National Toxicology Program
U.S. Department of Health and Human Services

# NTP Nonneoplastic Lesion Atlas

## *Eye, Lens – Cataract*


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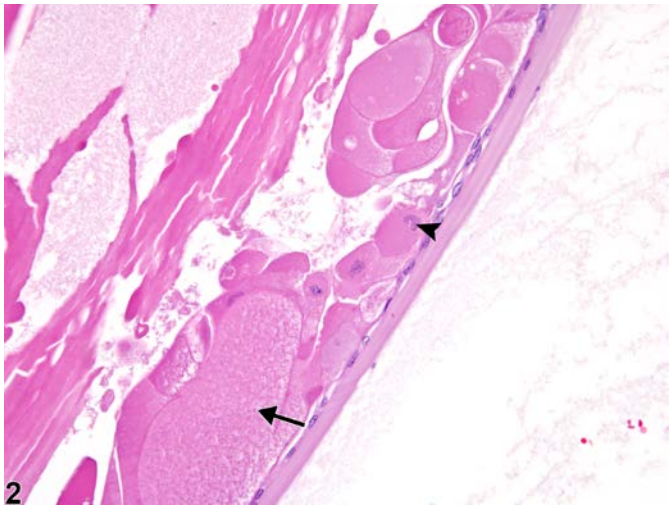
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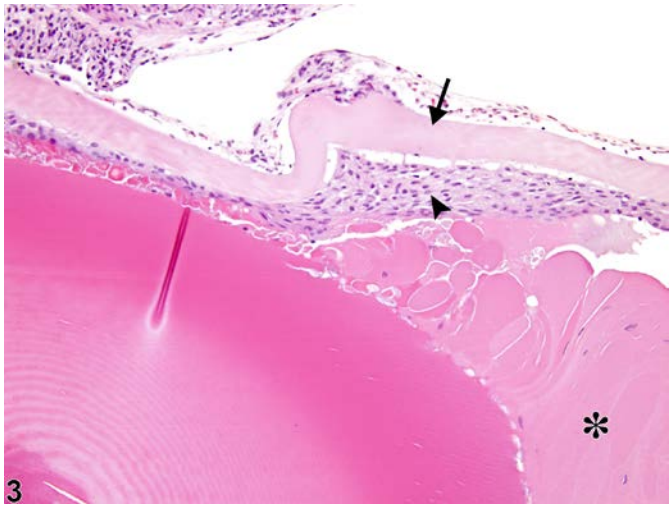
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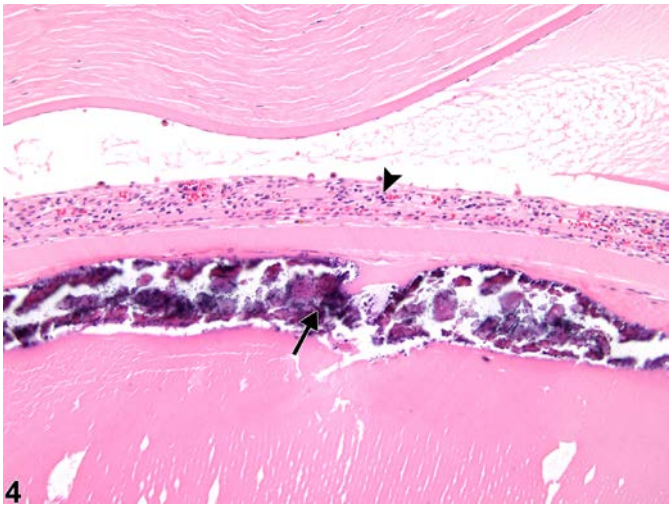
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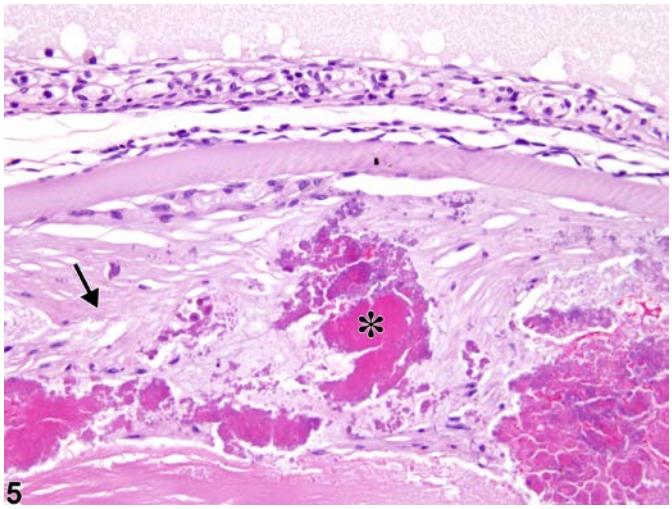
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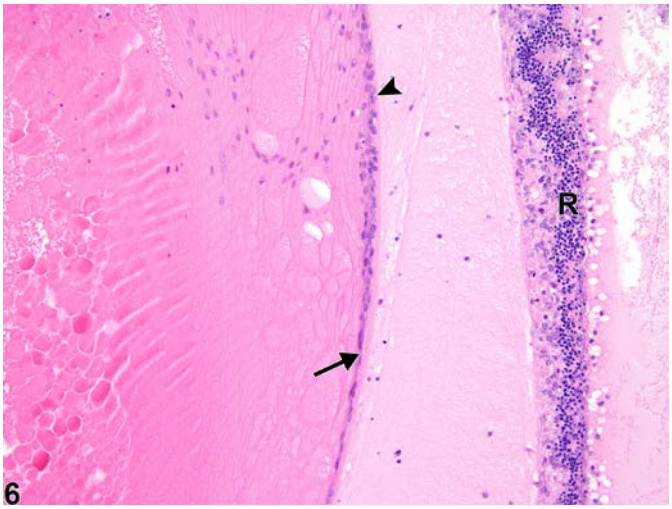

