International Journal of BioMedicine 2(4) (2012) 300-301

INTERNATIONAL JOURNAL OF BIOMEDICINE

Point of View

# Constitution of the Lymphatic System

Valeriy M. Petrenko, PhD, ScD*

*Center rehabilitation of the motionless patients, St. Petersburg, Russian Federation*

## Abstract

The lymphatic system consists of two types segments – general (systemic or periarterial) and special (own, intervalvular). The segments organize all the system's reactions in response to its environmental influences. This paper presents the results of the research the common structure of all the sections of the lymphatic bed.

***Key words*:** lymphatic system, segment, valve, artery.

## Introduction

Many models have been proposed regarding the functioning of the lymphatic system (LSy). Ranvier introduced lymphatic hearts or lymphangions as valve segments, while Horstmann and Mislin described the functional units of the lymphatic vessels (LV) as another [1]. These models indicate different aspects of organization of the LSy; however, a generally accepted concept of the LSy organization as a whole is absent.

***The aim*** of the study was to determine the common structure of all the sections of the lymphatic bed (LB) and to establish the main principles of the general construction of the LSy.

## Material and Methods

The construction and development of the LSy in man and mammals were studied using stained total preparations by injecting with blue Gerota's mass for histological sections, employing immunohistochemistry and electron microscopy [1,2].

***Corresponding author**: *Valeriy M. Petrenko, PhD, ScD, Center rehabilitation of the motionless patients, 6-2-65, Karbysheva str. 194021, St. Petersburg, Russian Federation.*
*E-mail: deptanatomy@hotmail.com*

## Result and discussion

The LB contains many valves, which divide the LB into intervalvular segments having different structures [1]: the lymphatic postcapillaries consist of nonmuscular segments, which allow the passive flow of lymph out through a network of lymphatic capillaries; the LV consist of muscular segments or lymphangions, which may contract by themselves by the deficit of energy in the extravasal matrix and thus actively move the lymph to the veins; the lymph node (LN) is a nodal or lymphoid lymphangion, which regulates the volume and composition of the lymph. The segmentary principle of construction extends to the network of the lymphatic capillaries. The mobile intercellular contacts points of their endothelium act as minivalves which regulate the filtration of the tissue fluid into the lumen of the LB (This process is called lymphization).

The LV and LN normally lie in the vicinity of the aorta and its branches; however, this does not happen by chance. The primary veins always accompany the embryonic arteries, and in some of these veins the blood flow is turned off to form the primary LV. Blood vessels invaginate into the lumen of these LV with the LN anlage in the fetus [2]. The lymphoid tissue surrounds the hilar branches of the LN arteries, and the tissue is surrounded by sinuses – the marginal (all parenchyma) and intermediate (parts of parenchyma) – lymphoid nodules, T-domens and medullary cords. Thus, the lymph nodes, as a lymphoid organ, are necessary to "fasten" on to arteries, but as the lymphatic organ (margin sinus with capsule between the distal

and proximal LN valves) they are needed to connect with the LV. The intermediate sinuses and trabeculae unite the lymphatic and lymphoid segments of the LN into a unified system termed the lymphoid lymphangion, to form the uninterrupted LB.

Therefore, the segmentary organization of the LB is defined as the structure of its walls (valves) influencing its topography (branching arteries). This is the reason for dividing all the segments of the LSy into two groups: (1) general (common for LB and blood bed) or systemic; (2) special, own or local. In this study, two types of general segments of the LSy have been distinguished: (1) central, para-aortic (lymphatic ducts, their different parts and roots); (2) peripheral, subaortic (found along the aortic branches). I have grouped the special segments of the LSy as nonmuscular and muscular intervalvular segments, lymphangions – on vascular and nodal. The own segments of the LSy unite with other components of the general segments of the LSy by means of loose connective tissue, which are transformed into lymphoid tissue in the LN. The intervalvular segments of the LB are surrounded by the common uninterrupted outermost tissue later called adventitia, which continues into the periadventitial tissue. It unites the walls of the LB with those of the surrounding organs.

# Conclusion

The constitution or general construction of the LSy determines its reactions to all the influences surrounding it, including the pushes of lymph flow, which is based upon the segmentary organization of the LSy: This includes, (1) the folding structure of the LB walls (valves and unique intervalvular segments) and its connection with the fluctuations in lymph flow [1]; (2) the quasi-segmentary connection of the LB with the arteries (both general and periarterial segments), which arises in the embryo [2] and reflects the external connections of the LB with its surroundings, the source of the extravasal factors of lymph flow. During conditions of deficit of the lymph flow energy of the LB itself, the intervalvular segments organize the passive and supplementary active movement of the lymph. The structure and regimen of the function of the LB intervalvular segments are determined by their topography, including the structure of the general segments of the LSy as an essential part of the cardiovascular system and of the whole organism.

# References

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