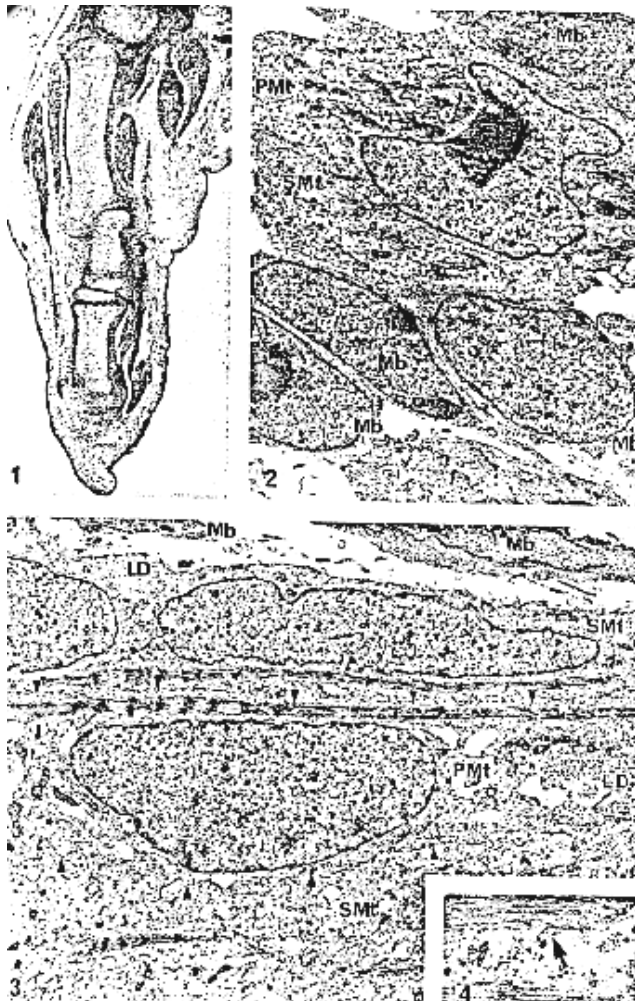


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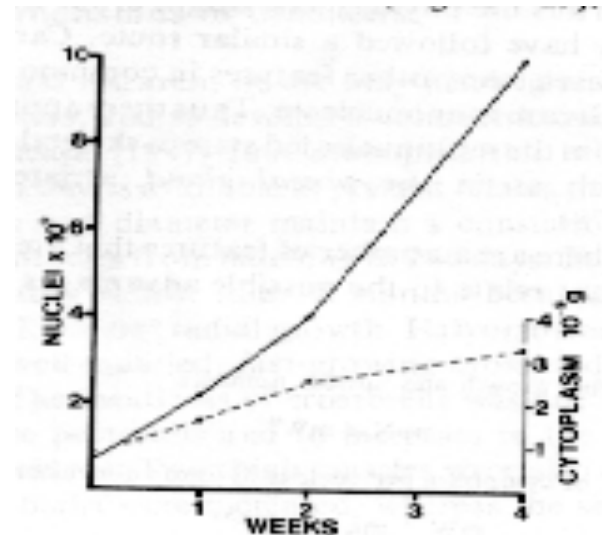
**Biochemistry and Physiology of Muscle as a Food**  
**SATELLITE CELLS, MUSCLE GROWTH, AND MUSCLE REPAIR**

**I. Satellite Cells**

- A. Proliferative, myoblastic cells that lie in invaginations in the sarcolemma
- B. Can be stimulated to proliferate by muscle growth or damage
- C. Can be isolated for cell culture
  - 1. Proliferate like immortalized premyoblasts
  - 2. Express myofibrillar proteins
  - 3. Fuse to form new myotubes.



**Developing limb bud.** Satellite cells are involved in the formation of primary and secondary myotubes during fetal development. Premyoblasts from somites close to the point of limb formation migrate to a point just under the ectoderm. Myoblasts fuse to form myotubes, aligning with developing limb bones.

