Massachusetts Institute of Technology
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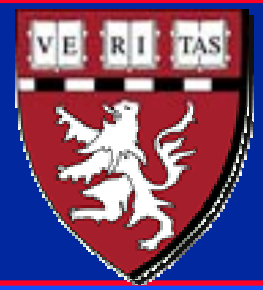

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EXTRACELLULAR MATRIX MOLECULES

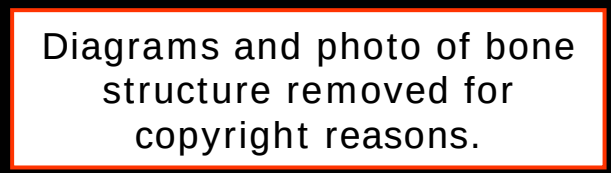
M. Spector, Ph.D. and I.V. Yannas, Ph.D.

MECHANICAL BEHAVIOR OF TISSUE

Determined by:

- **Molecule structure (nm scale)**
  - Which matrix molecules present
  - Organization of the molecules
- **Matrix architecture (μm)**
  - Including porosity
- **Tissue size and shape (mm, cm)**
  - Including composite structure comprising various architectural units

Bone


Diagrams and photo of bone structure removed for copyright reasons.

EXTRACELLULAR MATRIX MOLECULES

The principal structural matrix molecules are: collagen, proteoglycan, and elastin.

Adhesion proteins are also important matrix molecules (including fibronectin and laminin)

Water can also be considered as a matrix molecule contributing to the mechanical behavior of the tissue

COLLAGENS

- More than 20 distinct collagens have been identified and each is encoded by a different gene.
  - Combinations of these genes are expressed in different tissues.
- The main types of collagen in connective tissues are types I, II, III, V, and IX.
  - Type I is the principal collagen of skin and bone and, by far, the most abundant in the body (representing 90 per cent of body collagen).
  - Type II is found in the cartilage.
  - Type III is found in skin, blood vessels and internal organs.
  - Type V is found in bone, skin, tendons, ligaments, and cornea.
- Types IV and VIII are network-forming collagens which polymerize to form the sheet-like basement membrane .

References

Images removed for copyright reasons. Sources:

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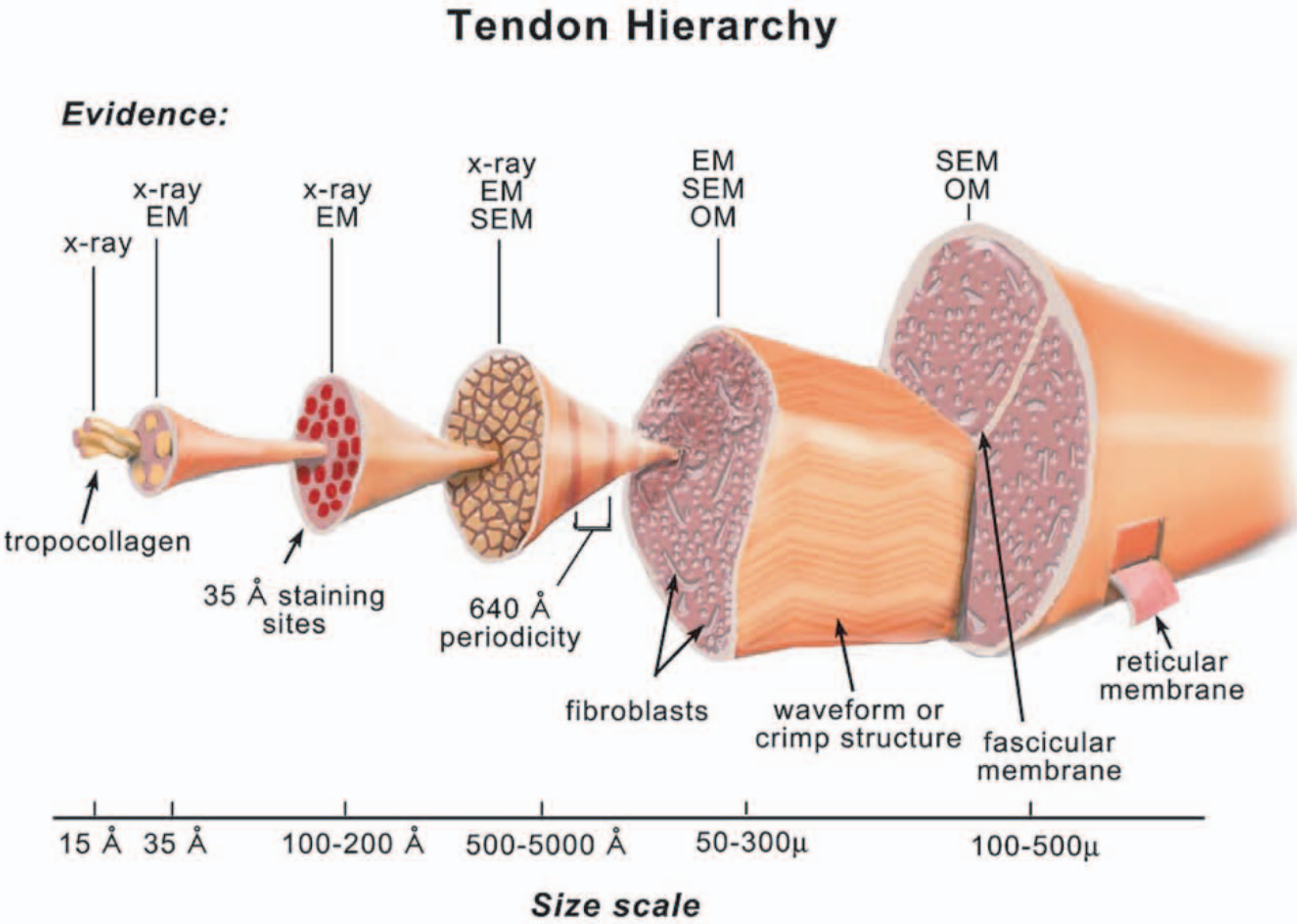

