

Trace elements limitation of lymph nodes structure according to the X-ray fluorescent analysis with synchrotron radiation (SR XRF)



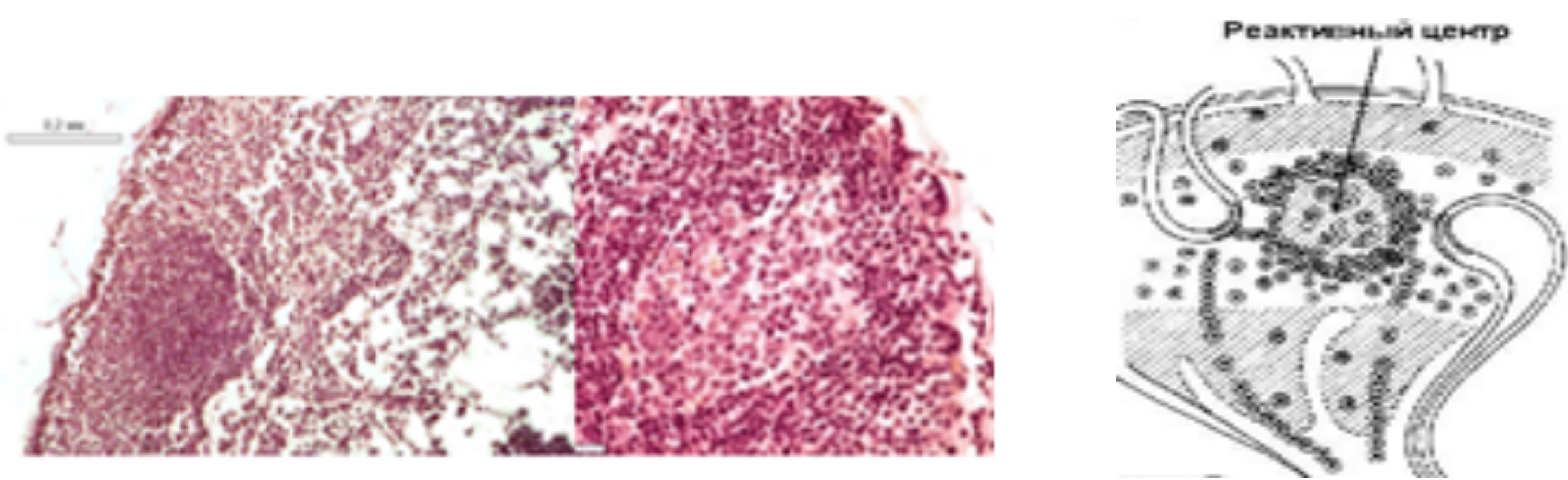
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The research purpose

– it is to establish causal connection between the content of trace elements and structure of lymph nodes of different localization.

Unique properties of X-ray fluorescent analysis with synchrotron radiation and classical morphological method allowed to reveal interrelation between the trace elements content and structure of lymph nodes. Belonging of lymph nodes to different regions is defining in formation of a certain microelemental profile and features of the microanatomic organization of lymph nodes.

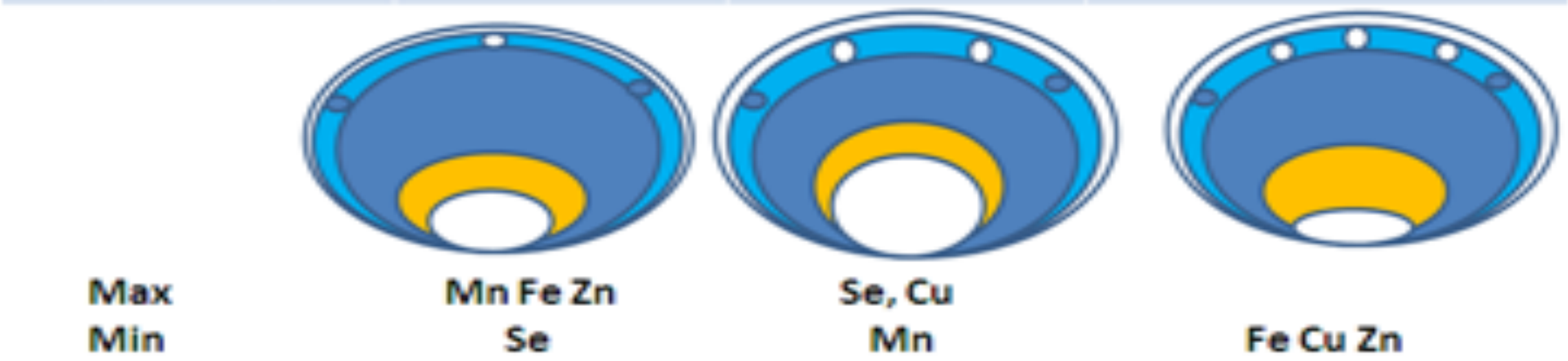


Methods

We investigated mesenteric, inguinal and tracheobronchial lymph nodes of Wistar rats by a morphological method. The content of trace elements (Se, Mn, Fe, Cu, Zn) in lymph nodes was defined by the X-ray fluorescent analysis with use of synchrotron radiation (SR XRF). Statistical data processing was performed with licensed statistical software package StatPlus Pro 2009, AnalystSoft Inc.

