The role of endogenous opiates in thermal regulation of the body during exercise

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Abstract

Naloxone abolished the rise in body temperature seen after bicycle ergometer tests performed by 10 healthy men. This suggests that endogenous opiates play a part in thermal regulation during muscular exercise.

Introduction

The effect of opiates on core temperature has been the subject of many studies. Evidence shows that endogenous opiates, in particular endorphins, have a role in the central control of body temperature. Because body temperature rises during dynamic muscular exercise we were intrigued to know whether endogenous opiates play a part in this phenomenon. We therefore studied the effect of naloxone (an opiate antagonist) on the changes in body temperature induced by exercise.

Subjects, methods, and results

Ten healthy men aged 22-28 years, who regularly participated in various sporting activities, underwent a graded ergometer test on three occasions. They exercised on a bicycle ergometer with electric brakes (Ergometric systems 380B, Siemens Elema, Sweden), and on each occasion an identical protocol was used. The tests were performed in the same laboratory at constant room temperature and humidity, at the same time of day, and with an interval of at least four days between each test for each subject.

The first test served as a control. In the second and third tests either placebo (5 ml saline) or 2 mg naloxone (naloxone hydrochloride 0.4 g), Dupont de Nemours, Belgium) was administered intravenously five minutes before exercising. The order of the placebo and naloxone tests was randomised and double blind; five subjects received placebo first and five received naloxone first to minimise carryover effects. The temperature in the laboratory was kept constant at 20°C and the humidity at 60%. Sublingual temperature was
Dihydrocodeine in renal failure: further evidence for an important role of the kidney in the handling of opioid drugs

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Abstract

The pharmacokinetics of a single oral dose of dihydrocodeine were studied in nine patients with chronic renal failure treated by haemodialysis and nine subjects with normal renal function. In the patients the mean peak plasma dihydrocodeine concentration occurred later and the area under the curve was greater than in the normal subjects. Furthermore, the drug was still detectable after 24 hours in all the patients but only three of the normal subjects.

These data, together with those obtained from previously published clinical case reports, contradict the traditional view that the body’s ability to cope with opioid drugs is not altered in renal failure.

Introduction

The kidney is the main site for the elimination of many drugs and their metabolites from the body, and renal disease can consequently have important effects on the pharmacokinetics of such drugs. In addition, the pharmacokinetics of these drugs may be altered in uraemia by changes in plasma protein binding and the rates at which they are metabolised.

Although opioid drugs and their metabolites are excreted by the kidney and some have decreased plasma protein binding in uraemia, it is generally considered to be safe to prescribe them at the normal therapeutic dosage to patients with impaired renal function.

This view must now be challenged. There have been several reports of serious narcotic pain in patients with renal failure treated with opioid drug, and evidence that the kidney has an important role in the elimination of opioid narcotics is accumulating.

The present study was performed to investigate the effect of end stage renal failure on the pharmacokinetics of a single oral dose of dihydrocodeine, a drug that has hitherto been considered to be safe at the conventional dosage in patients with chronic renal failure receiving maintenance haemodialysis.

Subjects and methods

We studied nine subjects (five men), mean (SD) age 34.2 (4.2) years, with normal renal function and nine patients (seven men), age 40.8 (5.2) years, receiving maintenance haemodialysis. All the subjects attended after an overnight fast, and the patients attended on days when they were not receiving dialysis. A 19 G Butterfly cannula was inserted into a forearm vein in the normal subjects or into a vein on the back of the hand in the patients. Blood samples were taken immediately and without tourniquet for estimating plasma temperature in the naloxone test was 36.58 (0.29)°C and after 36.40 (0.54)°C. The difference between the placebo and control tests was significant (p < 0.001) (table).

Discussion

Our finding that the rise in body temperature induced by exercise is antagonised by naloxone suggests that endogenous opiates play a part in thermal regulation during muscular exercise.

References


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