

Physiological and functional differences of the heart and the cardiovascular system between the genders

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Women live longer than men in most civil societies. The reasons for this difference is not yet clear, but cardiac causes may contribute. Male and female hearts behave differently in the aging progress. The male heart constantly loses myocytes from age 15 to 95 years, whereas the female heart does not. Cell loss leads to hypertrophy in the male heart, but usually not in the female heart. Male and female hearts respond differently to pressure load or to volume load and may also differ in their metabolic response. Fatty acid metabolism and glucose oxidation seem to be activated to different degrees in different metabolic states by hemodynamic load. Coronary arteries also show differences in men and women. Female coronaries are smaller, however, the difference to male arteries is less than expected. However, female coronary arteries have the reputation to be sometimes more tortuous and, therefore, more difficult to operate on. Endothelial progenitor cells probably contribute constantly to repair mechanisms in the heart. It seems that homing of endothelial progenitor cells is at least partially modulated by estrogens. Another important protective mechanism in the female heart that is less pronounced in the male heart is the production of nitric oxides. Activity of nitric oxide synthetases is greater in the female than in the male heart. Ion channel expression differs in male and female hearts and, therefore, rhythm, QT interval and rhythm disturbances may differ. Thus, normal female and male hearts really are beating differently and we need more research to completely understand these differences and their implication for heart disease.