Diagnostic Exercise
From The Davis-Thompson Foundation*

Case #: 109 Month: November Year: 2018

Answer Sheet

Title: Thymic epithelial hyperplasia in a rat

Contributor: Erin K. Morris, DVM, Diplomate ACVP. WRAIR-NMRC. Forest-Glen Annex, MD.

Clinical History: This was an incidental finding in an 11-week-old Sprague-Dawley QA/QC rat. There were no gross lesions reported on necropsy.

Microscopic Image:

Figure 1. H&E stain, 20X
**Figure 2.** Thymus. Epithelial cells are arranged in tubules extending to, but not beyond, the thymic lobe boundaries. H&E stain, 200X.

**Figure 3.** Thymus. Epithelial cells occasionally arranged in more densely cellular areas with scattered lymphocytes. H&E stain, 100X
Figure 4. Thymus. Cell size and nuclear morphology are variable in this case, but generally no mitotic figures are observed. H&E stain, 200X.

Microscopic morphologic diagnosis (based on the pictures shown): Thymus: Hyperplasia, epithelial, multifocal to coalescing, moderate.

Discussion: Thymic epithelial hyperplasia is reported in rats, occurring more often in older female rats, where it may be associated with thymic physiological involution\(^7\)\(^-\)\(^11\). This finding may be focal or diffuse and epithelial cells are cuboidal to columnar, form tubules or cords, and may be ciliated or have goblet cells. Tubules may contain eosinophilic colloid-like material.

More pleomorphic versions of thymic epithelial hyperplasia need to be distinguished from thymoma\(^7\). Thymomas can vary widely in the phenotypic appearance and consist of a neoplasm of the thymic epithelial component with variable predominance of lymphocytes.\(^1\) They may be epidermoid forming nodules of non-keratinizing squamous epithelium; consist of squamoid cells with some areas of keratinization; form papillary lesions with cystic areas; form ribbons, cords or tubules; and occur as spindloid cells. Rare types of thymomas have endocrine
(adenoid), neuroendocrine, and myoid growth pattern with skeletal muscle differentiation. Benign thymomas are usually solitary, expansile and encapsulated discrete lesions confined to the thymus. Malignant tumors may invade adjacent tissues but metastasis is rare. Thymomas may contain a cell-rich or cell-poor population of lymphoid cells and neoplastic cells can be localized or dispersed amongst lymphoid cells. Electron microscopic features include the presence of bundles of tonofilaments and desmosome attachments between neoplastic epithelial cells. Immunohistochemistry for cytokeratin may assist in confirming the epithelial nature of the neoplastic cells.

Thymic hyperplasia in rodents is more frequently noted as an age-related incidental finding, where it may present along with physiological involution of the thymus and may occur at relatively high incidences in some rat strains. Thymomas in rats are generally incidental, more common in inbred rat strains and Buffalo rats, and have been documented as early as 10 weeks of age. Large neoplasms may present grossly and fill the thoracic cavity. Some references cite multiple types in rats, including epithelial, lymphoid, or mixed cell type and with or without medullary differentiation. Well-differentiated thymomas have medullary differentiation, characterized by small, pale-staining areas throughout the tumor that occasionally contain Hassall's bodies with much less abundant lymphocytes. Rat thymic neoplasms with such medullary differentiation may be a challenge to differentiate from thymic hyperplasia with higher degrees of cellular pleomorphism.

Xenobiotic-related thymomas have been associated with exposure to urethane. Thymomas are relatively more common in dairy goats. Cats and rabbits with thymomas may develop thymoma-related exfoliative dermatitis. In dogs, thymomas may be associated with myasthenia gravis.

References:


The material has been reviewed by the Walter Reed Army Institute of Research. There is no objection to its presentation and/or publication. The opinions or assertions contained herein are the private views of the author, and are not to be construed as official, or as reflecting true views of the Department of the Army or the Department of Defense.

The research was conducted under an approved animal use protocol in an AAALACi accredited facility in compliance with the Animal Welfare Act and other federal statutes and regulations relating to animals and experiments involving animals and adheres to principles stated in the Guide for the Care and Use of Laboratory Animals, NRC Publication, 2011 edition.

*The Diagnostic Exercises are an initiative of the Latin Comparative Pathology Group (LCPG), the Latin American subdivision of The Davis-Thompson Foundation. These exercises are contributed by members and non-members from any country of residence. Consider submitting an exercise! A final document containing this material with answers and a brief discussion will be posted on the CL Davis website (http://www.cldavis.org/diagnostic_exercises.html).

**Associate Editor for this Diagnostic Exercise:** Ingeborg Langohr

**Editor-in-chief:** Vinicius Carreira