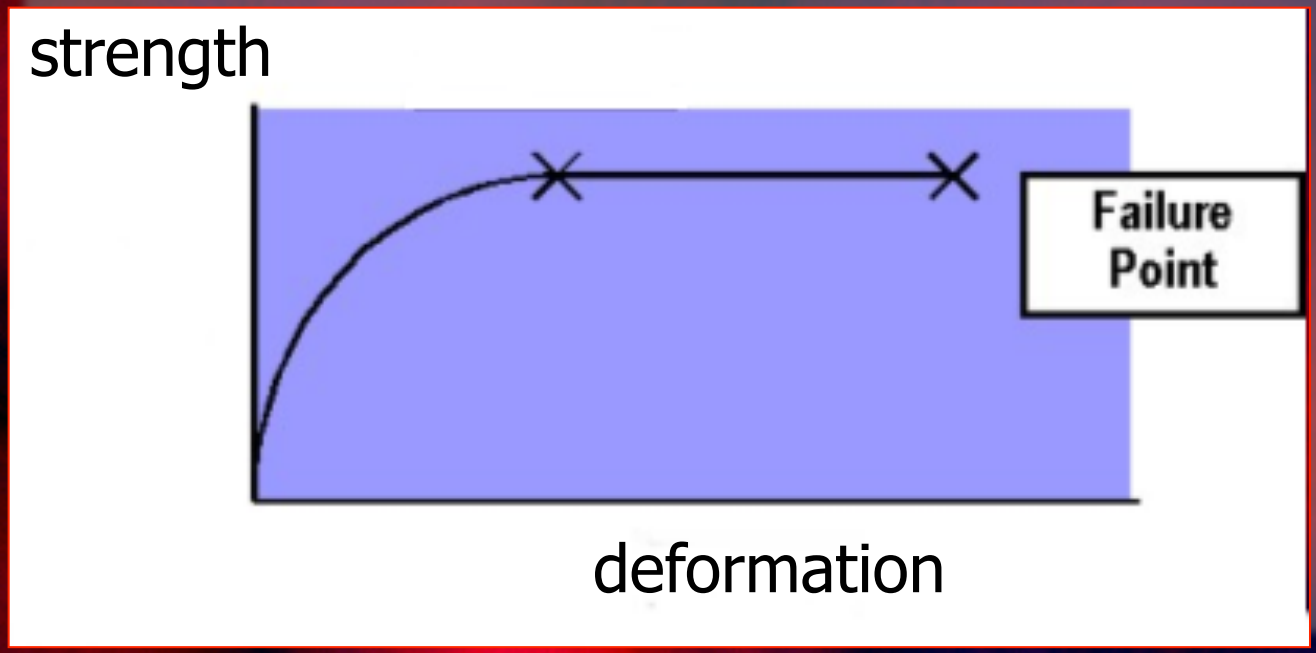
- ✓ destructive three-point-bending test
- ✓ span 20 mm
- ✓ load applied at the middle of the lateral surface of the femur and at the middle of the posterior surface of the tibia.
- ✓ Preloading of 10 N was applied
- ✓ Loading rate was 15 cm/min

