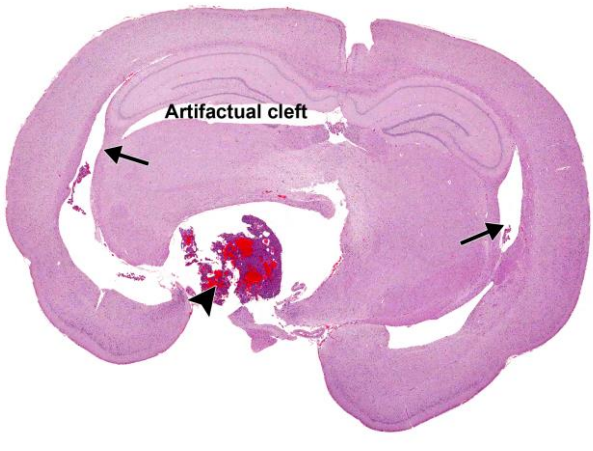
Brain – Hydrocephalus



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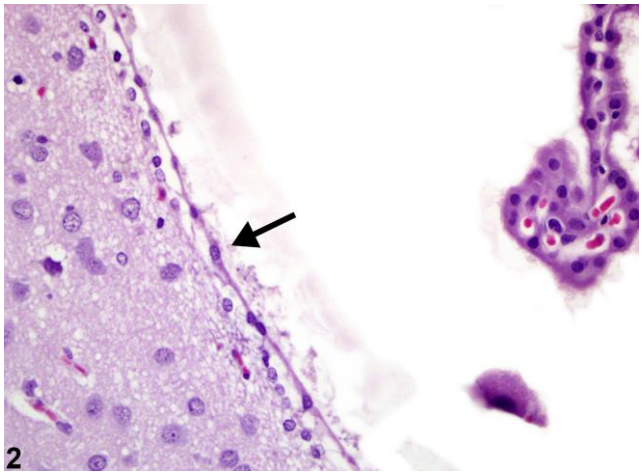

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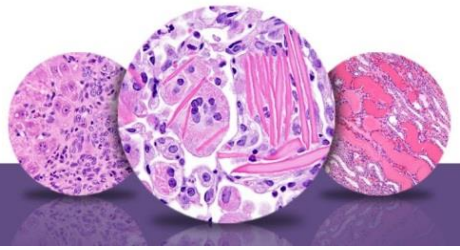
Figure Legend: Figure 1 An example of bilateral noncommunicating, obstructive hydrocephalus of the lateral ventricles (arrows) in a male F344/N rat from a chronic study. It is secondary to a pituitary neoplasm (arrowhead) compressing and distorting the diencephalon while obstructing the ventral aspect of the third ventricle. **Figure 2** The effect of obstructive hydrocephalic ventricular expansion, leading to flattened attenuation of normally cuboidal ependymal cells (arrow), in a female F344/N rat from a chronic study.

Comment: Hydrocephalus may be communicating or noncommunicating; that is, the former has no apparent obstructive process, whereas the latter has an obstructive cause somewhere in the ventricular connections. Most commonly, communicating hydrocephalus is considered to result from an idiopathic increase in cerebrospinal fluid production or deceased resorption. However, most examples are not clearly investigated. Figure 1 is an example of noncommunicating, obstructive hydrocephalus of the lateral ventricles (arrows) secondary to a pituitary neoplasm (arrowhead) obstructing the ventral aspect of the third ventricle. Figure 2 depicts the flattened attenuation of normally cuboidal ependymal cells (arrow). This is due to obstructive hydrocephalic ventricular expansion associated with incidental pituitary cysts. In this example, the effects of increased intraventricular pressure in hydrocephalus are evident on ependymal cells. The normally cuboidal ependymal cells are stretched to cover the increased ventricular surface area. There is some edematous separation of the epithelium from underlying brain and mild vacuolation of subjacent neuropil.



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Ependymal cells have been generally considered by pathologists to be poorly responsive to insults, simply undergoing degeneration and necrosis. However, in investigations of controlled spinal injury of rats, ependymal cells and closely associated subjacent cells appear to be quite responsive, at least to trauma. Nestin and GAP-43, immunohistochemical indicators of immature neural stem cells, and glial fibrillary acid protein were detected posttrauma in in vivo cells identified as ependymal, suggesting dedifferentiation of ependymal cells to neural stem cells and glia and their potential role in spinal injury repair.

Recommendation: In NTP studies, the cause of the hydrocephalus should be determined if possible. Hydrocephalus is diagnosed unless it is secondary to obstruction by tumor. This lesion need not be graded.

References:

Takahashi M, Arai Y, Kurosawa H, Sueyoshi N, Shirai S. 2003. Ependymal cell reactions in spinal cord segments after compression injury in adult rat. J Neuropathol Exp Neurol 62:185–194.
Abstract: http://www.ncbi.nlm.nih.gov/pubmed/12578228

Authors:

Peter Little, DVM, MS, PhD, DACVP
Neuropathology Consultant
Experimental Pathology Laboratories, Inc.
Research Triangle Park, NC

Deepa B. Rao, BVSc, MS, PhD, DABT, DACVP
NTP Pathologist (Contractor)
Integrated Laboratory Systems, Inc.
Research Triangle Park, NC