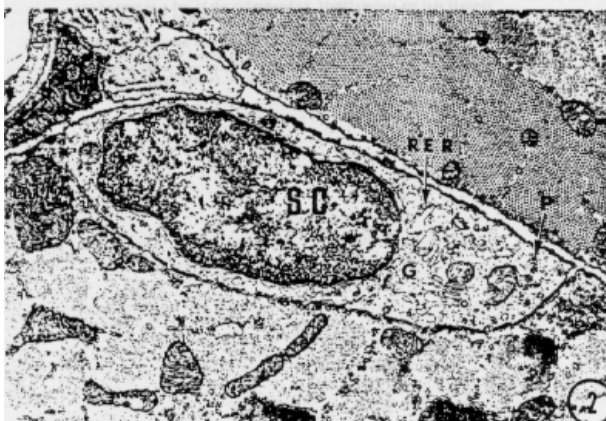
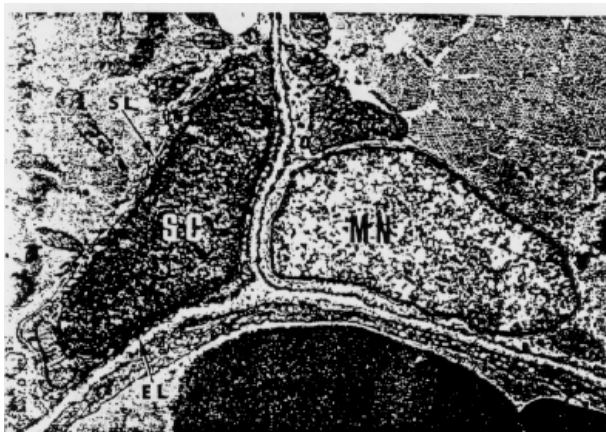
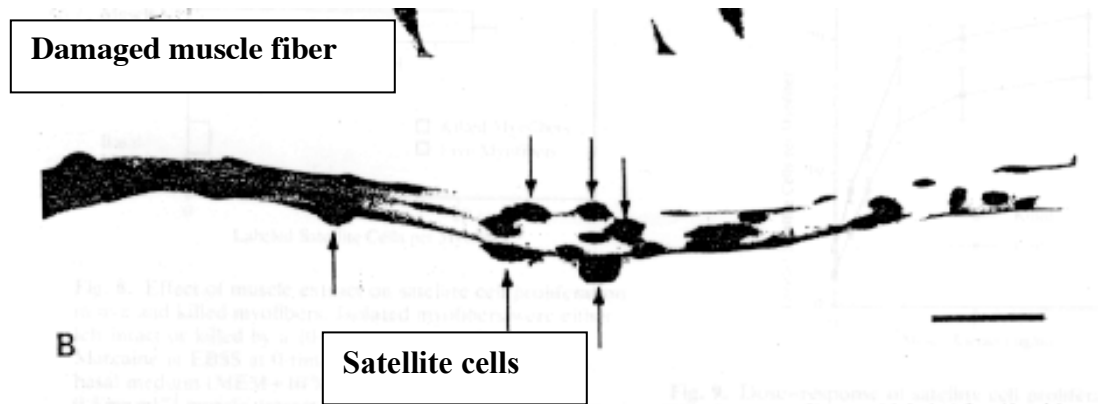


**Satellite cell hyperplasia.** The total number of muscle nuclei increases during postnatal growth. Nuclei increase at a faster rate than total cytoplasm (sarcoplasm), indicating that satellite cell hyperplasia exceeds myofiber hypertrophy.

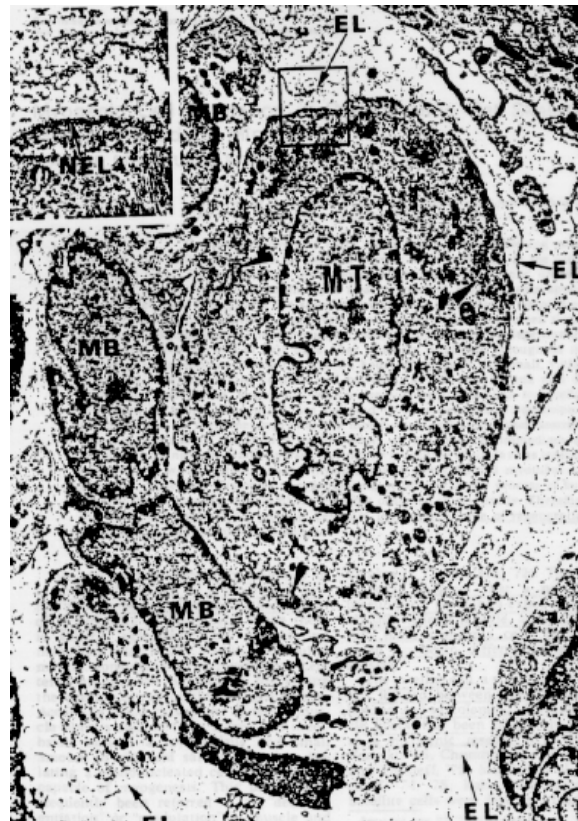
## II. Satellite cells and muscle fiber repair

A. Proliferation increases greatly when the muscle is damaged.

1. Satellite cells migrate to damaged area.
2. Secretion of mitogenic factors by damaged muscle stimulates migration.
3. Satellite cells (now called “myoblasts” by some authors) fuse to form new myotubes.



**Skeletal muscle fibers from rat soleus muscle.** A satellite cell (SC) is shown between the external lamina (EL) and sarcolemma (SL). Note the paler myonucleus (MN) in the top micrograph.



**Regenerating myotube (MT).** A myotube formed after the muscle was damaged. The myotube with a central nucleus is shown adjacent to three myoblasts (MB). The external lamina (EL) from an originally minced muscle fiber appears to be completely surrounding the myotube and myoblasts.