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The effects of dobutamine in the early stages of acute experimental myocardial infarction in the dog

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It has been reported (Tuttle, Pollock, Todd & Tust, 1973) that the β-adrenoceptor stimulant, dobutamine, reduces the area of infarction which results from coronary artery occlusion in dogs. The reasons for this interesting action are uncertain but could be related to changes in blood flow and oxygen availability. We have now investigated the effects of dobutamine on these parameters, using methods previously described (Marshall & Parratt, 1976), simultaneously in both normal and acutely ischaemic regions of the left ventricular wall, 1 – 2 h after acute coronary occlusion in anaesthetized greyhounds. These effects have been related to changes in the extent, and degree, of ischaemic injury as assessed by epicardial S-T segment mapping.

The results (Table 1) demonstrate the positive inotropic effect of dobutamine in the early stages of infarction. In contrast to other cardiac stimulants (Ledingham, Marshall & Parratt, 1973), this was achieved without a significant increase in myocardial oxygen consumption. Similar effects were observed with a dose of $20\,\mu g\,kg^{-1}\,min^{-1}$ except that the increase in heart rate (189 ± 7 to 219 ± 8 beats/min) was more pronounced. Blood flow in the ischaemic myocardium was consistently increased by dobutamine and oxygen extraction decreased. The

Table 1 The effects of dobutamine (10 μg kg^{-1} min^{-1}) following acute coronary artery occlusion in anaesthetized greyhounds

	Pre-dobutamine	*Post-dobutamine*
Mean systemic blood pressure (mmHg)	133 ± 3	134 ± 3
Heart rate (beats/min)	188 ± 13	210 ± 10*
LV dP/dt max (mmHg/s)	2278 ± 225	3313 ± 297*
LVEDP (mmHg)	7.7 ± 1.3	5.5 ± 1.2*
Cardiac output (l/min)	2.2 ± 0.4	2.6 ± 0.3*
Transventricular driving pressure (mmHg)	3.5 ± 2.8	8.2 ± 3.2*
Myocardial blood flow (normal region (ml/min)	75 ± 12	96 ± 14*
Coronary sinus oxygen content (ml/100 ml)	9.7 ± 0.5	12.4 ± 0.3*
Myocardial blood flow (ischaemic region) (ml 100 g^{-1} min^{-1})	27 ± 6	34 ± 6*
Coronary vein oxygen content (ml/100 ml)	8.5 ± 0.1	13.1 ± 1.3*

* $P < 0.05$ Paired t test.

dobutamine-induced increases in myocardial contractility and work did not extend the ischaemic area since epicardial S-T segment elevation was slightly reduced or remained unchanged. In contrast, isoprenaline in a dose (0.1 μg kg^{-1} min^{-1}) that increased dP/dt max. to the same degree, consistently *increased* S-T segment elevation, an effect related to the more pronounced tachycardia. Dobutamine and isoprenaline also differed in their effects on local myocardial temperatures, dobutamine causing significantly smaller increases especially in the subendocardial layers of the infarcting zone.

These effects of dobutamine on blood flow, temperature and S-T elevation may result from an increase in transventricular pressure (Marshall & Parratt, 1974) and thus favour subendocardial blood flow.

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Comparative effects of chloralose and pentobarbital on atrioventricular conduction in the dog

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Two electrodes were implanted in mongrel dogs of either sex: one at the upper end of the atrioventricular node, the other 2 cm away in the atrial myocardium. The electrode leads emerged in the region of the back of the neck. It was then possible to study in the conscious dog atrioventricular conduction by stimulating the atria at increasing frequencies in successive stages. In the unanaesthetized animal at rest, there was a difference in the sensitivity to the atrial stimulation depending on the stage of the respiratory cycle: minimal (135 ± 15 beats/min) during expiratory bradycardia, maximal (240 ± 14 beats/min) during inspiration.

Chloralose (0.8 g/kg i.v.) did not substantially modify sinus rate or atrioventricular conduction ($n = 7$). It did not alter these two stages but decreased the positive chronotropic effects and to a lesser extent, the dromotropic effects of atropine (0.1 mg/kg i.v.).

Pentobarbital (25 mg/kg i.v.) suppressed