Biomechanical Testing



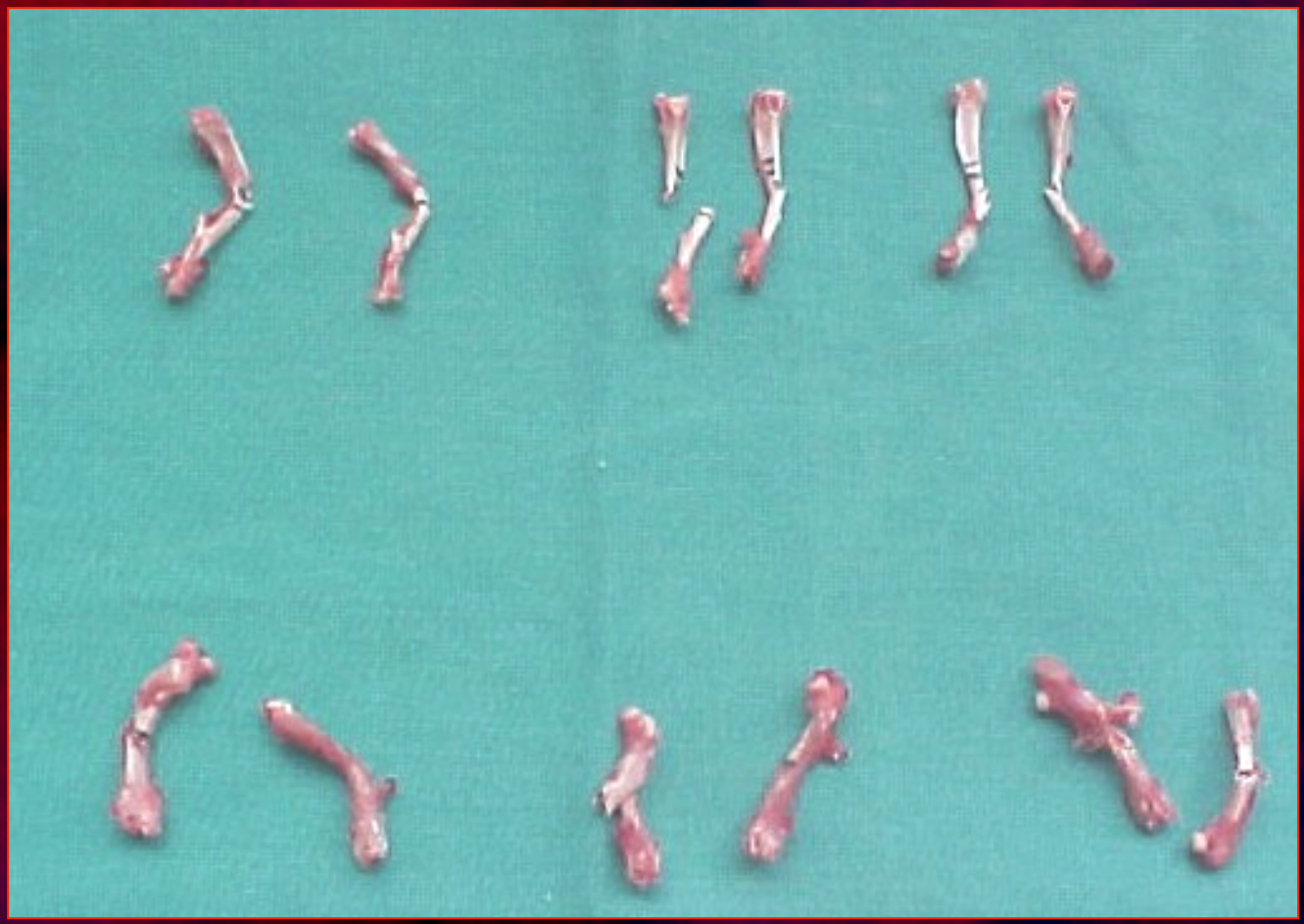

F = 0.00 N
S = 72.56
EPSON

