

EVOLUTION OF ANTIOXIDATIVE SYSTEMS

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Summary

Life on Earth had evolved about 3.5 billion years ago. Evolutionary processes were accompanied by changes in the composition of the atmosphere, including changes in oxygen level. Primitive organisms have evolved in an environment in which the atmospheric oxygen content was fluctuating around 0.02% . These organisms, after having acquired the ability to generate energy through the process of photosynthesis and to catalyze splitting of water using solar energy, gave rise to gradual increase of the oxygen level in the atmosphere and provided a basis for the evolution of aerobic metabolism. The increased oxygen level, due to its oxidizing properties, appeared toxic to living organisms. This led to the development of early antioxidant mechanisms and their further evolution to more efficient systems for removal of dangerous reactive oxygen species. In the course of the evolution, organisms have acquired ability to control the amount of generated reactive oxygen species and to use them in signaling processes and transduction of information.