Dynamic Chiropractic

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A Review of the Chemosmotic Theory of ATP Synthesis Relative to Clinical Direct Current Application

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This is a review of the hypothetical mechanism of adenosine triphosphate synthesis by soft tissue cell organelles as proposed by the British biochemist Peter Mitchell.

Hypothetically, when direct microcurrent of 50-500 microamperes (uamps) is applied to injured human tissue, an artificial proton gradient may be formed, which may also result in ATP synthesis. As a result of cellular electrostimulation by direct current, electrons react with the water molecules to protect OH- radicals at the cathode, and H+ (protons) at the anode. Although a proton gradient is formed within the cellular medium, no net pH change takes place, because the rate of proton formation is in equilibrium with the rate of proton consumption. The migrating protons (H+) activate the adenosine triphosphatase enzyme necessary for ATP synthesis. ATP synthesis is an endothermic process itself. The energy otherwise used for electron transport is in this case used for ATP synthesis.

Although this process actually involves a feedback process referred to as a "loop," to explain this mechanism would require more space than this column provides. Theoretically, amino acids are transported by the electrical gradient across the mitochondrial membranes wherein they become available for use in the synthesis of protein.

To summarize, DC cellular electrostimulation results in the creation of protons at the anode and a proton gradient is formed across the cytosol. The energy of the protons migrating to the mitochondria activates the enzyme H+-ATPase, catalyzing the formation of ATP. The energy of electron transport is used to generate ATP, otherwise it would probably appear as free energy.

The reader is reminded that although the Mitchell hypothesis is the best current explanation for this process, it remains just that and until science provides for a more established explanation, it provides a reasonable basis for this process.

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