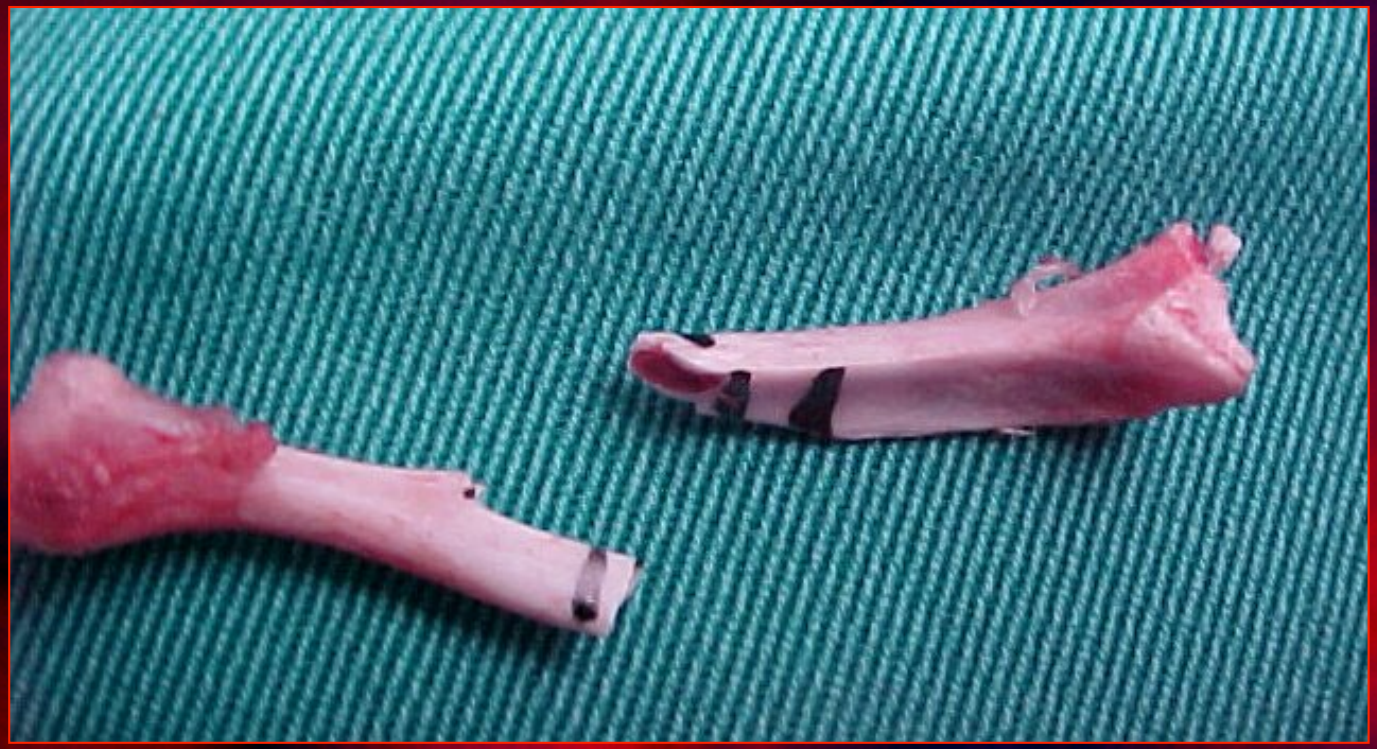
Measured Parameters: Load-Deformation Curve



