

THE EFFECT OF ASPARTATE, MALATE AND FRUCTOSE ON THE
'TEMPERATURE-DEPENDENT' INOTROPIC EFFECT OBSERVED 'IN VITRO'
IN MAMMALIAN SKELETAL MUSCLE FIBRES.

D. Rees. Department of Physiology, Victoria University of Wellington, New Zealand.

RS-saline, a non-phosphate buffered mammalian saline, has been shown to preserve both neuromuscular function and the morphological integrity of mouse/rat hemi-diaphragm nerve-muscle preparations 'in vitro' at 20-37 °C for periods of 12-48h (Rees, 1978). The further inclusion of dl-carnitine (10mg/L) in RS-saline significantly offset the observed decrease in muscle contractility of mouse/rat hemi-diaphragm preparations when subjected to prolonged (i.e., 6-30h) electrical stimulation at 0.1 to 1.0 pps within the temperature range of 20-35°C.

Recent studies have investigated an observed 30-50% decrease in the 'isometric-twitch' responses of the mouse/rat hemi-diaphragm preparations during electrical stimulation when the temperature' of either RS-saline or phosphate buffered salines is increased from 25 °C to 35°C. This 'temperature-dependent' negative inotropic effect was significantly offset by the inclusion of aspartate (10µM) and/or malate (10µM) plus 20-200µM d-fructose to RS-saline.

These results suggest that the 'activities' of the 'aspartate-malate' and/or 'glycerol phosphate' shuttles operative within the respective fibre types of the mouse/rat hemi-diaphragm muscle may be a controlling factor in the observed 'temperature-dependent' inotropism.