PubMed

U.S. National Library of Medicine
National Institutes of Health

Full Text
Physiol Rev

Display Settings: Abstract

Physiol Rev. 1990 Oct;70(4):987-1028.

Microlymphatics and lymph flow.

Schmid-Schönbein GW.

Department of Applied Mechanics and Engineering Sciences, University of California, San Diego, La Jolla.

A careful review of several different organs shows that with the information available today the beginnings of the microlymphatics in the tissue consist of endothelialized tubes only. Lymphatic smooth muscle within the collecting lymphatics appears further downstream, in some organs only outside the parenchyma. This particular anatomic picture has been observed in many different mammalian organs and in humans. The nonmuscular, so-called initial, lymphatics are the site of interstitial fluid absorption that requires only small and transient pressure gradients from the interstitium into the initial lymphatics. A fundamental question concerns the mechanism that causes expansion and compression of the initial lymphatics. I presented several realistic proposals based on information currently on hand relevant to the tissue surrounding the initial lymphatics. To achieve a continuous lymphatic output, periodic (time variant) tissue stresses need to be applied. They include arterial pressure pulsations; arteriolar vasomotion; intestinal smooth muscle contractions and motilities; skeletal muscle contraction; skin tension; and external compression, such as during walking, running, or massage, respiration, bronchiole constriction, periodic tension in tendon, contraction and relaxation of the diaphragm, tension in the pleural space during respiration, and contractions of the heart. The nonmuscular initial lymphatic system drains into a set of contractile collecting lymphatics, which by way of intrinsic smooth muscle propel lymph fluid. The exact transition between noncontractile and contractile lymphatics has been established only in a limited number of organs and requires further exploration. Retrograde flow of lymph fluid is prevented by valves. There are the usual macroscopic bileaflet valves in the initial and collecting lymphatics and also microscopic lymphatic endothelial valves on the wall of the initial lymphatics. The latter appear to prevent convective reflow into the interstitium during lymphatic compression. Many of the lymph pump mechanisms have been proposed in the past, and most authors agree that these mechanisms influence lymph flow. However, the decisive experiments have not been carried out to establish to what degree these mechanisms are sufficient to explain lymph flow rates in vivo. Because individual organs have different extrinsic pumps at the level of the initial lymphatics, future experiments need to be designed such that each pump mechanism is examined individually so as to make it possible to evaluate the additive effect on the resultant whole organ lymph flow. (ABSTRACT TRUNCATED AT 400 WORDS)

PMID: 2217560 [PubMed - indexed for MEDLINE]

Publication Types, MeSH Terms, Grant Support

LinkOut - more resources