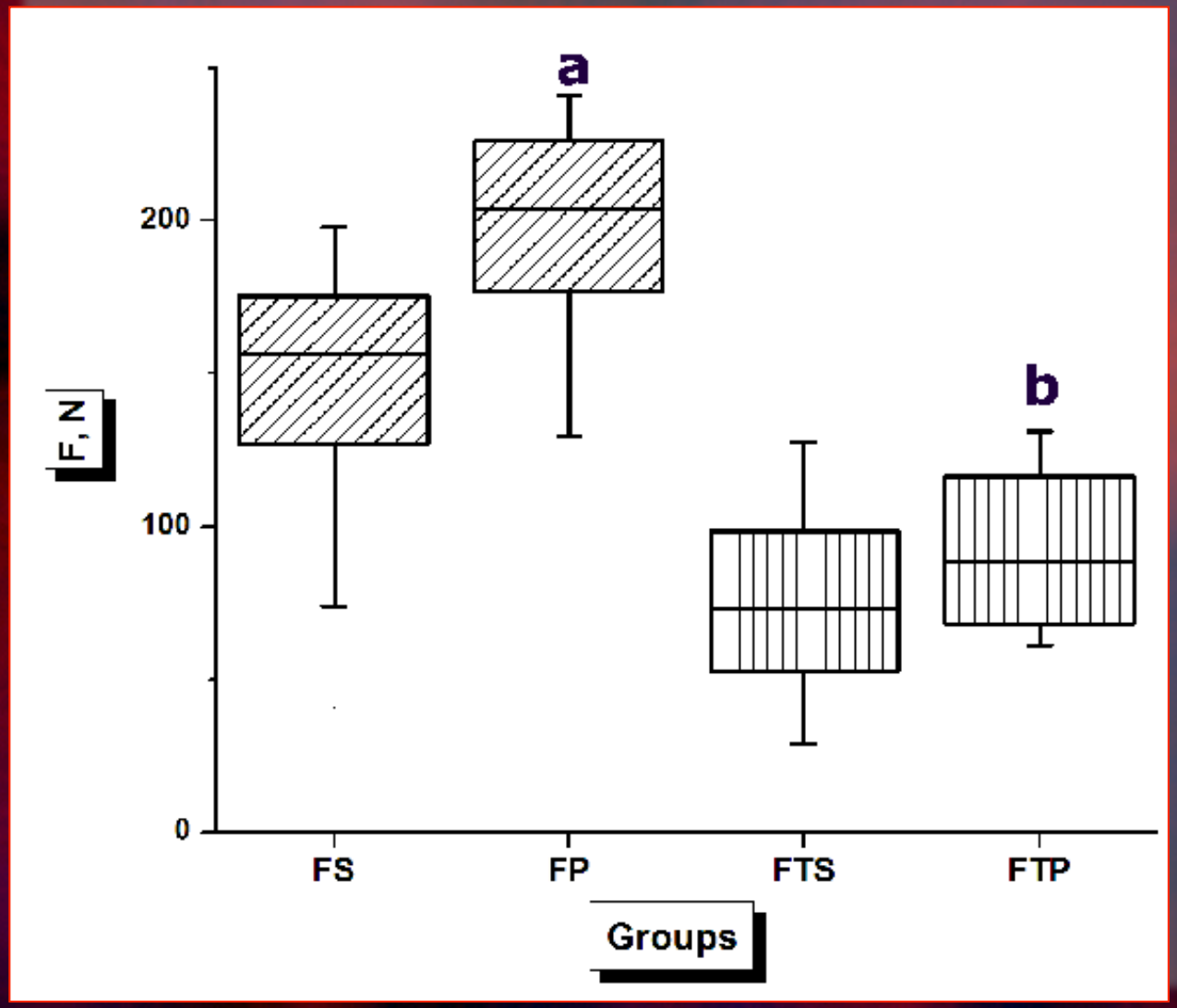
- Ultimate strength
- Ultimate stiffness
- Absorbed energy
- Deflection

