Interleukin-1 beta inhibits Na+-K+ ATPase activity and protein expression in cardiac myocytes.

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Recent studies have shown that heart diseases are always accompanied with high levels of IL-1beta and a decrease in Na+-K+ ATPase concentrations. This work studies the involvement of the cytokine in the observed changes in the pump. Rats were injected intraperitoneally with 400 mg of IL-1beta and 4 h later, the heart was isolated and a crude homogenate of the right and left ventricles was prepared and tested for Na+-K+ ATPase activity and protein expression. IL-1beta inhibited by around 70% the activity of the ATPase in the left and right ventricles. This inhibition of the pump was ascribed to a decrease in its protein expression as demonstrated by western blot analysis. A dose and time response study conducted on isolated cardiac myocytes confirmed the inhibitory role of the cytokine on the ATPase and showed that IL-1beta exerts its maximal down-regulatory effect at 2 h and at a dose of 20 ng/ml. The cytokine caused also an up-regulation of the NaKCl2 cotransporter. Both MEK and p38MAPK were shown to be involved in the signaling pathway activated by the cytokine. It can be concluded that the decrease in the Na+-K+ ATPase concentration observed in heart diseases is a consequence of the accompanying high levels of IL-1beta, and may be responsible for the different symptoms that accompany cardiac ischemia.

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