

## **Immunohistochemical identification of stretch-sensitive two-pore-potassium (TREK) channels in the human heart**

*S.Y. Yuan, H.P. Zhu and D. Saint, Department of Physiology, School of Molecular & Biomedical Science, University of Adelaide, Adelaide, SA 5005, Australia.*

Rhythmic contraction and relaxation of cardiac muscle are determined by a regular cycle of depolarisation and repolarization of cardiac myocytes. Outward movement of potassium ions across the membrane is important for the repolarization and maintenance of resting membrane potential. Potassium channels activated by membrane stretch may contribute to maintenance of normal electrical activity of cardiac myocytes. However, so far there is no evidence for the existence of these channels in human cardiac myocytes. In this study, we examined the existence and location of stretch sensitive potassium (TREK-1 and TREK-2) channels in different regions of human heart using immunohistochemical method. Eight pieces ( $5 \times 10 \times 2 \text{ mm}^3$  for each piece) of human tissue, four fresh atrial appendages and four frozen ventricles taken from patients with coronary bypass surgery and heart transplantation, were processed for immunohistochemistry after fixation and paraffin section. We found that both TREK-1 and TREK-2 immunohistochemical reactivities were observed as bright punctate granules in most atrial and ventricle cardiac myocytes. These are distributed mainly in the cytoplasm and rarely in the center of the nuclear region. Both TREK-1 and TREK-2 immunoreactive granules were found along the surface of cardiac myocyte membranes and the membrane of T-tubules in the cytoplasm (n=4). No connective tissue was labelled. No immunoreactivity was found in negative control preparations after omission of primary antibody. This study demonstrated that TREK-1 and TREK-2 channels are present in human cardiac myocytes. They may play an important role in regulation of human heart electrical behaviour under physiological and diseased conditions.