



# ECVP/ESVP Summer School in Veterinary Pathology



## Marie Curie Training Courses

### Summer School 2006 – GEMS Question 4

#### Question 4 (slide CP05-2410-11, courtesy of Dr Kelli Boyd, St. Jude's Hospital, Memphis Tennessee USA)

Tissue from an FVB/N transgenic mouse:

The section consists of a cross-section of the head, at the level of the posterior portion of the nasal cavity. The section includes frontal bone, olfactory bulb of the cerebrum, eyes, Harderian glands, the nasal cavity (lined by olfactory epithelium and, on the ventral aspect, a small area of respiratory epithelium), the posterior tip of the septal cartilage, the nasopharyngeal duct, palate, several tooth roots, nerves, skeletal muscles, and a portion of a salivary gland.

*Retina:* Bilaterally, the retina is markedly attenuated and degenerate. In most areas, all layers inside the inner nuclear layer are absent, including the optic nerve fibers, the ganglion cells, and the inner plexiform layer. Occasionally, however, portions of the inner plexiform layer remain. The inner nuclear layer is reduced to a single-cell layer that is multifocally absent. Cells of the inner nuclear layer vary and include forms with condensed, oval nuclei and others with large, oval nuclei with small nucleoli and stippled chromatin. The outer plexiform layer is variably attenuated. The outer nuclear layer is disorganized and varies from a single-cell layer to 5-6 cells thick. Rods and cones are absent, and the retina is multifocally detached.

*Harderian gland:* Unilaterally, the Harderian gland is markedly degenerate. The gland is occupied by numerous cysts, into which project occasional narrow papillae. Many of the cysts are lined by narrow, attenuated epithelial cells. Some of the cysts contain flocculent proteinaceous material and occasional engorged macrophages. Most of the interstitium among the cysts consists of mature fibrous connective tissue and aggregates of lymphocytes, mixed with a few plasma cells and macrophages. A few of the macrophages contain golden-brown pigment, likely hemosiderin. Adjacent skeletal muscle contains many shrunken myocytes.

*Nasal cavity:* The nasal cavity contains a thick exudate composed primarily of eosinophilic, proteinaceous material mixed with mucus and stringy necrotic debris. A few degenerate neutrophils, which have eosinophilic cytoplasm and shrunken, hyperlobulated nuclei, are mixed within the exudate. A few neutrophils infiltrate the lamina propria of the ethmoturbinate.

*Bone marrow:* The marrow of the frontal bone contains an overwhelming preponderance of mature neutrophils, although all three lineages of hematopoietic cells are represented.

Diagnoses:

1. Retinal degeneration, bilateral, diffuse, marked
2. Harderian degeneration, cystic, with fibrosis and lymphocytic inflammation, unilateral, chronic, diffuse, marked
3. Nasal exudate, mild, with minimal neutrophilic rhinitis, posterior aspect of nasal cavity
4. Neutrophilic hyperplasia, bone marrow

## Interpretation:

Retinal degeneration is common in FVB/N mice and often causes blindness. It is due to a mutation in the *rd-1* gene, now known as *Pde6b<sup>rd1</sup>*. This can present challenges to husbandry, dramatically confound studies of behavior, and of course interfere with many ophthalmic investigations. It is also a common mutation of C3H mice.

Unilateral chronic Harderian degeneration could have been the iatrogenic result of retroorbital puncture to obtain blood samples.

There is no obvious explanation for the neutrophilic hyperplasia in the bone marrow. Speculatively, this may be the result of transgene expression.