

NTP Nonneoplastic Lesion Atlas

Brain, Neuron – Chromatolysis

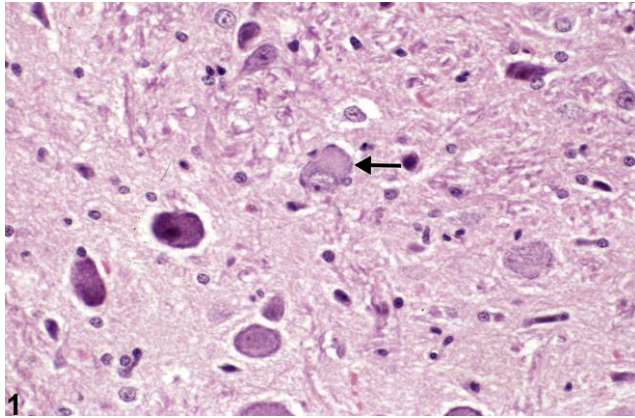
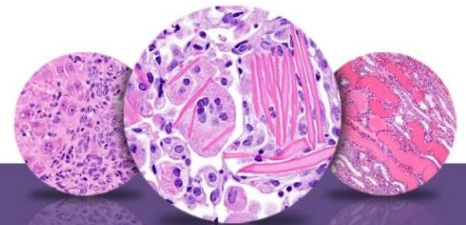


Figure Legend: Figure 1 Neuronal central chromatolysis in a male F344/N rat from a subchronic study. The arrow identifies the affected neuron with typical features of cytoplasmic pallor and eccentricity of the nucleus.

Comment: This image displays the usually early, often sublethal, change that occurs in neuronal injury. It is commonly the result of toxin exposure and interference with cellular metabolism. In the case of spinal neurons, particularly, it may be secondary to traumatic radicular nerve crush or severance of the peripheral nerve. Central chromatolysis (arrow) occurs when the normal aggregations of rough endoplasmic reticulum and associated ribosomes, known as Nissl substance, in the neuronal perikaryon disperse as a response to injury. It signifies the acceleration of neuronal protein synthesis in the face of cellular injury. At the same time, the cytoskeletal network, which frames the neuronal cytosol and supports the nucleus, is negatively affected. This loss of nuclear suspension leads to the nucleus losing its central position, becoming eccentric, lying adjacent to the cell membrane. During recovery from the neural insult, the Nissl substance may reaggregate, but from the center, so that there remains cytoplasmic clarity peripherally. This change is referred to as “peripheral chromatolysis,” considered a microscopic indication of early neuronal recovery. It is important to note that some particularly active nuclei in the brain, such as the anterior olivary nucleus and hypothalamic nuclei, contain neurons that normally have apparent central chromatolysis, but not nuclear eccentricity; therefore, caution in the diagnosis of this change is required. This dictates that central chromatolysis, wherever it occurs, should be assessed with the knowledge of these



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particular neuroanatomic sites and should also be compared with equivalent sites in controls to avoid misdiagnosis of this important early neuronal feature of injury.

Recommendation: When present, chromatolysis, its anatomic subsite location, and severity grading are noted in NTP studies.

References:

Summers BA, Cummings JF, De Lahunta A. 1995. Malformations of the central nervous system. In: Veterinary Neuropathology. Mosby, St. Louis, MO, 68–94.

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