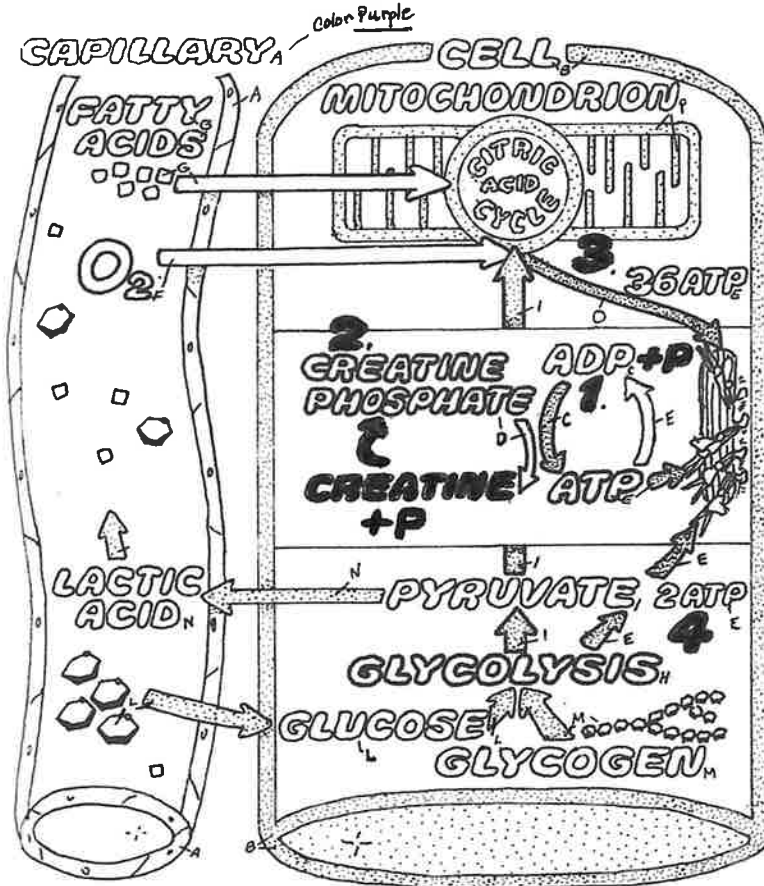


SOURCES OF ENERGY IN MUSCLE FIBER



AEROBIC

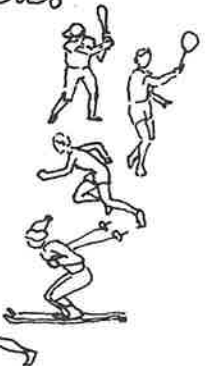
During exercise, muscles require rapid supplies of ATP. The ATP in the cells is used quickly (1), forming ADP and inorganic phosphate. The next available source is creatine phosphate (2). It really donates its high-energy phosphate to ADP to form ATP + creatine. Creatine phosphate is also easily exhausted, and fatty acids and glucose begin to be utilized. At low levels of sustained activity, the blood supply of O₂ is adequate to meet demands so that utilization of these fuels is aerobic (3); it terminates in oxidative phosphorylation where O₂ is the final acceptor of the H stripped off fuel molecules, and many ATP are produced.



1. ADP + PHOSPHATE
2. CREATINE PHOSPHATE
3. OXIDATIVE PHOSPHORYLATION.
4. GLYCOLYSIS

or Phospho-creatine

During strenuous exercise, involving bursts of intense activity, blood cannot supply O₂ fast enough. The muscle cells rely on anaerobic metabolism of glucose and glycogen (4) to rapidly supply ATP. Pyruvate is no longer metabolized by mitochondria; it is converted to lactic acid, which escapes in the blood. Anaerobic metabolism is very rapid but inefficient, because compared to aerobic metabolism the amount of ATP produced by each fuel molecule is small.



ANAEROBIC

3 KINDS OF SKELETAL MUSCLE FIBER

1. RED/SLOW, 2. RED/FAST, 3. WHITE/FAST.

COLOR (MYOGLOBIN),
 (Color Red)



SPEED OF TWITCH



ATPase ACTIVITY



TYPE OF ATP PRODUCTION

OXIDATIVE PHOSPHORYLATION. ANAEROBIC GLYCOLYSIS.

NUMBER OF CAPILLARIES



RESISTANCE TO FATIGUE



DIAMETER OF FIBER



Skeletal muscles generally contain mixtures of three types of fibers. 1. Red/slow fibers are specialized for slow sustained activity and resistance to fatigue. They are red because they contain the respiratory pigment myoglobin, which, like the hemoglobin of blood cells, stores O₂ by loosely binding it. The fibers are small, surrounded by many capillaries, and contract slowly so that blood supply of O₂ can keep up with demand. Their metabolism is essentially aerobic. Postural muscles of the back contain high proportions of these.

2. Red/fast fibers are intermediate between red/slow and white/fast. 3. White/fast fibers are abundant in muscles that have rapid, intense bursts of activity. Myoglobin is absent, mitochondria are sparse, and capillaries are less profuse. Glycolysis is well developed so that ATP is produced rapidly, but the muscle fatigues quickly when the limited glycogen stores are depleted.