

Koumi S, R Martin, R Sato. Alterations in ATP-sensitive potassium channel sensitivity to ATP in failing human hearts. *Am J Physiol* 1997;272(41):H1656-H1665.

Little is known about the involvement of preexisting heart disease on characteristics of ATP-sensitive K⁺ channels [I[K(ATP)]] in human heart. We have characterized I[K(ATP)] in isolated cardiac myocytes from patients with congestive heart failure (HF) and compared these channel characteristics with those from donor hearts (healthy control) using the patch-clamp technique. During metabolic inhibition induced by treatment with cyanide (1 mM) and 2-deoxyglucose (10 mM), action potential shortening occurred in atrial myocytes isolated from both HF and donors, but this response was significantly greater and sooner in HF than in donors. The action potential duration at 90% repolarization was 24.7 +/- 4.1% (n = 15) of control in HF, whereas it was 58.7 +/- 5.9% (n = 10, P < 0.001) of control in donors measured at 30-min metabolic inhibition. The shortening of the action potential was partially reversed by glibenclamide (0.5 microM) in both groups. Consistent with the action potential measurements, the whole cell membrane current response to metabolic inhibition, evaluated by the differential current measurement, was sooner and greater in HF than in donors. Single-channel atrial I[K(ATP)] from both HF and donors, recorded in the excised inside-out patch configuration, exhibited bursting opening, conductance, and gating behaviors that did not differ between the two groups. However, the concentration of ATP at half-maximal inhibition of the channel in HF was greater (131.0 microM) than in donors (26.1 microM). We conclude that I[K(ATP)] in cardiac myocytes from patients with HF has channel characteristics substantially similar to those in donors, but that the channel is less sensitive to ATP inhibition in HF than in donors.