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Chronic Stress, Oxygen, and Mitochondria Disfunction the Secret Killers

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Editorial

Microorganisms represent the largest component of biodiversity in our world, yet a common human propensity is to regard all microorganisms as “harmful”, in particular, equating bacteria to pathogenic germs. Nothing could be further from the truth. The number of beneficial bacterial species far exceeds the number of pathogenic species and many of the known bacteria are in fact useful or even indispensable for the continued existence of life on Earth. For millions of years, prokaryotic microorganisms have functioned as a major selective force shaping eukaryotic evolution. The nature of primitive eukaryotes was drastically changed due to the association with symbiotic prokaryotes facilitating mutual coevolution of host and microbe. The cooperative interactions between species (mutualism) have had a central role in the generation and maintenance of life on earth. Prokaryotes and eukaryotes are involved in diverse forms of mutualism. As an example, the endosymbiotic theory states that several key organelles of eukaryotes originated as symbioses between separate single-celled organisms. According to this theory, mitochondria in animals and chloroplasts in plants, and possibly other organelles, represent formerly free-living bacteria that were taken inside another cell as an endosymbiont, around 2 billion years ago. Molecular and biochemical evidence suggest that the mitochondrion developed from proteobacteria and the chloroplast from cyanobacteria. That symbiotic association changed the evolution of life forever. Mitochondria, usually referred as the "powerhouse of eukaryotic cells" are responsible of supplying cellular energy, however, mitochondria are also involved in many other metabolic tasks, such as: Signaling through mitochondrial Reactive Oxygen Species (ROS), regulation of the membrane potential, apoptosis-programmed cell death, calcium signaling, regulation of cellular metabolism, heme synthesis reactions, steroid synthesis, and hormonal signaling. Hence, damage and subsequent dysfunction in mitochondria is an important factor in a range of animal and plant diseases due to their influence in cell metabolism. Inflammation is the endpoint of stress, regardless of its origin or nature (biological, environmental, nutritional, physical, chemical or phsycological). Stress and inflammation are innate responses in living organisms involving hormones, immune cells, and molecular mediators, which are essential mechanisms for the survival and the healing process in all forms of life. However, all of the above mechanisms during stress responses depend on the energy and vitality of healthy mitochondria. During chronic inflammation, the increase production of reactive oxygen species induce peroxidation of lipids in cell membranes as well as mitochondria membranes. The long-term damage of this vital organelle has a profound impact in all cells of the individual. It is well accepted that in animals, the interactions between diet ingredients, gut microbiome, nervous system, immune system and endocrine system play key roles in metabolic and gastrointestinal disorders, diabetes, cancers, autoimmune diseases, malnutrition, obesity, myopathies, cardiovascular and muscle function, and even neurological diseases. Interestingly, all this metabolic diseases and even neurological pathologies in humans including autism, schizophrenia, bipolardisorder, dementia, Alzhemer's disease, Parkinson's disease, epilepsy, stroke are extremely linked with mitochondrial disorders. That is why, we need to recognized to chronic stress, oxygen, and mitochondria disfunction as the secret killers.

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