Figure by MIT OCW. After Fung.

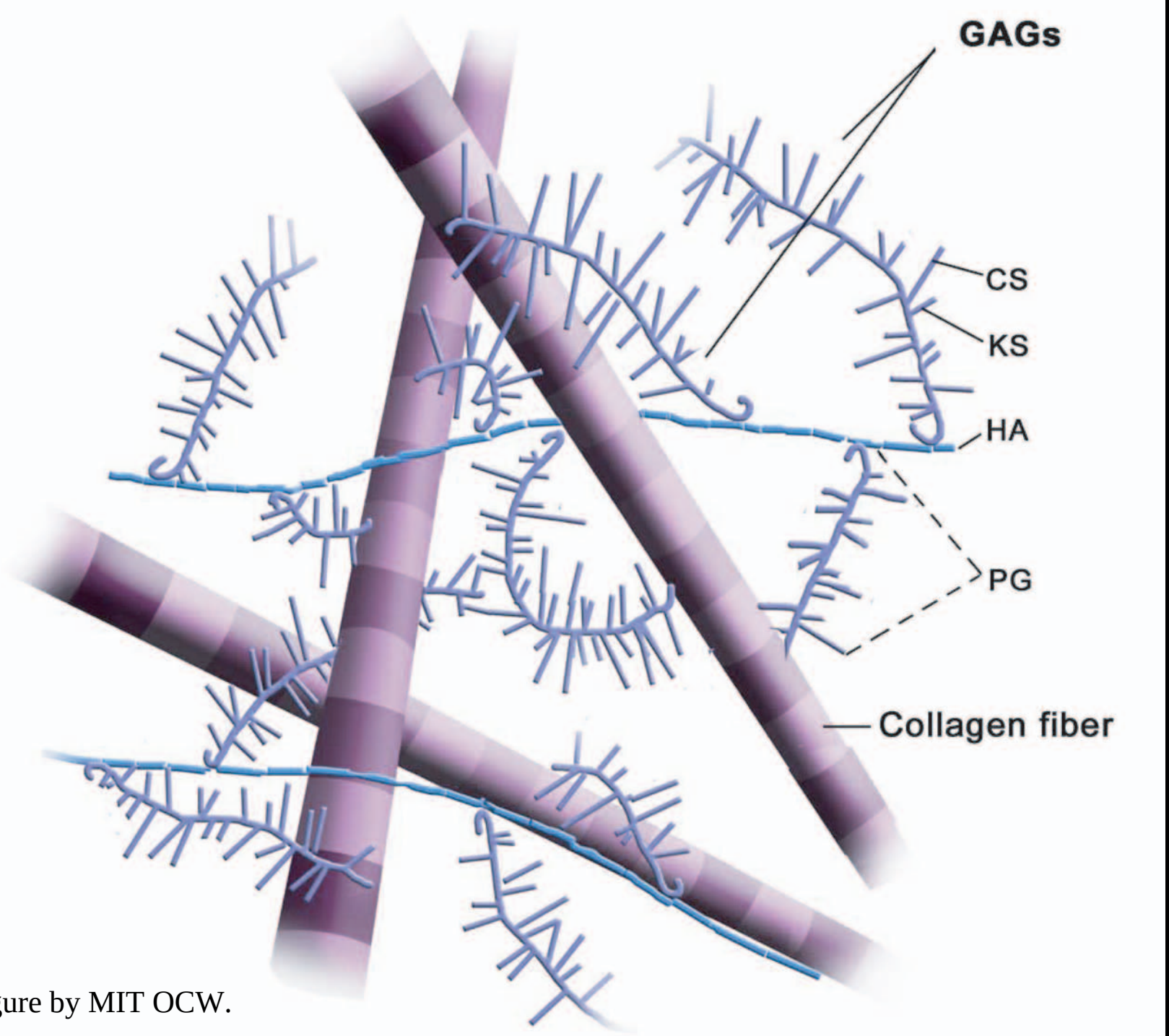

Figure by MIT OCW.