OXIDATIVE STRESS BY ENDOGENOUS UV

Thomas PREVENSLIK

QED Radiations – Berlin, Germany

nanoqed@gmail.com

Introduction: Since the discovery of ATP synthesis in mitochondria by oxidative phosphorylation [1] across the inner membrane, oxidative stress has been considered the errant consequence of aerobic metabolism based on chemiosmosis comprising a chain of complex redox reactions with electron transfer from donors to acceptors assisted by enzymes. But consistent with mitochondria evolving [2] on the early Earth under intense solar UV radiation, ATP synthesis was proposed [3] to more likely evolve by UV enhanced dehydration [3] reactions of ADP and phosphate instead of redox reactions by hydrolysis. Over time, mitochondria evolved nanoscale spaces between cristae equal to the half-wavelengths of the solar UV radiation. But once ozone formed in the atmosphere, solar UV was reduced and survival required mitochondria to evolve its own endogenous UV source.

Materiel & Methods: Simple QED is a method of nanoscale heat transfer based on the Planck law that precludes atoms in mitochondria the heat capacity to conserve ATP heat by an increase in temperature. Instead, simple QED conserves ATP heat by creating UV radiation in the spaces between cristae.

Results: In mitochondria, simple QED converts ATP heat into Planck energy $E = hc/2nd$, where h is Planck's constant, c is the speed of light while n and d are the refractive index and spacing. EM radiation [3] near the UVC is formed.

Conclusion: Not only does endogenous UV produce the ATP necessary for survival, but also damages DNA and excites oxygen to produce ROS - superoxide, nitric oxide, hydrogen peroxide, and hydroxyl radicals. Survival then required the evolution of DNA repair including antioxidants: carotenoids, EGCG; and enzymes: catalases and peroxidases, all of which are UV absorbers. Solar UV and DNA mutagenesis on the early Earth explains the similarity but differences in Darwin's species. Finally, mitochondrial survival on Earth has always been a balance between competing effects of UV radiation.

References

1. *Mitchell, P. (1961). Coupling of phosphorylation to electron and hydrogen transfer by a chemiosmotic type of mechanism. Nature, 191, 144–148.*
2. *Ponnamperuma, C., et al. (1963). Synthesis of Adenosine Triphosphate under possible primitive Earth conditions. Nature 199, 222.*
3. *Prevenslik, T. ATP Synthesis by Endogenous UV Radiation. 10th Congress Targeting Mitochondria, Oct. 28-29, 2019 - Berlin, Germany.*