Results

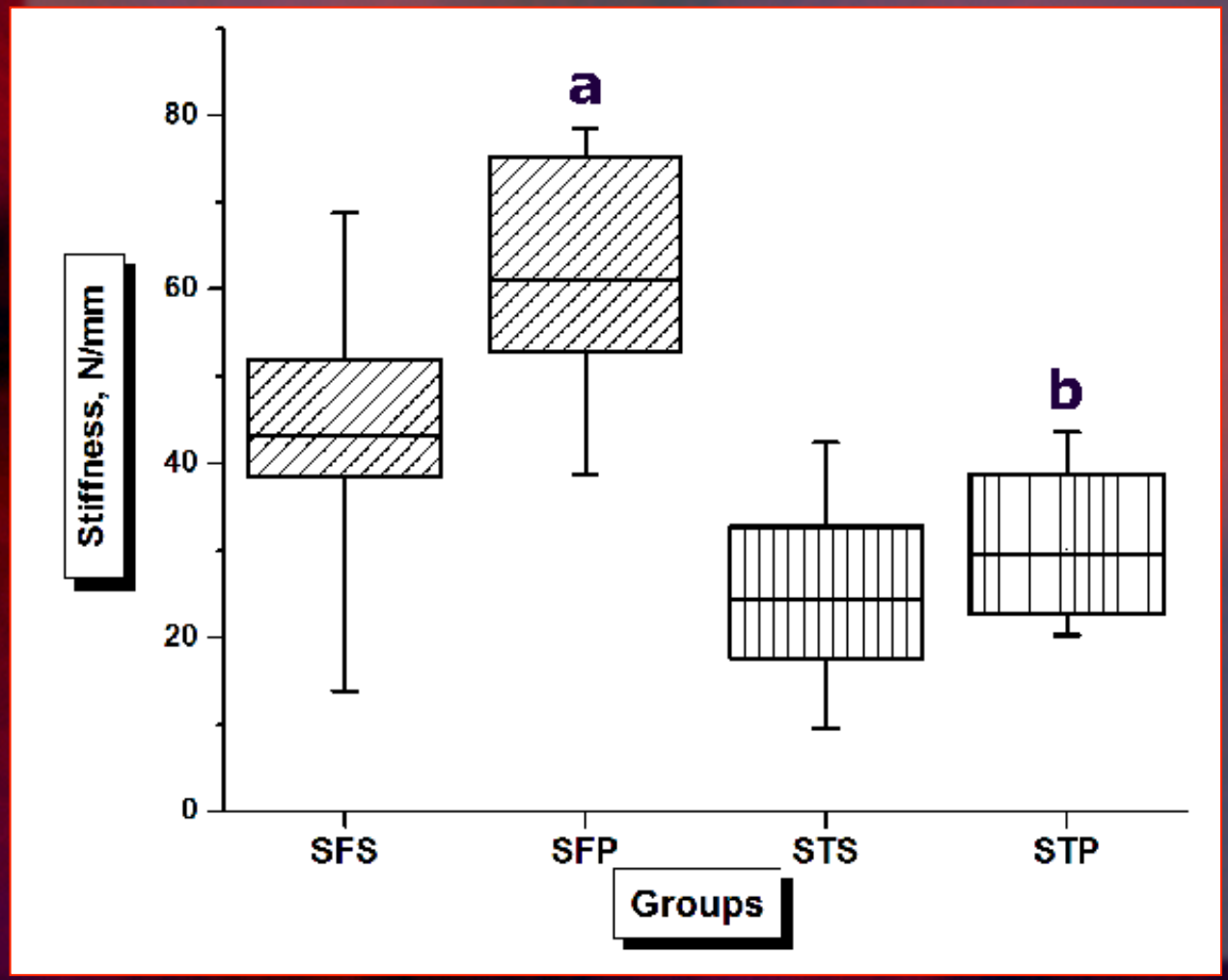




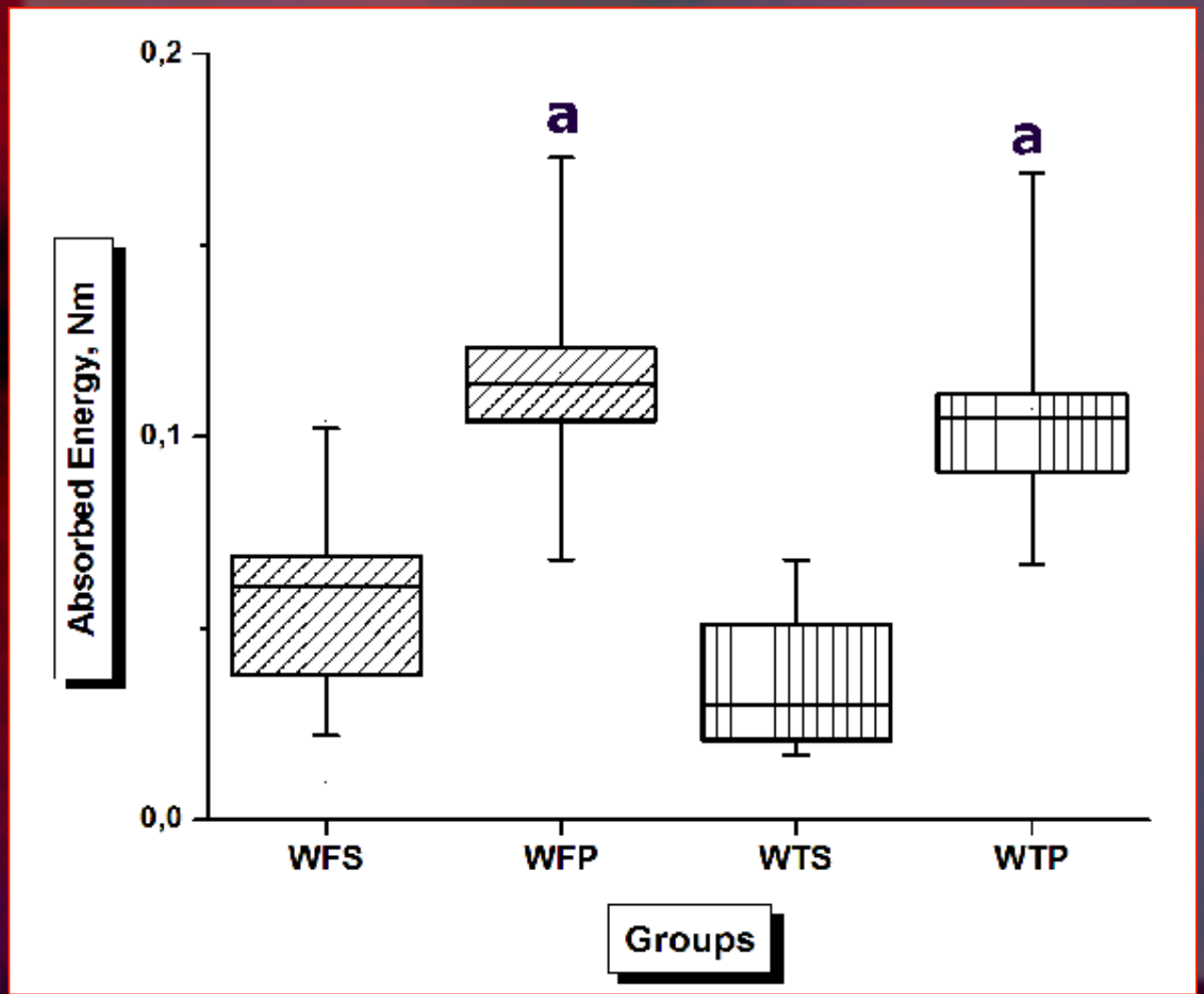
Load to Failure, N



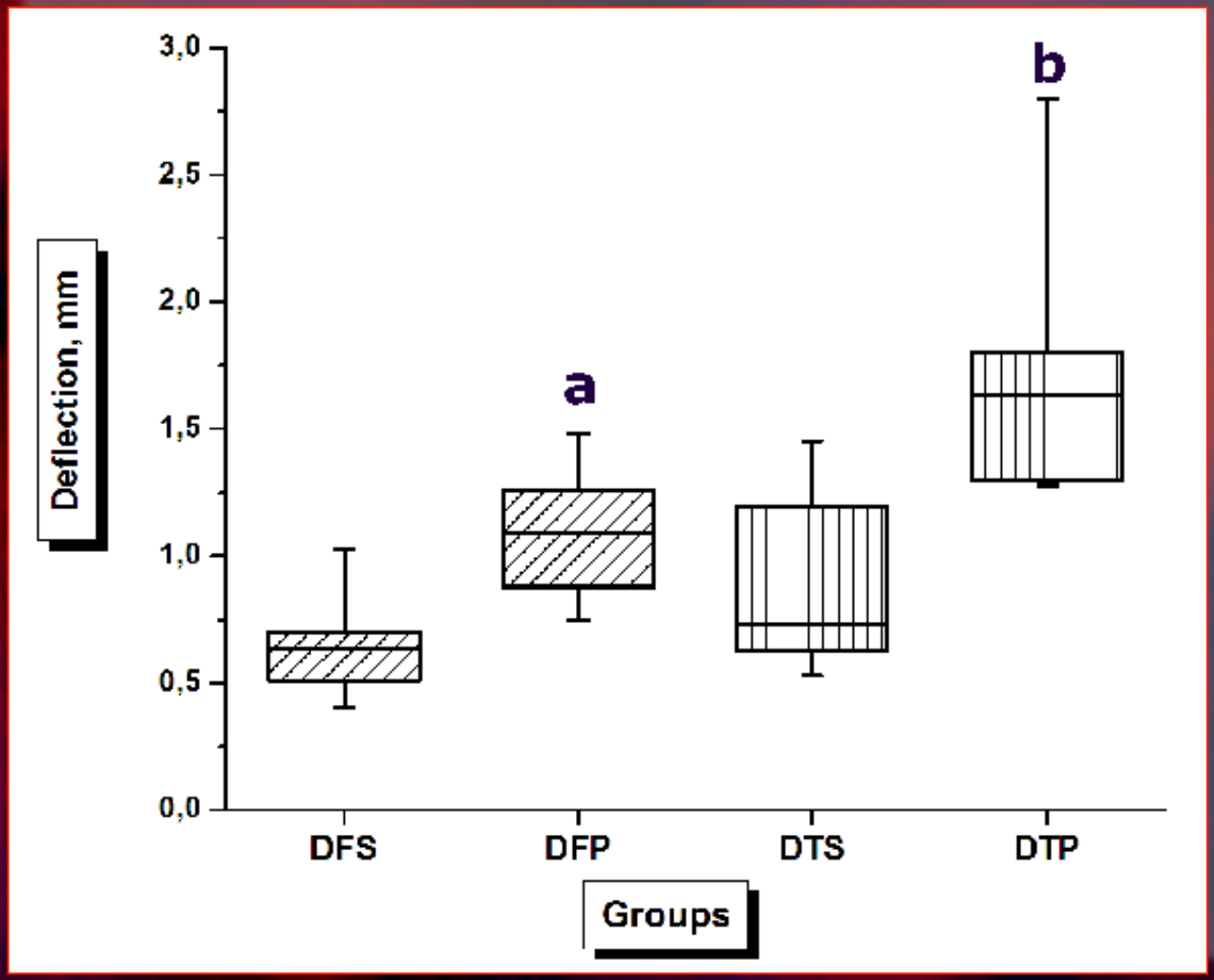
Stiffness, N/mm



