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A technique for recording monophasic action potentials from the atria of small animal isolated working hearts

S.C. CHOISY, L.A. ARBERRY, J.C. HANCOX and A.F. JAMES

Department of Physiology, Cardiovascular Research Laboratories, School of Medical Sciences, University of Bristol, Bristol, BS8 1TD, UK

Isolated perfused working hearts provide a physiologically relevant means of investigating normal and pathological contractile and electrophysiological cardiac behaviour *in vitro*. Typically, this methodology is used to study ventricular function; however, it may also offer a useful means of investigating normal atrial electrophysiology and alterations to atrial function in animal models of disease (e.g. hypertension). It may be of particular value when used in combination with monophasic action potential (MAP) recording, but this presents a challenge due to the much thinner nature of the atrial than ventricular wall.

We have developed a suction electrode-based method that is suitable for recording MAPs from the atrium of mechanically loaded working heart from small animals such as guinea-pigs and rats. The suction electrode consists of a small polypropylene T-tube junction acting as an insulating material between two unpolarisable platinum-iridium electrodes. The internal or recording electrode is thus separated from the external or reference electrode, surrounded at the external surface of the tip of the suction cannula by a ring of conductive epoxy. The electrode assembly is approximately 2 cm long and 0.5 cm in diameter. The electrode is attached to the epicardial surface of the atrium by light suction (applied *via* a 1 ml syringe connected to one arm of the T-tube comprising the electrode). As a result of this suction, the tissue immediately underneath the suction electrode becomes slightly damaged and thus depolarised, creating a difference in potential between the internal and external electrodes. Propagating action potentials are captured as changes to this difference potential. The signal from the electrode assembly is carried to a Bio-Amplifier (AD Instruments, Chalgrove, UK) by thin copper wires, which allow the suction electrode assembly to move with the atria as the heart beats. The amplified signal is captured and displayed on a personal computer, using a PowerLab/8SP and Chart software from AD Instruments.

In this demonstration the atrial MAP electrode assembly will be shown. Its function will be demonstrated in epicardial recordings from atria of a working guinea-pig or rat heart, from animals killed humanely.

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Where applicable, the experiments described here conform with Physiological Society ethical requirements.