

EDITORIAL

LYMPHATICS OF THE HEART

The lymphatic system of the mammalian heart has been a neglected and controversial subject. In two recent issues of *Lymphology*, Marchetti and his colleagues examined the distribution and ultrastructure of lymphatics, initially in the ventricles (1) and then the atria of the rabbit heart (2). Lymphatic channels have usually been detected after regional instillation of vital dyes or other particulate matter. Marchetti et al, however, perfused rabbit hearts with a fixative solution and then embedded specimens for light and electron microscopy. This technique permitted visualization of previously unexamined fine structures (e.g. lymph capillaries) within the heart wall. They confirmed the presence in both right and left atria of unevenly distributed lymphatic networks, more developed in the subepicardium and less prominent than in the ventricles. Of interest, lymphatic capillaries were much more extensive within and adjacent to the conduction system.

The authors have made a valuable contribution to the growing anatomic and physiologic evidence of the lymphatic system's role in the inner workings of the heart, specifically the conduction system. They recognize, however, that it is difficult to extrapolate directly from anatomy to functional significance.

Evidence for a close relationship between the lymphatics and conduction system of the heart includes a) lymphatic capillaries are permeable to the entrance or exit of water, electrolytes and large molecules—which underlies depolarization and "myocardial conductance;" b) light and

electron microscopy demonstrate a close anatomic relation between lymphatic capillaries and the conduction system (3-6); c) lymphovenous anastomoses appear after ligation of cardiac efferent lymphatics (7); d) cardiac lymph levels of potassium and cytoplasmic enzymes (factors which may affect conduction) rise after experimental myocardial infarction (8); e) injection of post-infarction lymph in normal dogs initiates arrhythmias (9); f) cardiac "lymphangitis" has been associated with heart block (10).

Our own studies have suggested that intracardiac lymphatics may serve as a transport or portal system whereby metabolites arising in one area of the heart may exert physiologic or pathologic effects at another site. For example, lymph drainage from an inferior area of myocardial infarction may induce arrhythmias as ventricular lymphatics transport noxious agents to and through the A-V conduction system. Lymphatics in the heart as demonstrated in other endocrine organs may also participate in transport of cardiac hormones such as Atrial natriuretic factor).

Is there a specific reason why lymphatics on the papillary muscles (11) and those adjacent to the A-V node are so plentiful? Do they serve to bring substances to that region, carry them away, or both? As Marchetti et al suggest, a great deal more needs to be uncovered.

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