

Abstract

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The aging of the heart and blood vessels: a consideration of anatomy and physiology in the era of computed tomography, magnetic resonance imaging, and positron emission tomographic imaging methods with special consideration of atherogenesis.

Botvinick EH, Perini R, Bural G, Chen W, Chryssikos T, Houseni M, Hernandez-Pampaloni M, Torigian DA, Alavi A.

Department of Radiology, University of Pennsylvania School of Medicine, Philadelphia, PA, USA.

BACKGROUND: Physicians have long told their patients that the doctor's job is to help patients "get as old as they can." As physicians, we have been aided in this objective by many other scientists in other disciplines. The entity of aging and its related changes blends imperceptibly with a variety of age-related diseases. However, these entities do appear to be separate though interrelated. Curing disease is important and a goal that we all work toward to add years to life expectancy.

DISCUSSION: Here, we consider aging as it affects the heart and great vessels and as it serves to influence and support, if not cause, age-related cardiac diseases. This relationship is drawn as cardiac mechanics, hemodynamics, perfusion, metabolism and innervation, anatomy, and pathophysiology are each considered. The effects of aging are presented in 2 sections related to the early and recent "spikes" in aging related information. The latter is largely based in recent developments in chemistry, genetic engineering, molecular biology and the new imaging methods.

OBJECTIVE: The purpose of this manuscript is to present these new imaging methods, especially PET, and their impact on the second "spike." This is emphasized particularly in the second half of this review. As a method of demonstrating these imaging tools and their finest potential application, we decided to "showcase" atherosclerosis as the age-related disease for which these methods have made their greatest impact, for which yet more is promised, and for which the influence on longevity is most obvious.

SUMMARY: The application of positron emission tomography and other imaging methods to the characterization and image identification of atherosclerotic plaques and particularly the "vulnerable" plaque is emphasized. Yet, even with the eradication of coronary disease, the potential for very long life would not be likely. Only with the identification and eradication of the causative factors of aging can this possibility have a chance of becoming reality.

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