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Liver Regeneration and Immune System Interactions: Evidence from Thymus and Bursa of Fabricius in Chickens

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ABSTRACT

This study investigates the morphofunctional changes in two primary lymphoid organs of birds, the thymus and the bursa of Fabricius, during liver regeneration following partial hepatectomy. As a central immune organ, the thymus exhibited pronounced reactive responses as early as the first postoperative day, including cortical aplasia, apoptotic cell death, increased cyst formation. By days 3–5, signs of structural restoration appeared, marked by lymphocyte proliferation, formation of follicle-like clusters, and active mitotic division of lymphoblasts, resembling germinal centers typically found in peripheral lymphoid tissues. These regenerative processes became less prominent by day 10 but remained detectable up to day 30. In the bursa of Fabricius, an initial decrease in organ mass and lymphocyte density within follicles was observed, indicative of a stress-induced involutional response. However, by days 10–20, a significant increase in bursal mass (up to 174% of baseline) was recorded, along with epithelial hyperplasia and recovery of lymphoid components, pointing to functional activation of the organ. Together, these findings demonstrate that both the thymus and the bursa of Fabricius actively participate in the systemic immune response during liver regeneration. Their coordinated involvement suggests a complex immunomodulatory role, emphasizing the interdependence between the immune and hepatic systems in birds and highlighting potential directions for future studies in avian regenerative biology and immunology.

Keywords: bursa of Fabricius, thymus, liver regeneration, immune homeostasis

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