



NTP Nonneoplastic Lesion Atlas

Urinary bladder – Inflammation, [Acute, Suppurative, Chronic, Chronic Active, Granulomatous

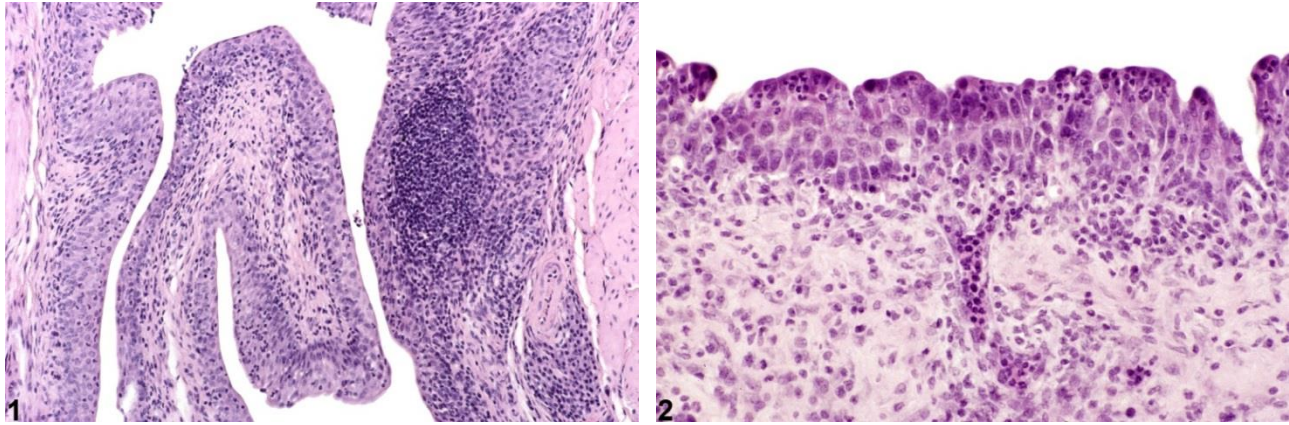
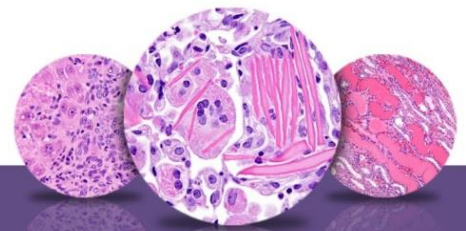


Figure Legend: **Figure 1** Chronic-active inflammation involving the urothelium and subepithelial layers in a male F344/N rat from a chronic study. **Figure 2** Acute inflammation within the urothelium in a male F344/N rat from a chronic study.

Comment: Inflammation is one of the most frequently diagnosed lesions of the urinary bladder. Inflammation may be acute, suppurative, chronic, chronic-active, or granulomatous, depending on the predominant cell type or cell response involved. In *acute inflammation*, the predominant infiltrating cell is the neutrophil, though fewer macrophages and lymphocytes may also be present. There may also be evidence of edema and hyperemia. The neutrophil is also the predominant cell type in *suppurative inflammation*; however, the neutrophils are aggregated, and many of them are degenerative (suppurative exudate). Lymphocytes predominate in *chronic inflammation*; lymphocytes also predominate in *chronic-active inflammation*, but there are also a significant number of neutrophils—both lesions contain macrophages. Diagnosis of *granulomatous inflammation*, another form of chronic inflammation, requires the presence of a significant number of aggregated, large, activated macrophages, epithelioid macrophages, or multinucleated giant cells.

Inflammatory cells can be seen anywhere in the bladder, including the lumen, mucosa, submucosa, and muscularis (Figure 1). Hemorrhage, necrosis, urothelial hyperplasia, and fibrosis may be evident, depending on the lesion (Figure 2). In most instances, inflammation arises from bacterial infections or the presence of calculi. Inflammation may also be a direct consequence of chemical administration.



NTP Nonneoplastic Lesion Atlas

Urinary bladder – Inflammation, [Acute, Suppurative, Chronic, Chronic Active, Granulomatous

Recommendation: Inflammation should be diagnosed according to the cell response and the location within the bladder and should be given a severity grade. Hemorrhage, necrosis, urothelial hyperplasia, and fibrosis may be diagnosed separately if they constitute a significant component of the lesion.

References:

Frith CH. 1979. Morphologic classification of inflammatory, nonspecific, and proliferative lesions of the urinary bladder of mice. *Invest Urol* 16:435–444.

Abstract: <http://www.ncbi.nlm.nih.gov/pubmed/571862>

Gaillard ET. 1999. Ureter, urinary bladder and urethra. In: *Pathology of the Mouse: Reference and Atlas* (Maronpot RR, Boorman GA, Gaul BW, eds). Cache River Press, Vienna, IL, 235–258.

Abstract: <http://www.cacheriverpress.com/books/pathmouse.htm>

Jokinen MP. 1990. Urinary bladder, ureter, and urethra. In: *Pathology of the Fischer Rat: Reference and Atlas* (Boorman GA, Eustis SL, Elwell MR, Montgomery CA, MacKenzie WF, eds). Academic Press, San Diego, 109–126.

Abstract: <http://www.ncbi.nlm.nih.gov/nlmcatalog/9002563>

Authors:

John Curtis Seely, DVM, DACVP
Senior Pathologist
Experimental Pathology Laboratories, Inc.
Research Triangle Park, NC

Abraham Nyska, DVM, Diplomate ECVF, Fellow IATP
Expert in Toxicologic Pathology
Visiting Full Professor of Pathology
Sackler School of Medicine, Tel Aviv University
Timrat Israel