

## Age-related Cardiovascular Function in the Elderly

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### EDITORIAL

Aging is related with a loss of physiologic reserve in all organ systems, which increases sensitivity to illness and lowers the ability to adjust for stress. Every 8.5 years, the chance of death in the general population doubles. It's worth noting that this doubling time also applies to the chance of dying from specific conditions including appendicitis, pneumonia, cardiovascular disease, and many types of cancer. When it comes to perioperative mortality, the chance of dying nearly doubles with each additional decade of age.

Hemodynamic stability is one of the most important aims and problems in anaesthetic delivery. Not only does ageing make such stability more difficult to attain; ageing and age-related illness may also make hemodynamic instability more likely to result in negative consequences. Blood pressure is inherently more unstable during anaesthesia as a result of cardiovascular and autonomic ageing, primarily due to exaggerated responses to changes in ventricular filling, exaggerated responses to changes in sympathetic nervous system activity, and impaired baroreflex control of blood pressure due to a decreased response to beta-receptor stimulation. Concomitant vascular illness may result in organ hypo perfusion at blood pressures that a young, healthy adult might tolerate. The objectives of this article are to examine the physiology of cardiovascular ageing, present what is known about the effect of anaesthetic on the old cardiovascular system, and explore hemodynamic management methods in the elderly patient.

The most noticeable and significant alterations include a reduction in the responsiveness to beta-receptor stimulation, stiffness of connective tissue in the arteries, veins, and heart, and an increase in sympathetic nervous system activity. Less significant alterations include myocyte loss without replenishment and a reduced responsiveness to atropine. Systolic hypertension, ventricles that contract with good strength but more slowly than young hearts, a

poor tolerance of hypovolemia, and a diminished chronotropic and inotropic response to anything involving beta-receptor stimulation, such as exercise, exogenous catecholamine administration, or the baroreflex, are all visible changes.

The reduced responsiveness to beta-adrenoceptor stimulation is perhaps the most well-known impact of ageing on the cardiovascular system. Isoproterenol at any dosage, for example, will not increase heart rate as much in an older heart as it will in a younger heart. Similarly, contractility does not rise as much in the elderly; isoproterenol increases ejection fraction about twice as much in the young. The mechanism behind the reduced response is not a decrease in beta-receptor density with age, but rather a decrease in both the affinity of beta-agonists for the beta-receptor and the effectiveness of post receptor coupling to the intracellular components responsible for muscle contraction. There are several examples of the implications of a reduced response to beta-receptor stimulation, but the ones covered here will include the reaction to exercise, bar reflex blood pressure regulation, and the effects of ventricular contraction.

The baroreflex begins with low and high pressure baroreceptors that transmit information to the medulla via the vagus and glossopharyngeal nerves. Following information processing, the sympathetic and parasympathetic nervous system output is regulated. There is no indication that ageing affects the neural system components of the baroreflex in a meaningful way. The most noticeable baroreflex deficiency in aged people is a failure to mount as strong a cardiac response as in young participants, probably due to a reduction in beta-receptor responsiveness. Age actually increases the shift in sympathetic nervous system activity that occurs with a change in blood pressure. Despite the possibility that the alpha-receptor response to stimulation decreases significantly with age, the vasoactive component of the baroreflex in the elderly is as effective, if not more so, than in young people.

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