

Cardiovascular Ageing

Blood vessels

Heart failure

Free radicals

Hypertension

Blood Vessel and Cardiac Function in Ageing

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The Investigation

Objectives

- to determine the changes in the mechanical and functional properties of the heart and blood vessels in ageing
- to identify the role of nitric oxide in alterations in blood vessel and cardiac function in ageing
- to determine if altering nitric oxide availability can restore normal blood vessel function in ageing.

Background

- At the start of the 20th century diseases of the heart and blood vessels accounted for 1 in 10 deaths. Today this figure is nearly 1 in 2.
- Diseases of the heart and cardiovascular system also dramatically reduce our ability to lead an active life and contribute to society.
- Ageing is now the major risk factor for the development of heart failure and related morbidity/mortality and is also strongly linked to the development of certain types of cardiac arrhythmias.
- Restoring blood vessel and cardiac function in ageing, or preventing deterioration of function during ageing, will increase life expectancy and the quality of life.

Research Plan

The aim is to understand how the blood vessels and heart alter with normal ageing and to identify possible targets to improve cardiovascular function.

Methodology

This project uses a sheep model of ageing. Sheep normally live for 10-12 years. We will compare the function of the heart and blood vessels in sheep aged 18-24 months (normal adult population) and greater than 10 years of age (aged cohort). The sheep is a particularly good surrogate model of man in terms of their longevity and also their similarity of normal cardiac and blood vessel physiology.

Resources

SPARC equipment to quantify blood vessel and cardiac function.

[British Heart Foundation](#) a project grant (12/06) to determine some of the cellular mechanisms responsible for cardiac arrhythmias in ageing

PhD studentship (04/05) to define the role of changes in cellular Ca²⁺ homeostasis.

Potential Benefits

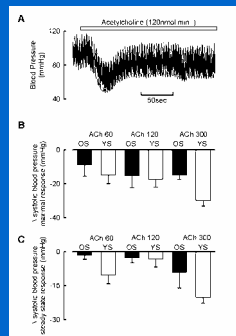
For older people

- This work has already begun to demonstrate that the major blood vessels leading from the heart to the body periphery have impaired function and thus increasing the workload on the heart and predisposing the development of heart failure.
- Establishing the precise mechanisms involved in the development of blood vessel dysfunction will enable the design of appropriate management and / or prevention strategies.

For society

- Reductions in the economic burden of cardiovascular disease.
- Increased active participation by older people in society.

Experimental Data



Impaired endothelial function in the aorta of aged sheep.

A. Changes in ascending aortic blood pressure in response to acetylcholine administration. B. Mean peak blood pressure response. C. mean steady state blood pressure response. OS – old sheep, YS – young sheep. N 3-4 per group. $P < 0.05$ OS vs YS.



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