Results

LYMPH NODES	INGUINAL	MESENTERIC	TRACHEO-BRONCHIAL
Lymphoid follicles	+	++	+++
Cortex plateau	+	++	+++
Paracortex	+++	++	++
Medullary cords	++	+	++
Lymphatic sinus	++	+++	+
Functional specialization	drainage	drainage and immune	immune



Mn	+++	+	++
Fe	+++	++	+
Zn	+++	++	+
Cu	++	+++	+
Se	+	+++	++

The dimension of internal structures (compartment) differs in lymph nodes because of an originality of lymphatic regions, showing regional specifics. The inguinal lymph node has active drainage function because of the developed sinus system at the maximum of Mn, Fe, Zn concentration; immune function prevails in a tracheobronchial lymph node at the low content of all trace elements; the mesenteric lymph node has evenly developed drainage and immune functions at the maximum of Cu, Se contents.

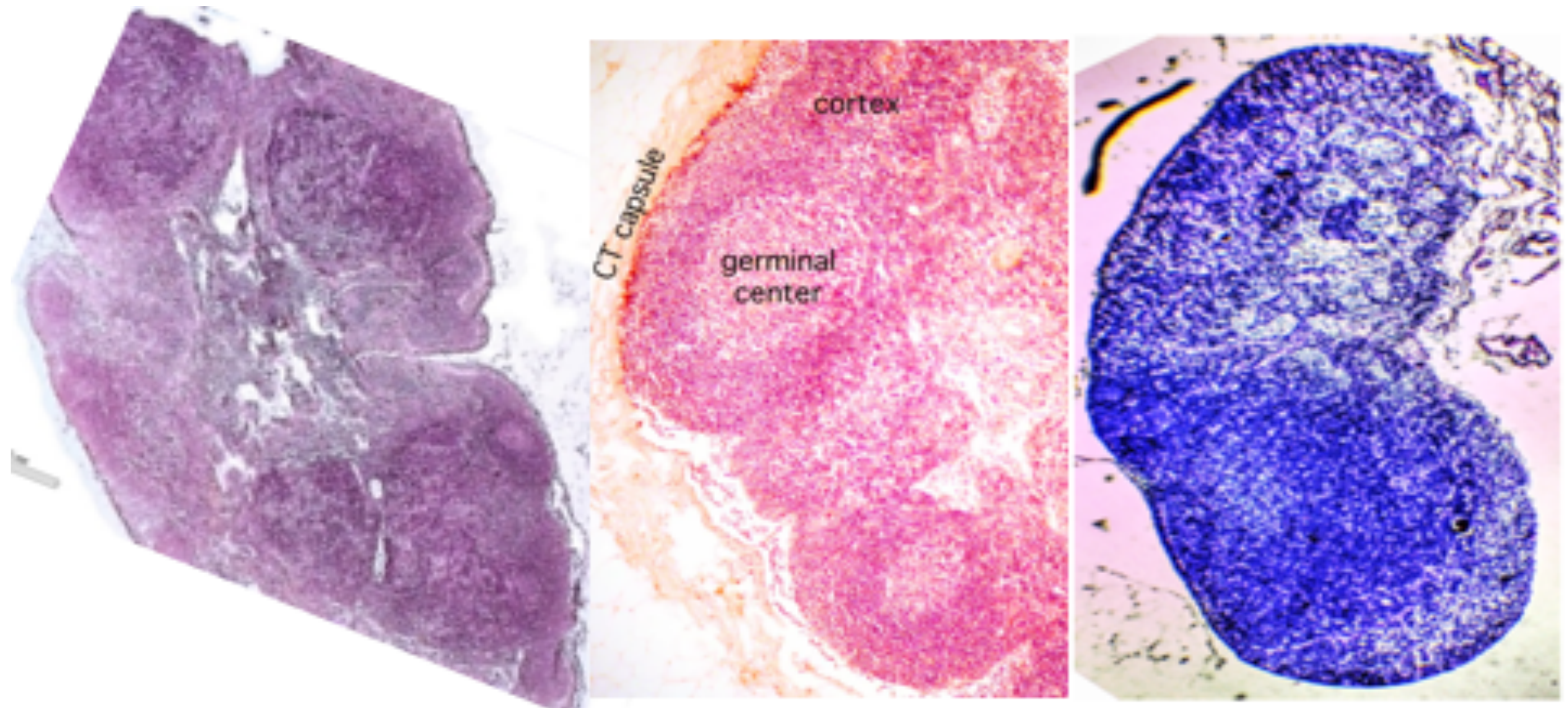
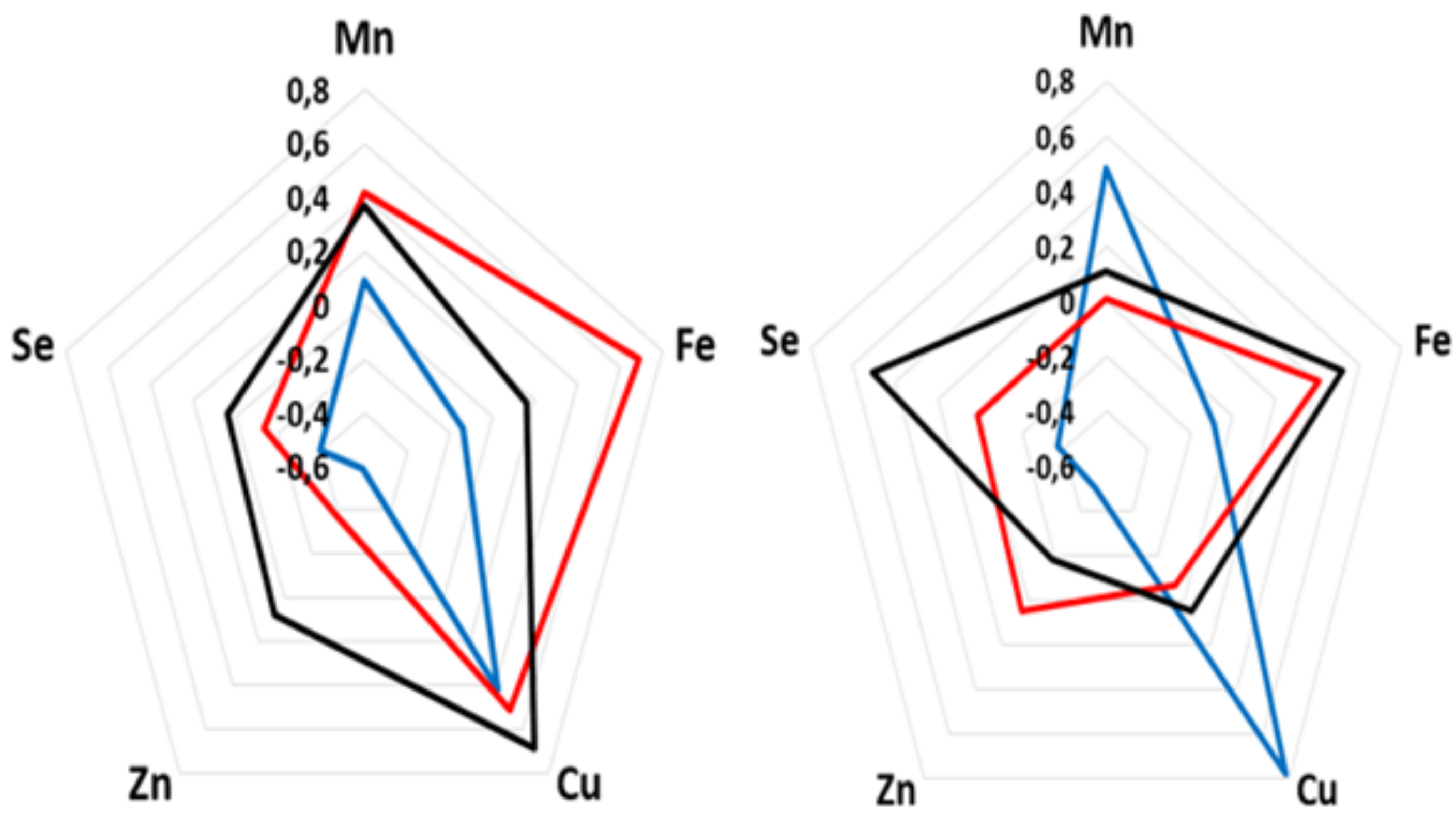
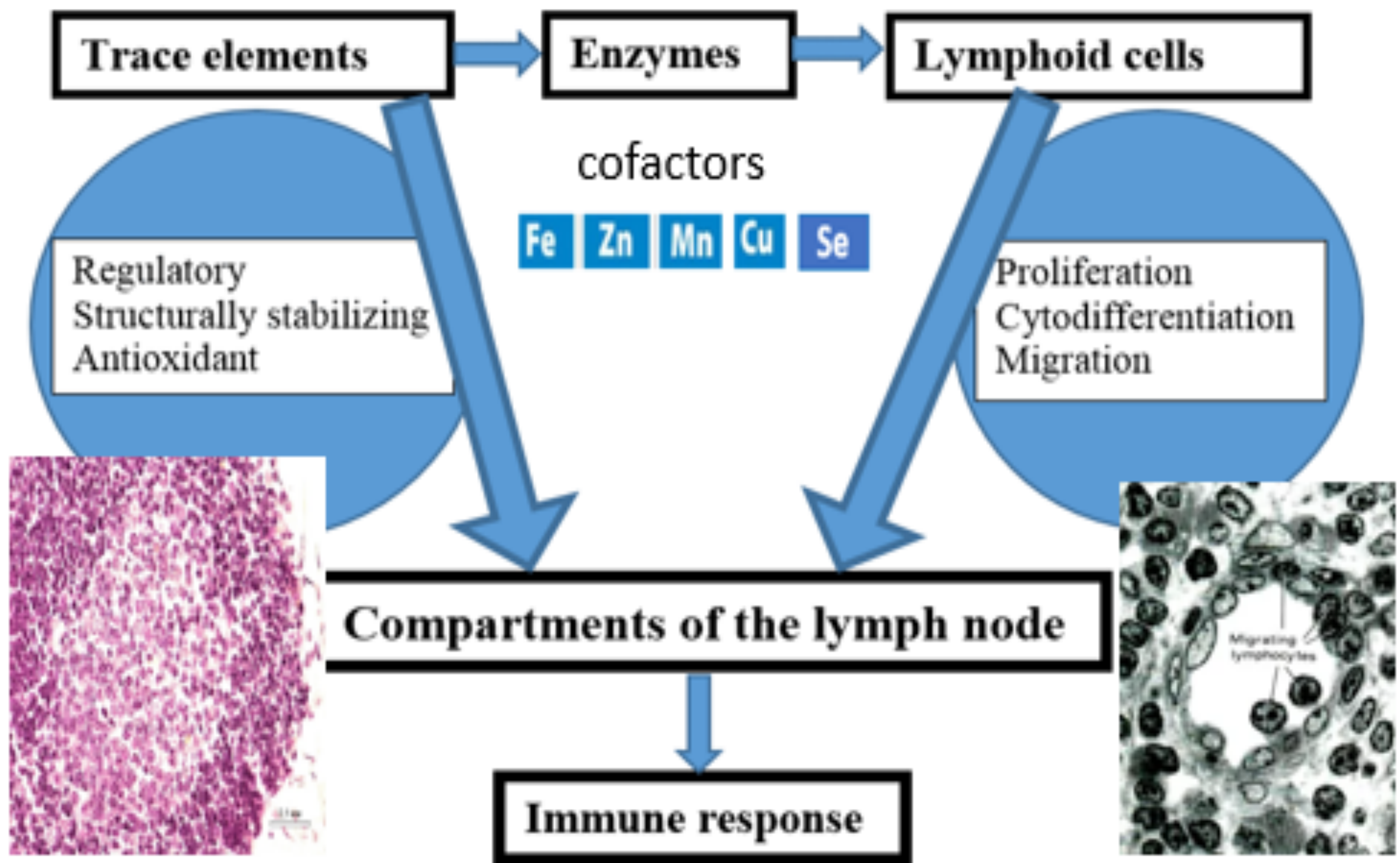


Figure. Correlation coefficient between microelements and lymphoid follicles with the germinative center (on the left) and without the germinative center (on the right) in inguinal (the blue line), mesenteric (the red line) and tracheobronchial (the black line) lymph nodes



The content of trace elements is considered as the leading mechanism limitation the structural organization of lymph nodes. Innovative approach helped to reveal formation of lymphoid-microelemental association. Features of this association modify the structural organization of lymph nodes depending on localization (region specifics). Trace elements and lymphoid follicles are necessary for proliferation of lymphoid (immune) cells and functioning of compartments of lymph nodes.



Conclusions

We obtained the evidence of forming of lymphoid-microelement association. This association is active and defines proliferation of lymphoid cells and development of an immune response according to morphological variant of lymph nodes structure. The content of trace elements is considered as the leading mechanism in limitation of the structural organization of the lymph nodes belonging to different lymphatic regions. SR XRF is an informative method for understanding the region-dependent content of trace elements for modification of structure of lymph nodes. This method is of essential interest from the theoretical and practical point of view.