Model Study of Hypertension Originating an Increased Cardiac Ejection Fraction

戴承正

Hsieh JC;Tai CJ

摘要

Abstract

Hypertension is normally associated with vascular change by increased afterload. But hypertension is also observed without increased peripheral resistance in the patients with normal stroke volume but increased heart rates. To understand the interactions between vascular change and cardiac ejection fraction that leads to primary hypertension, a computer simulation arterial model was developed. Experimental aortic pressure, Pa(t) and aortic flow, ea(t) derived from the data on mongrel dogs, were digitized then incorporated into the lumped arterial system model. By manipulating the peripheral resistance (Rs), the systemic capacitance (Cs), and the ea(t), the Pa(t) was studied. Results indicated that (1) elevated Pa(t) caused by 20% increased ejection fraction can be observed in reduced peripheral resistance and increased systemic capacitance; and that (2) by power spectrum analysis, the amplitude of input impedance in cardiac induced hypertensive atrial system showed 40% lower oscillation than vascular-induced hypertension. The authors' results showed cardiac-induced hypertension has opposing effects on the change of peripheral vascular resistance in terms of time and frequency. In conclusion, their simulation indicated a predicted hyperdynamic state of aortic pressure without increased peripheral resistance. This is referred to as hypertension of cardiac origin

.