Biotinylated dextran amine

Biotinylated dextran amines (BDA) are organic compounds used as anterograde and retrograde neuroanatomical tracers. They can be used for labeling the source as well as the point of termination of neural connections and therefore to study neural pathways.

BDA is delivered into the nervous system by iontophoretic or pressure injection and visualized with an avidin-biotinylated horseradish peroxidase procedure, followed by a standard or metal-enhanced diaminobenzidine (DAB) reaction. Samples can then be analyzed by optical microscope as well as by electron microscope.

High molecular weight BDA (10 kDa) yields sensitive and detailed labeling of axons and terminals, while low molecular weight BDA (3 kDa) yields sensitive and detailed retrograde labeling of neuronal cell bodies.

A study of Çavdar et al., aims to define the cortical and subcortical and brain stem connections of the cerebellum via the superior cerebellar peduncle (SCP) and middle cerebellar peduncle (MCP) using biotinylated dextran amine (BDA) and FluoroGold (FG) tracer in Wistar rats. 14 male rats received 20-50-nl pressure injections of either FG or BDA tracer into the SCP and MCP. Following 7-10 days of survival period, the animals were processed according to the related protocol for two tracers. Labelled cells and axons were documented using light and fluorescence microscope. The SCP connects cerebellum to the insular and infralimbic cortices whereas, MCP addition to the insular cortex, it also connects cerebellum to the rhinal, primary sensory, piriform and auditory cortices. Both SCP and MCP connected the cerebellum to the ventral, lateral, posterior and central, thalamic nuclei. Additionally, SCP also connects parafasicular thalamic nucleus to the cerebellum. The SCP connects cerebellum to basal ganglia (ventral pallidum and clastrum) and limbic structures (amygdaloidal nuclei and bed nucleus of stria terminalis), however, the MCP have no connections with basal ganglia or limbic structures. Both the SCP and MCP densely connects cerebellum to various brainstem structures. Attaining the knowledge of the connections of the SCP and MCP is important for the diagnosis of lesions in the MCP and SCP and would deepen current understanding of the neuronal circuit of various diseases or lesions involving the SCP and MCP [1)].

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Çavdar S, Özgür M, Kuvvet Y, Bay H, Aydogmus E. Cortical, subcortical and brain stem connections of the cerebellum via the superior and middle cerebellar peduncle in the rat. J Integr Neurosci. 2018 Jul 25. doi: 10.3233/JIN-180090. [Epub ahead of print] PubMed PMID: 30056432.