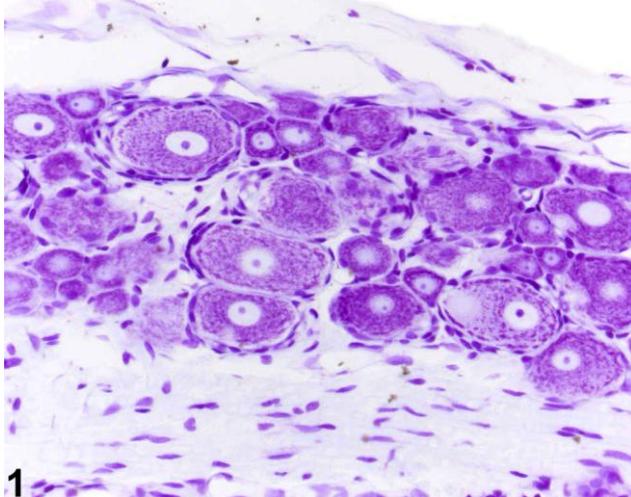
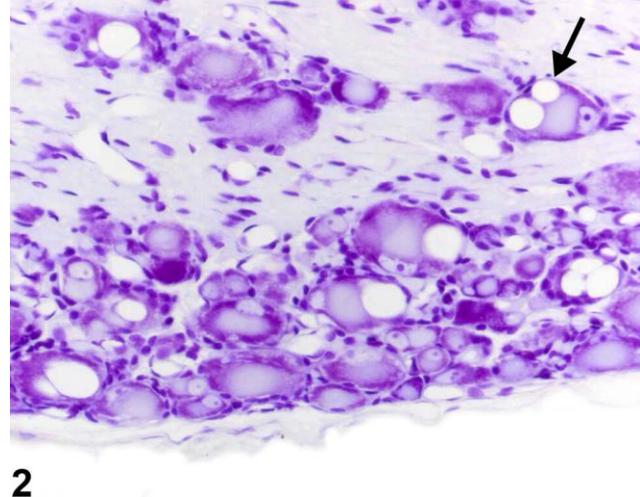


# NTP Nonneoplastic Lesion Atlas

## Spinal cord, Dorsal root ganglion, Neuron – Vacuolation



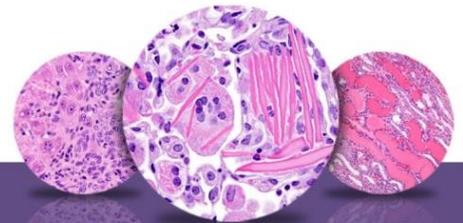
1



2

**Figure Legend:** **Figure 1** Normal appearance of rat dorsal root ganglionic neurons (cresyl violet). Image provided courtesy Dr. G. Krinke. **Figure 2** Genuine dorsal root ganglionic vacuoles, appearing as variably sized, but generally large, clear vacuoles in the perikaryon of the affected neurons, may be accompanied by chromatolysis (arrow). Image provided courtesy Dr. G. Krinke.

**Comment:** Neuronal vacuolation, while it may be seen in any population of neurons undergoing degeneration, is a particular concern for its neuropathologic significance in the dorsal root ganglia. Figure 1 shows the normal appearance of rat dorsal root ganglionic neurons. At issue diagnostically is the recognition that neuronal vacuolation at these ganglionic sites may occasionally be present at a low incidence in tissue not exposed to toxic compounds and is more common in older rodents. Importantly, neuronal vacuolation may be a significant effect of toxicity. The vacuoles appear as variably sized, but generally large clear vacuoles in the perikaryon of the affected neurons may be accompanied by chromatolysis (Figure 2, arrow). The lining of the vacuoles is composed of a single membrane, and short protrusions of this membrane occur into the vacuoles, accompanied by chromatolysis. Electron microscopic images do not clearly identify the affected swollen organelles, but smooth endoplasmic reticulum and Golgi apparatus are the most likely candidates.



# NTP Nonneoplastic Lesion Atlas

## *Spinal cord, Dorsal root ganglion, Neuron – Vacuolation*

In view of the known occurrence of neuronal vacuolation as an occasional incidental finding, it is important to carefully examine control and treatment groups for its presence in comparable regions. The existence of associated changes such as neuronal chromatolysis or adjacent responses by glia or satellite cells may be helpful in attributing vacuolization as a lesion.

**Recommendation:** When present, neuronal vacuolation is diagnosed in NTP studies, the subsite recorded, and the severity graded. In the presence of concurrent lesions, lesions with the most severity are typically diagnosed. Other concurrent lesions may be diagnosed separately, if warranted by the severity.

### **References:**

Groves MJ, Scaravilli F. 2005. Pathology of peripheral neuron cell bodies. In: *Peripheral Neuropathy*, 4th ed (Dyck PJ, Thomas PK, eds). Elsevier, Philadelphia, PA, 683–732.  
Abstract: [http://store.elsevier.com/Peripheral-Neuropathy/P\\_K\\_Thomas/isbn-9780721694917/](http://store.elsevier.com/Peripheral-Neuropathy/P_K_Thomas/isbn-9780721694917/)

Rogers-Cotrone T, Burgess MP, Hancock SH, Hinckley J, Lowe K, Ehrich MF, Jortner BS. 2010. Vacuolation of sensory ganglion neuron cytoplasm in rats with long-term exposure to organophosphates. *Toxicol Pathol* 38:554–559  
Abstract: <http://www.ncbi.nlm.nih.gov/pubmed/20448080>

### **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