

Letter to the Editor

Are M cells present in the ventricular myocardium of the pig? A question of maturity

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A number of studies have described the presence of M cells in the midmyocardial layers of ventricular myocardium of several species (Table 1) [1–14]. The M cell is distinguished by the ability of its action potential to prolong disproportionately to other myocardial ventricular cells in response to a slowing of rate and/or to agents that prolong action potential duration. The ionic basis for these features of the M cell include the presence a smaller slowly activating delayed rectifier current (I_{Ks}) [1] as well as a larger late sodium current (late I_{Na}) [15]. The unique repolarization characteristics of the M cells have yielded some interesting observations relative to our understanding of the electrophysiology, pharmacology and pathophysiology of the ventricles of the heart as well as some new insights into the basis for the electrocardiographic J, T and U waves [16].

Rodriguez-Sinovas et al. [5] recently confirmed the presence of M cells in the canine heart, but presented evidence for their absence in the porcine heart. Without discounting the value of this fine study, we would like to point out that the work involving the canine tissues was performed using adult dogs, whereas that involving porcine tissues employed pigs 1 to 2 months of age. This difference may be a critically important one in that recent developmental studies indicate that in the dog the M cell is not electrophysiologically distinct until approximately 3 months of age (unpublished observation). The neonatal heart is homogeneous with respect to action potential morphology in the first few days of life. A notched appearance of the action potential gradually appears in epicardial and midmyocardial, but not endocardial, cells in the first few weeks of life due to the accentuation of phase 1, secondary to an increase in the density of the transient outward current (I_{to}). Differences in the time of repolarization of phase 3 of the action potential among cells span-

Table 1

Evidence for the presence of M cells in ventricular myocardium of several mammalian species

<i>Dog</i>	
Myocytes	[1,2]
Tissues slices	[3–5]
Perfused wedge	[6–8]
In vivo	[9,10]
<i>Guinea Pig</i>	
Tissue slices	[11]
<i>Rabbit</i>	
Tissue slices	[12]
<i>Human</i>	
Myocytes	[13]
Tissue slices	[14]

ning the ventricular wall gradually develop over the first few months and are usually not prominent until the third month of life. In the anterior wall of the canine left ventricle, the M cells with the longest action potential appear in the midmyocardial to subendocardial layers [7,8,16]. A similar but small transmural gradient was observed by Rodriguez-Sinovas et al. [5] in the pig, suggesting the presence of M cells in a formative stage of development. A definitive assessment clearly must await studies utilizing older pigs. If the pig indeed is devoid of M cells, it will be the first member of the mammalian species in which this distinction has been demonstrated.

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