TYPE ABSTRACT ON THIS FORM

DO NOT FOLD WHEN YOU MAIL, RETURN FLAT

CARDIAC METABOLISM OF SHORT AND LONG CHAIN FATTY ACIDS AND OF CARBOHYDRATE IN CONSCIOUS DOGS. S.P. Lim, M.L. Wahlqvist, E. Anne Shanahan, I.G. Jarrett, O.H. Filsell and E.G. Wilmshurst. Departments of Medicine and Surgery, Monash University, Melbourne; Division of Human Nutrition, CSIRO, Adelaide; Department of Endocrinology, Royal North Shore Hospital, Sydney.

Determinants of myocardial substrate metabolism in vivo are still incompletely understood. In this study, the myocardial extraction (CA-CS) of the short chain fatty acids acetate (Ac), acetoacetate (AcAc) and βOH butyrate (βOHB) were compared with long chain free fatty acids (LCFFA). Six dogs were studied 1-3 days after the implantation of arterial and coronary sinus catheters for blood sampling and assessment of CA-CS. A central venous catheter was implanted for infusions of insulin or glucose. The fractional extraction (FE) of a substrate was expressed as a percentage {(CA-CS/CA).100, where CA is arterial concentration}. Before infusions, the FE for LCFFA was 32±4% (CA 1350±230μmol/1), for AcAc 43±8% (CA51±14μmol/1) and for βOHB 4±8% (CA 38±18μmol/1). Thus the reduced member of the redox pair βOHB/AcAc contributes relatively less to myocardial energy metabolism, although AcAc behaves similarly to LCFFA. The FEs for carbohydrate substrates were 2±1% for glucose (CA 4300±280μmol/1), -2±8% for lactate (CA 420±95μmol/1) and 2±4% for pyruvate (CA 63±13μmol/1). As a group, these animals did not extract significantly either member of the redox pair lactate/pyruvate. With the exception of glucose, the CA of each substrate studied was a significant determinant of myocardial extraction for that substrate LCFFA (r=0.66, p<0.01); Ac (r=0.71, p<0.01); AcAc (r=0.97, p<0.001); βOHB (r=0.55, p<0.05); lactate (r=0.94, p<0.001); pyruvate (r=0.68, p<0.01). The fractional extraction of glucose tended to increase during insulin infusion of 2u/hour from 2.3±1.1% to 4.6±1.9% despite the fall in CA glucose from 4300±230μmol/1 to 2800±340μmol/1. This suggests that insulin is more important than CA glucose in determining myocardial glucose extraction at these glucose concentrations. During glucose infusion of 70mg/min with a higher CA glucose of 6680±800μmol/1, the FE of glucose was maintained in the control region at 2.9±1.4%. Presumably glucose-stimulated insulin release does not allow a greater fraction of elevated CA glucose to be extracted by the heart.