PHOSPHOCREATINE: THE ENERGY RESERVOIR

- Phosphocreatine (PCr), another intracellular high-energy phosphate compound.
- The PCr and ATP molecules share a similar characteristic; a large amount of free energy releases when the bond cleaves between the PCr's creatine and phosphate molecules.

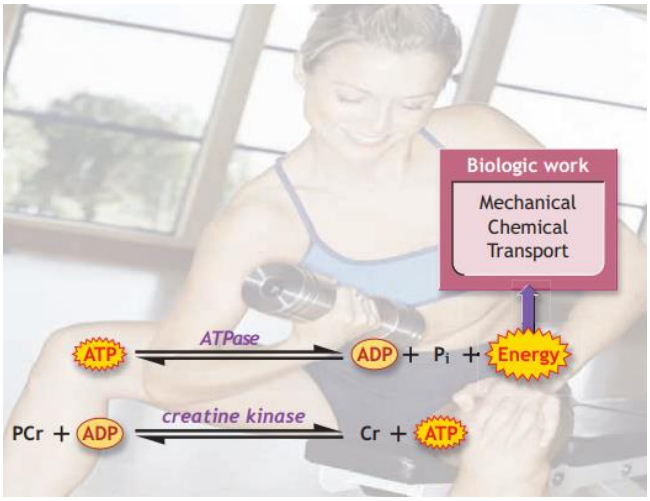

FIG: ATP and PCr provide anaerobic sources of phosphate-bond energy.

The energy liberated from the hydrolysis (splitting) of PCr rebonds ADP and Pi to form ATP.

- Transient increases in ADP within the muscle's contractile unit during exercise shift the creatine kinase reaction toward PCr hydrolysis and ATP production; the reaction does not require oxygen and reaches a maximum

energy yield in about 10 seconds. Thus, PCr serves as a “reservoir” of high-energy phosphate bonds.

$$2\ ADP \xleftrightarrow{\text{adenylate kinase}} ATP + AMP$$

CELLULAR OXIDATION

- Oxidation reactions (those that donate electrons) and reduction reactions (those that accept electrons) remain coupled and constitute the biochemical mechanism that underlies energy metabolism.

ELECTRON TRANSPORT

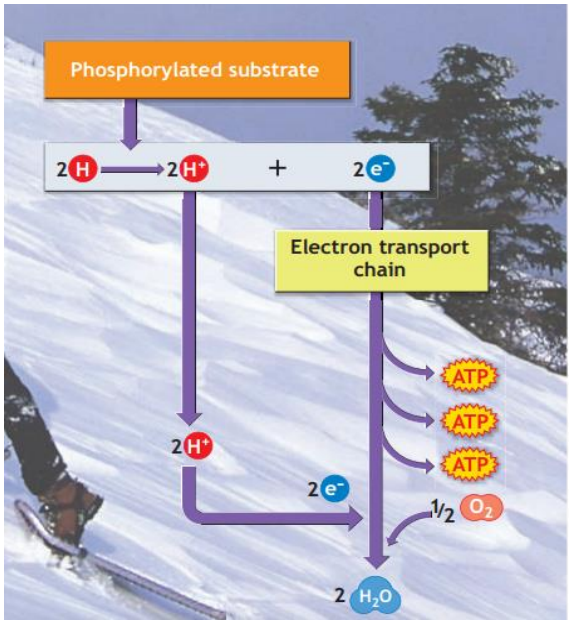

FIG: A general scheme for oxidizing (removing electrons) hydrogen and the accompanying electron transport. In this process, oxygen is reduced (gain of electrons) and water forms. The liberated energy powers the synthesis of ATP from ADP.