

Short Reports

**TRANSMURAL MIGRATION
OF LYMPHOCYTES FROM SPECIAL
MICROVESSELS INTO MARGINAL ZONES
OF SPLENIC PULP IN WHITE RAT**

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Introduction. Spleen is the organ which filters blood, eliminating old or damaging erythrocytes from blood flow. Thus this is secondary lymphoid organ checking normal cellular composition of peripheral blood [1, 6]. However up to now it is unknown how spleen functions: either branchings of penicillar arterioles end into sinusoids and veins – closed blood circulation [4, 5], or blood flows out nodular arterioles straight in splenic red pulp, from which then passes into sinusoids – unclosed blood circulation [7–9]. Perhaps, in collapsed spleen blood circulation is closed, but in extended spleen it is unclosed, because blood flows in the pulp through wide intercellular chinks of sinusoids [3]. It is unknown too how splenic white pulp is formed, how lymphocytes get to here. Brought up a proposal [2], that branches of penicillar arterioles, ending capillaries, about which periarteriolar macrophage sheaths lie, are homologues of postcapillary venules with high endotheliocytes in lymph nodes which are not discovered in splenic pulp.

Materials and methods. I study construction of spleen in 10 white rats of 2–3 months old of both sexes. After fixation in Buen fluid or in 10% neutral formalin it is prepared serial sections of the spleen with thickness 7 mkm, staining by picrofuxin or azur – II-eosin.

Results and discussion. Spleen is build as lymph node: hemopoetic tissue is surrounded by capsule, which sends trabecules into parenchyma, the largest – about hilum. Trabecular arteries give off branches into the parenchyma and trabecular veins get tributaries from it. Unlike lymph node, splenic parenchyma loses lymphatic sinuses and is mainly myeloid tissue (red pulp), lymphoid tissue (white pulp) surrounds some pulp branches of trabecular arteries on their some extent and is embedded into splenic red pulp as small seats – periarteriolar lymphoid sheaths. They thicken in distal part with formation of splenic lymphoid nodules. In their thickness there are central arterioles. Splenic lymphoid nodules have shape of pear or octopus, because they narrow, stretch and often branches out in direct of splenic red pulp. In thickness of distal shoots of lymphoid nodule (or postnodular periarteriolar lymphoid sheaths) central arterioles lose muscular coat. Such metarterioles give off numerous branches with to a far more diameter, dencer and very basophilic walls – penicillar arterioles. They have construc-

tion of precapillary or magistral capillary and are surrounded by periarteriolar macrophage sheaths. On one side these sheaths fuse with postnodular periarteriolar lymphoid sheath, but on another side adjoin to sinusoids and splenic cords of red pulp. Thus this area of splenic parenchyma, intermediate between white pulp and red pulp, can be divided on two narrow marginal zones: in white pulp – periarteriolar lymphoid sheaths (central part), in red pulp – periarteriolar macrophage sheaths (peripheral part). There is no rigid, always even line of demarcation between proper red pulp and its marginal zone: sinusoids very often pass in the marginal zone driving a wedge between its neighbouring periarteriolar macrophage sheaths. Penicilli may be bare, without macrophage covering, and straight, avoiding sinusoids, flow into collective venules of proper red pulp (capillary shunts of M. Knisley). Thus, penicillar arterioles and their branches end either in sinusoids, or in collective venules. Some penicillar arterioles are extended significantly, their endothelium is thickened (Fig. 1). Into and next to such endothelium there are lymphocytes, which make uneven and broken chain. Transmural migration of lymphocytes from penicillar arterioles into marginal zone of red pulp may be induced by antigens – products of destruction of old or damaging erythrocytes. They penetrate into red pulp through very thin endothelial walls of extended sinusoids, which accept widen penicillar arterioles with thickened endothelium. Chains of lymphocytes next to penicilli fuse into postnodular periarteriolar lymphoid sheaths which unite in splenic lymphoid nodule. On edges of lymphoid nodule, beginning from its distal shoot (marginal zone of splenic white pulp), are defined postcapillary venules (Fig. 2). They look like sinuses surrounding lymphoid nodules in lymph node, get tributaries from thickness of splenic lymphoid nodule and neighbouring red pulp, pass along edges periarteriolar lymphoid sheath and flow into collective venules of red pulp. There are lymphocytes into and next to endothelium of marginal postcapillary venule.

