Global Conference on Medical and Health Sciences
Hosted Online from Madrid, Spain
Date: 14th March, 2026
Website: https://econferencia.com

STRUCTURAL INVOLUTION AND REMODELING OF LYMPH NODES IN RHEUMATOID ARTHRITIS

Avezov B. B.
Sadiyev E. S.
Bukhara State Medical Institute named after
Abu Ali ibn Sino, Bukhara, Uzbekistan

Objective

The aim of the study was to morphometrically assess age-related morphofunctional changes in lymph nodes, including structural remodeling associated with increased stromal components and medullary zone reduction, in 18-month-old albino rats under chronic rheumatoid arthritis conditions, and to compare the findings with a control group.

Materials and Methods

The morphofunctional alterations of popliteal lymph nodes in albino rats under experimental rheumatoid arthritis were investigated at the Scientific-Experimental Biomedicine Research Center and the Immunohistochemistry and Pathohistology Laboratory of Bukhara State Medical Institute during 2022–2023. A total of 195 male albino rats aged 3, 12, and 18 months, weighing 350–370 g, were used. All animals were maintained under identical vivarium conditions (temperature 19–22°C, relative humidity 50–60%, 12-hour light/12-hour dark cycle).

Animals were divided into three groups: control group (healthy rats, n=48), experimental group (rheumatoid arthritis model induced using Freund's adjuvant, n=70), and correction group (arthritis model induced, followed by 4-week treatment with milk thistle extract, n=77). The experimental model was

established via a single subcutaneous injection of 0.1 ml Freund's adjuvant in the tail base. Rats in the correction group received 100 mg/kg of milk thistle extract administered intragastrically via a gavage tube.

At the end of the experiment, animals were euthanized according to bioethical standards. Peripheral lymph nodes were isolated and prepared for morphometric and immunohistochemical analysis. Measurements included total lymph node diameter, cortical and paracortical zone thickness, number and diameter of lymphoid follicles, germinal center proportion, relative area of the medullary zone, and volumetric proportion of stroma.

Results

In 18-month-old albino rats under experimental rheumatoid arthritis conditions, morphometric parameters of popliteal lymph nodes showed evident structural remodeling compared to controls against the background of sustained lymphoid tissue immunoactivity. The total lymph node diameter was 3.595±0.047 mm, representing a 33.1% increase compared to the control group (2.70±0.047 mm), indicating that lymph nodes remained enlarged under prolonged antigenic stimulation.

Cortical zone thickness was 598.05±8.24 μm, a 74.6% increase relative to controls, which can be attributed to the preserved proliferative activity of lymphoid follicles. Paracortical zone thickness measured 541.25±9.07 μm, increasing by 109.7% versus controls. This was the most pronounced difference among all age groups, confirming prolonged involvement of T-lymphocyte areas in the sustained immune response.

The average number of lymphoid follicles per section was 19.0±0.27, a 35.7% increase over controls. The mean follicle diameter was 268.45±4.62 μm, 70.8% larger than controls (157.2±3.07 μm), indicating ongoing proliferative processes

in the follicular apparatus alongside structural reorganization. The proportion of germinal centers was 62.7±0.97%, 246.4% higher than controls, although slightly decreased compared to the 12-month group, suggesting gradual stabilization of the immune response.

The relative area of the medullary zone was 15.65±0.23%, 56.8% lower than controls, reflecting significant internal architectural redistribution due to dominance of lymphoid elements. The stromal volumetric proportion reached 35.4±0.46%, a 59.8% increase relative to controls, indicating stromal expansion and the initiation of involutional-fibrotic processes under prolonged inflammation.

Thus, in 18-month-old rats with rheumatoid arthritis, lymph nodes retained high immunoactivity but demonstrated morphofunctional remodeling characterized by stromal expansion and relative reduction of germinal center activity. This suggests that prolonged pathological processes gradually shift compensatory immune reactions toward involutional changes.

Conclusions

In 18-month-old albino rats with rheumatoid arthritis, lymph nodes maintained immunoactivity, yet structural remodeling and predominance of involutional changes were evident. Enlargement of cortical and paracortical zones and high germinal center proportion reflected ongoing immune responses, while marked stromal expansion and reduced medullary zone indicated fibrosis-prone morphological reorganization under chronic inflammation. This stage represents gradual adaptation of compensatory mechanisms during prolonged pathological processes.