In vitro and *in vivo* alterations in responsiveness of cardiac β-adrenoceptors to some catecholamines (norepinephrine, epinephrine, isoproterenol and dopamine) in chronic morphine-treated and morphine-withdrawal rats

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ABSTRACT

Norepinephrine, epinephrine, isoproterenol and dopamine were investigated to explore the effects on cardiac β-adrenoceptors in isolated rat atrial preparations (*in vitro*) and anesthetized rats (*in vivo*) of both the morphine dependence and morphine withdrawal compared with control rats. In isolated rat atrial preparations, norepinephrine and isoproterenol at higher concentrations significantly increased and decreased both heart rate and tension in morphine-dependent and morphine-withdrawal groups, respectively, whereas epinephrine produced only a decrease in heart rate in the morphine-withdrawal group, and dopamine significantly increased tension and decreased heart rate in the morphine-dependent and morphine-withdrawal group, respectively.

In anesthetized rats, norepinephrine at higher concentrations produced a significant increase in heart rate only in the morphine-treated group, and epinephrine was likely to produce a significant increase and decrease in heart rate in morphine-dependent and morphine-withdrawal groups, respectively whereas isoproterenol produced a markedly significant increase heart rate in both the morphine-dependent and morphine-withdrawal groups. In addition, norepinephrine, isoproterenol and dopamine significantly increased maximum responses of contractile force in isolated atria of morphine-dependent rats, while norepinephrine, epinephrine and dopamine significantly decreased maximum responses of heart rate in morphine-withdrawal rats.

In anesthetized rats, norepinephrine, epinephrine and isoproterenol significantly increased maximum responses of heart rate in morphine-dependent rats, whereas only

epinephrine and isoproterenol significantly decreased maximum responses of heart rate in morphine-withdrawal rats. In summary, the present findings were likely to suggest that the cardiac β-adrenoceptor hyperresponsiveness and hyporesponsiveness to these catecholamines in both preparations may be due to an up-regulation of β-adrenoceptors during the development of morphine dependence, and down-regulation during the morphine withdrawal, respectively.

Key words cardiac β-adrenoceptors, norepinephrine, epinephrine, isoproterenol, dopamine, responsiveness, morphine dependence, morphine withdrawal

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