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The Mitochondrial Free Radical Theory of Ageing

The Mitochondrial Free Radical Theory of Ageing is based on the fact that mitochondria are one of the most prolific producers of free radicals within a cell. Free radicals inflict damage on mitochondria and other cellular components and have been associated with many degenerative diseases. MitoQ is a revolutionary targeted form of coenzyme Q10 that is a potent antioxidant. It accumulates inside mitochondria and acts as a reservoir in case of excess free radical production. MitoQ protects cell membranes and supports efficient cellular reactions, naturally decreasing free radical production. Take MitoQ alongside a healthy diet and exercise and get on the road to a younger, healthier and longer life today!

What determines the age we live to? Why is it that the longest a human has survived is 122 years yet there is a type of clam that has lived to 507? Scientists have been trying to unravel the mystery of ageing for years and many theories on ageing exist. One of the more robust is the Mitochondrial Free Radical Theory of Ageing (MFRTA) that stems from the general free radical theory of ageing. Free radicals are produced during cellular reactions, and inflict damage on cellular tissue, fats, and DNA if production is over and above cellular requirements.

The MFRTA is based on the fact that mitochondria are one of the most prolific producers of free radicals within a cell. Mitochondria are bean-shaped organelles that generate fuel for the cell in the form of adenosine triphosphate (ATP). Cells that require the most energy - such as the brain, heart, liver, kidney, skeletal muscles, and the eye - contain the most mitochondria. Mitochondria also signal other cellular components to perform specific functions, allow cell growth, and determine cell death. They are able to self-replicate independently because they contain their own DNA and RNA.

Unfortunately, they are extremely vulnerable to free radical attack. Damage is inflicted from environmental influences such as UV radiation, pollution, and cigarette smoke. Endogenous damage occurs when mitochondria generate free radicals at a higher rate than normal. These rogue free radicals steal electrons off the closest stable molecule in their vicinity, which may be a protein molecule making up the mitochondria DNA or RNA or a structural fat molecule within the mitochondrial membrane.

This is where the MFRTA fits in. Damage inflicted on mitochondria may not be enough to kill them but is usually enough to disrupt their normal function. Dysfunctional mitochondria send incorrect messages, decrease ATP production, and produce more free radicals. Defective mitochondria replicate their own damaged DNA into new mitochondria, eventually displacing all well-performing mitochondria. Dysfunctional mitochondria are associated with many degenerative diseases. Out of control free radicals cause widespread tissue damage and put our body in a state of oxidative stress. Oxidative stress affects our skin, and can change our skin's appearance and disturb wound healing, worsening skin scarring.

Studies show that long-lived animals have low rates of free radical production and possess mitochondrial and cellular membranes that are relatively resistant to free radical attack. These two factors can be explained by the MFRTA and not any other ageing theory. The MFRTA also explains why longevity varies so widely among different animal species.

But how can we decrease mitochondrial free radical production and oxidative stress? If scientists knew the complete answer to that question then we would know the secret to perpetual youth! What we do know is that dietary restriction, including restriction of specific dietary components such as protein or methionine (an amino acid found in meats, fish and dairy) has shown in animal studies to increase life-span, decrease incidence of degenerative diseases and decrease mitochondrial free radical production. Antioxidants help increase survival rates of animals subjected to suboptimal environmental conditions, but evidence suggests they need to be targeted to increase longevity. MitoQ is one such targeted antioxidant. Its revolutionary formulation allows it to penetrate the double membrane of mitochondria and accumulate inside, acting as a reservoir in case of excess free radical production. MitoQ contains coenzyme Q10 which protects cell membranes and supports efficient cellular reactions, naturally decreasing free radical production. It has an excellent safety profile and studies support long-term administration.

Future research hopes to further investigate targeted antioxidants and work out why longer-lived animals generate lower levels of free radicals. Hopefully the answer is not too far on the horizon so we all can enjoy a “young”, vigorous, and

healthy longer life sooner rather than later! In the meantime, eat a healthy balanced diet with limited processed food, exercise most days, stay out of the sun, don't smoke, and take MitoQ today.

Always read the label and use as directed. If symptoms persist see your healthcare professional

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