Counteracting Aging with Basic Physics

by

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Summary

This presentation summarizes the history of the free radical theories of inflammation, disease and aging. Because the free radical is a molecule with one or more unpaired electrons, it has charge and magnetic properties that make it highly reactive as well as attractive to free electrons and antioxidant molecules. Free radicals were discovered in 1900, but most scientists thought they were too short-lived to have any biological consequences. Key work of Gershman and Gilbert (1954) revealed that elevated oxygen atmospheres in incubators were causing retrolental fibroplasia in premature babies. This was one of several clues that led Denham Harman (1956) to propose his free radical theory of aging, which has stood the test of time. Today, free-radicals are being implicated in virtually all of the diseases of aging and in the aging process itself. Study of the role of inflammation in chronic disease has become one of the most exciting areas in biomedical research worldwide. The physical properties of free radicals have brought energetic medicine into the forefront in the study of inflammation and aging. Recognition of the free electron as the ideal antioxidant has led to an explanation of how a number of clinical devices are so effective at eliminating inflammation and treating chronic diseases. Devices that introduce or induce microcurrents into tissues, when combined with appropriate nutritional supplementation, can produce profound anti-aging effects, particularly for osteoporosis.

Discovery of free radicals

In 1900 Moses Gomberg discovered the first persistent free radical. He became known as the founder of radical chemistry.[1] Free radicals are relatively unstable molecules with one or more unpaired electrons. When such electrons move about in an atom, they create both electrical and magnetic fields that attract them to nearby molecules, with which they readily combine. Many free radicals are so unstable that they can exist for only a fleeting moment, a microsecond or less. Experiments done by Friedrich Adolf Paneth, an Austrian chemist, in collaboration with W. Hofeditz, a German researcher led to the discovery in 1929 of the brief but powerful existence of the *methyl* and then the *ethyl* free radicals.[2]

Free radical theory of aging

Denham Harman MD, PhD, FACP is widely known as the "father of the free radical theory of aging". In 1954 Dr. Harman became a research associate at the Donner Laboratory of Medical Physics at UC Berkeley, where he pursued the puzzle of the cause of aging. After four months of frustration he hit upon the idea that free radicals damage macromolecules and that this is the fundamental cause of aging. While many were reluctant to accept this theory, in 1956 Harman published an article in the Journal of Gerontology that is now widely cited.[3] In 1995 Denham Harman was nominated for the Nobel Prize in medicine. Of all the theories of aging, Harman's has the most consistent experimental support.

The free radical theory of aging was conceived by Harman at a time when most scientists still believed that free radicals were too unstable to exist in biological systems and before free radicals had been invoked as a cause of degenerative diseases. Harman drew inspiration from two sources: 1) the rate of living theory, which held that lifespan was an inverse function of metabolic rate and oxygen consumption. 2) Rebecca Gershman's observation that hyperbaric oxygen toxicity and radiation toxicity could be explained by the same underlying phenomenon: oxygen free radicals. In 1954, in collaboration with Daniel Gilbert, Gershman developed a free radical theory of disease in which highly reactive oxygen species (ROS) damage living tissue. Their discovery was the result of a search for the cause of a serious disease called retrolental fibroplasia. The condition was traced to the elevated oxygen concentrations that had been routinely used in incubators

for premature newborns. Gershman and Gilbert, linked the development of the disease to oxygen free radicals.
It is interesting that Joseph Priestly, the English chemist who discovered oxygen in 1774, had questioned whether the gas, which is so essential to life, might also in some way be harmful. Modern research has revealed that oxygen is actually a very toxic material, and that the body has a number of antioxidant defense systems that act continuously to keep tissue oxygen levels from getting too high. One of the built-in systems that accomplishes this is the enzyme, superoxide dismutase, discovered by Irwin Fridovich and Joe McCord.[4]

Noting that radiation causes "mutation, cancer and aging" Harman argued that oxygen-free radicals produced during normal respiration might also cause cumulative damage which would eventually cause the organism to lose functionality, and ultimately lead to death.

Free radicals, disease and aging

Today, free-radical induced inflammation has become one of the most exciting areas in biomedical research worldwide. The National Library of Medicine database, Pub Med, lists over 80,000 articles on the relationship between inflammation and disease and nearly 5000 on the relationship between free radicals and aging.

The free radical theory of disease and aging is supported by the fact that radical chemistry is an important aspect of phagocytosis, inflammation, and apoptosis. The latter term, apoptosis or cell suicide, is the body's way of controlling cell death, and involves free radicals and redox signalling. Redox factors play an even greater part in other forms of cell death such as necrosis or autoschizis. The latter term refers to a novel form of non-apoptotic cell death. Vitamin C and vitamin K_3 administered in a ratio of 100:1 induces necrosis in cancer cells that begins with membrane damage and loss of cytoplasm. It is thought that the process increases oxidative stress on the cancer cells until their reducing ability is compromised.[5] Morphological and molecular changes distinguish autoschizis from apoptosis and oncosis.[6] The definitions and distinctions between these important terms have been reviewed.[7]

Clinical applications

These discoveries have profound clinical implications. The electrical and magnetic properties of free radicals bring energy medicine to the forefront of the most active area of biomedical research today: the investigation of inflammation, cell death and aging. Energy medicine, in turn, paints much clearer pictures of the physical interactions taking place in aging. As a field of investigation, energy medicine brings the discoveries of physics and biophysics into clinical practice. Recognition of the free electron as the ideal antioxidant[8] has led to an explanation of why a number of devices that introduce or induce microcurrents into tissues, when combined with appropriate nutritional supplementation (Orthomolecular medicine) can produce profound anti-aging effects. The first author will present case studies from his clinic in Northern Germany. Particularl emphasis will be on osteoporosis.

About the authors

Wolf-Dieter Kessler MD has been a physician for over 35 years. His clinic in Northern Germany is a leading institute for treating acute and chronic disease. He was part of the lung transplant team at Montefiore Hospital in New York performing mainly electron-microscopical research on both human and canine transplanted lungs. He was confronted with a health problem more than 30 years ago after contracting a chronic infection in India and became highly allergic to almost anything. The lack of satisfactory help in conventional medicine made him hunt for both: to advance conventional and complementary treatments.

James L. Oschman, PhD is a leading authority on the science behind a wide variety of energy medicine therapies. He has worked in major research labs around the world, and his scientific papers have been published in the world's leading journals. He is the author of *Energy Medicine: The Scientific Basis*, published by Churchill Livingstone and *Energy Medicine in Therapeutics and Human Performance*. Jim's scholarly writings have led to useful insights that can help all health care professionals better understand and advance their work and explain it to others. You can learn more about his work on his website: http://www.energyresearch.us/

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