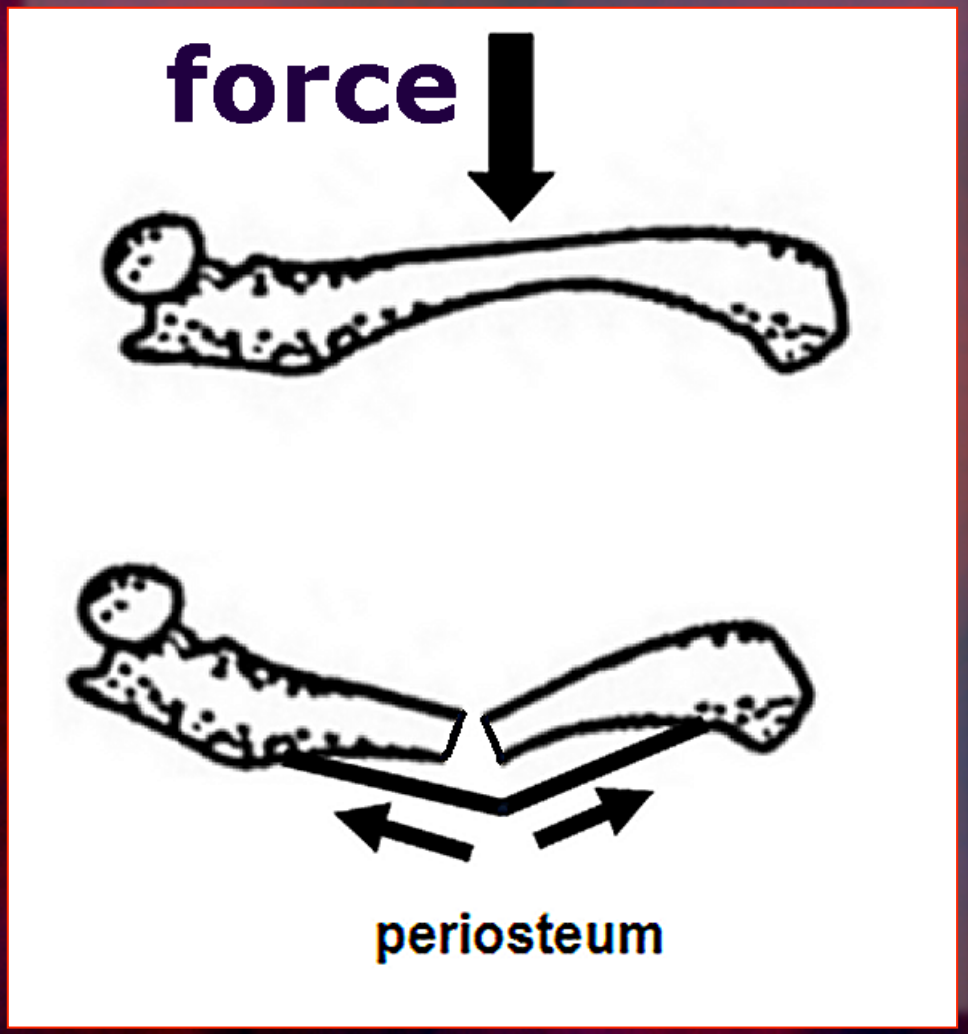
Absorbed Energy, Nm



Deflection, mm



Discussion



Future Directions

- Immature vs Mature animals
- Males vs Females
- Various loading configurations
- Fatigue?
- Viscoelasticity?
- Other bones
- Other species

Conclusion

The periosteum may, under certain biological and loading conditions, increase the biomechanical capacity of the bones


Thank You