Answer Sheet

Diagnosis:

**Morphologic Diagnosis:** Lacrimal gland, harderization

Typical gross findings:

- “White spots”

**Typical microscopic findings:**

- Alveoli are composed of cuboidal to columnar cells with finely vacuolated cytoplasm
- Alveolar lumens are distinct

**Discussion:**

In addition to Harderian gland, which lies behind the eye in the orbit and partially encircles the optic nerve, the rodent eye is also equipped with one intraorbital and one extraorbital lacrimal gland composed of serous glands, structurally similar to those found in the parotid gland. The intraorbital lacrimal gland is associated with the eyelid, and the large extraorbital lacrimal gland lies subcutaneously.
at the base of the ear. The extraorbital lacrimal gland has marked irregularity in size of nuclei and variation in mitochondrial content of the cytoplasm. The lacrimal glands are lobulated and consist of serous acini with narrow lumens and branching duct system of intralobular ducts. Acinar cells are polyhedral or pyramidal with round to oval nuclei. The extraorbital lacrimal gland has marked irregularity in size of nuclei and variation in mitochondrial content of the cytoplasm (cytomegaly and karyomegaly). These are more prominent in males than females and become more frequent with age. The acini in males are generally larger than those in females. The secretory granules of male extraorbital lacrimal gland are prevalently composed of sulphate substances, those of the female are composed of acid substances, and only a few cells positive to proteins have been seen in the acinar epithelium of the glands. Androgen and estrogen receptors are present in the rat extraorbital lacrimal gland of both sexes.

Harderization of the lacrimal gland (also known as hardarianization, Harderian gland alteration or ectopic Harderian glandular tissue) consists of the appearance of lipid foci in the extraorbital lacrimal gland. It is not an uncommon finding in aging rats, starting as early as at three weeks of age and increases at six months of age in the male glands, while it is not detectable anymore in those of females. It is not certain if the cells have the metabolic and functional characteristics of Harderian gland cells and thus represent a metaplastic change or whether the change is simply a degenerative one. It appears that the Harderian gland cells develop from undifferentiated basal cells of the acini and the intercalated ducts in the extraorbital lacrimal gland at age 2-6 months. Then, at age 22 months, they also probably developed from those of the excretory ducts of the extraorbital lacrimal gland. It has been suggested that estrogen plays a role in the harderization process. The estradiol present in older female rats may prevent the further lipid degeneration of the female extraorbital lacrimal gland at six months of life, while the disappearance of estrogen receptor in the male gland promotes the development of hardarianization.

References and Recommended literature:

Please send your comments/questions to the whole LCPG list by hitting “reply to all”.

A final document containing this material with answers and a brief discussion will be posted on the C. L. Davis website by the end of the current month (http://www.cldavis.org/lcpg_english.html).