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Effect of propranolol on lactate induced phenomena in normal subjects

A. G. ARBAB, J. A. BONN and DEBORAH C. HICKS (introduced by P. TURNER), *Division of Clinical Pharmacology and Department of Psychological Medicine, St. Bartholomew's Hospital, London, EC1*

Granville-Grossman & Turner (1966) found that propranolol reduced somatic symptoms which may accompany anxiety states. Pitts & McClure (1967) produced symptoms of panic in susceptible subjects by lactate infusion. The present study investigated the possible modification by propranolol of the effects of intravenous lactate in normal subjects.

Six normal subjects received 1 M DL sodium lactate (5 ml/kg) by intravenous infusion over 20 min, having been pretreated 10 min earlier with intravenous propranolol (10 mg) or normal saline. Blood samples were taken before and 15, 20 and 80 min after the beginning of the lactate infusion. Heart rate, skin temperature and forearm muscle-action potentials were recorded continuously and subjective physical and psychological effects noted.

Blood lactate (L isomer) was measured enzymatically (Marbach & Weil, 1967) and increased during lactate infusion from a mean resting level of 0.866 mM (S.E.M. \pm 0.13) to 4.31 mM (S.E.M. \pm 0.32) after propranolol and from 0.837 mM (S.E.M. \pm 0.06) to 4.26 mM (S.E.M. \pm 0.34) after saline. Plasma propranolol concentration was measured fluorimetrically (Shand, Nuckolls & Oates, 1970) and the mean level at the end of the lactate infusion was 65.2 ng/ml (S.E.M. \pm 4.53).

Propranolol produced a significant fall in mean heart rate before lactate infusion from 86.7 to 66.2 beats/min ($d=20.5$, S.E.M. \pm 4.04, $t=5.07$, $P<0.01$) but the rise in heart rate during lactate infusion was not significantly different following propranolol (66.2-90.0 beats/min, $d=23.8$, S.E.M. \pm 4.7, $t=5.07$, $P<0.01$) and following saline (74.1-102 beats/min, $d=27.8$, S.E.M. \pm 5.85, $t=4.75$, $P<0.01$).

All subjects noted unpleasant effects during lactate infusion but no preference in modifying them was established for propranolol or saline either by the subjects or clinical observer. This would suggest that β -adrenoceptor stimulation is not the primary mechanism responsible for the unpleasant effects of lactate infusion.

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