Conclusion. Results of my investigation allow me to agree with opinion of M. Knisley about closed blood circulation into spleen [4, 5]: branchings of penicillar arterioles end into sinusoids and venules. But construction of sinusoids changes with connection of functional state of spleen: during venous congestion sinusoids widen and their very thin endothelial walls still more thin and thin out. Then blood flows into splenic red pulp through wide intercellular chinks into endothelium of sinusoids [3]. Controversial ideas apply to microcirculatory bed in intermediate zone of splenic parenchyma, and more exactly – marginal zone of splenic red pulp.

It is absent in International histological terminology, in difference from splenic white pulp. But just in this nameless zone there are connections of high special microvessels of splenic pulp – penicillar arterioles, which compare with postcapillary venules in lymph node [2], and sinusoids. I find widen penicillar arterioles with high endotheliocytes in marginal zone of splenic red pulp and postcapillary venules in marginal zone of splenic white pulp. Lymphocytes migrate through walls of these special splenic microvessels.

Thus spleen functions probably as ant-current haemomicrocirculatory system of penicillar arterioles and sinusoids attached to tissue channels as collaterals of their communications where opposite currents of lymphocytes and collapsed erythrocytes interact. Postcapillary venules in marginal zone of splenic white pulp can function as penicillar arterioles only in ant-current haemomicrocirculatory system of marginal zone of splenic red pulp or as postcapillary venules with high endotheliocytes in lymph nodes.

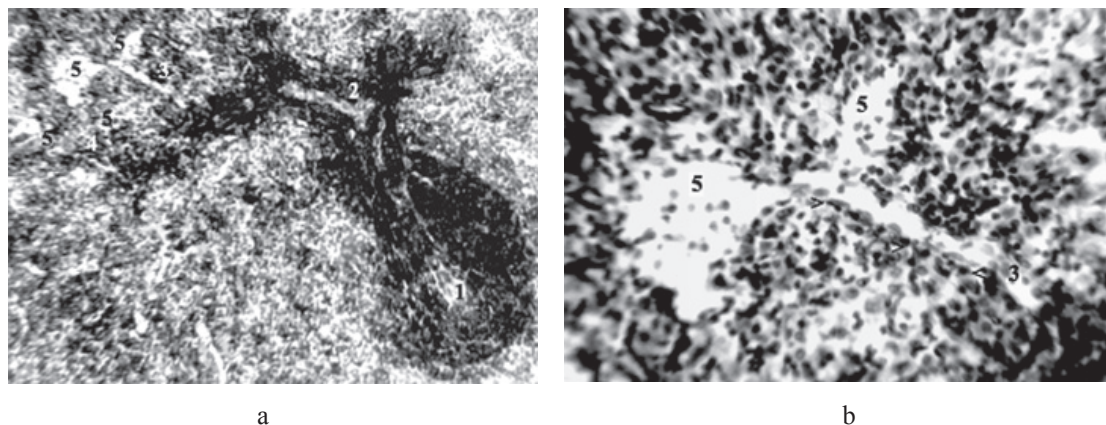


Fig. 1. Spleen of white rat, histological section:

1 – central arteriole of lymphoid nodule; 2 – bifurcation of metarteriole into postnodular periarteriolar sheath; 3,4 – active, wide and reserve, narrow penicillar arterioles; 5 – sinusoids. Arrows direct on chain of lymphocytes next to and into wall of active penicillar arteriole. Ferrous hematoxilin and picrofuxin staining. Light microscopy, magnification: a – 80 X; b – 300 X

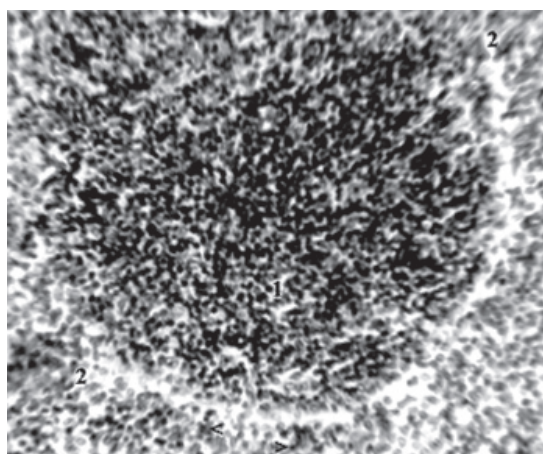


Fig. 2. Spleen of white rat, histological section:

1 – lymphoid nodule; 2 – postcapillary venule. Arrows direct on chain of lymphocytes next to and into wall of postcapillary venule. Ferrous hematoxilin and picrofuxin staining. Light microscopy, magnification: 300 X

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