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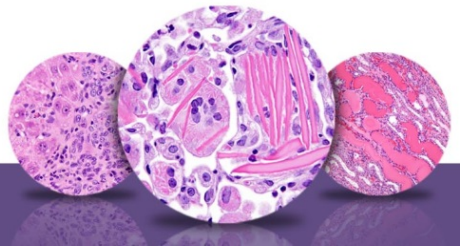

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**Figure Legend:** **Figure 1** Eye, Lens - Cataract in a female F344/N rat from a chronic study. There are lens fibers with separation, swelling, granularity, condensation, fragmentation, and disruption of the normally orderly configuration. **Figure 2** Eye, Lens - Cataract in a male F344/N rat from a chronic study. There are swollen, disrupted lens fibers (arrow) with abnormal retention of lens fiber nuclei (arrowhead). **Figure 3** Eye, Lens - Cataract in a male F344/N rat from a chronic study. There is capsular thickening and wrinkling (arrow), subcapsular anterior epithelial hyperplasia (arrowhead), and swollen, disrupted lens fibers (asterisk). **Figure 4** Eye, Lens - Cataract in a female F344/N rat from a chronic study. There is subcapsular mineralization (long arrow) of the lens; posterior synechia of the iris (short arrow) is also present. **Figure 5** Eye, Lens - Cataract in a male F344/N rat from a chronic study. Anterior subcapsular fibrosis (arrow) is intermixed with dark eosinophilic, fragmented lens fiber material (asterisk). **Figure 6** Eye, Lens - Cataract in a male F344/N rat from a subchronic study. There is hyperplasia (arrowhead) and posterior migration (behind the lens bow) (arrow) of the anterior lens epithelium; there is also retinal degeneration and detachment (R).

**Comment:** A cataract is a lens opacity (capsular, subcapsular, anterior or posterior cortical, or nuclear) resulting from any cause, including heredity, trauma, metabolic disease, nutritional imbalance, environmental factors, increased intraocular pressure, aging, and excessive exposure to ionizing radiation or ambient light. Cataracts can also be concurrent with or secondary to other ocular disease, such as severe inflammation, iridial synechiae, and/or retinal degeneration. Incidental, spontaneously occurring cataracts of uncertain etiology are not uncommon in aging rats and mice.

Cataracts are characterized by lens fibers with various abnormal features, including separation, swelling, granularity, condensation, fragmentation, and disruption of the normally orderly configuration, as well as abnormal retention of lens fiber nuclei in several swollen lens fibers (Figure 1 and Figure 2). Swollen lens fibers with abnormally retained nuclei are sometimes referred to as “bladder” or “balloon” cells. Cataracts can also exhibit additional features, such as capsular thickening, wrinkling, and/or rupture (Figure 3) or lens fiber or capsular mineralization (Figure 4). Anterior epithelial cells of cataractous lens can also undergo proliferation and fibrous metaplasia (epithelial-to-mesenchymal transition) in response to injury. There may also be anterior subcapsular fibrosis (Figure 5) in a cataractous lens (note the intermixed dark eosinophilic, fragmented lens fiber material), as well as

hyperplasia of the anterior epithelium of (Figure 6). The proliferative anterior epithelium may also extend posterior to the lens bow (posterior migration of lens epithelium) (Figure 6).

**Recommendation:** Cataracts should be diagnosed and assigned a severity grade. The site modifier "lens" should be included in the diagnosis (i.e., Eye, Lens - Cataract). If pertinent to the characterization of a treatment effect, the subtopographical localization of cataracts (subcapsular, cortical, nuclear, etc.) should be described in the pathology narrative but should not be included in the diagnosis. Morphologic features of cataracts (mineralization, fibrous metaplasia, bladder cells, etc.) should not be diagnosed separately, but should also be described in the narrative. Associated lesions (e.g., posterior synechia) should be diagnosed separately.

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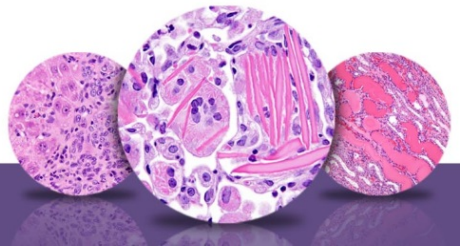

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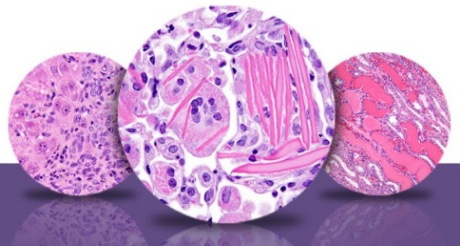

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