

### **Motor nerve conduction velocity (MNCV)**

Nerve conduction velocities are used diagnostically to distinguish type 1 (demyelinating) and type 2 (axonal) neuropathies in humans. Type 1 neuropathies typically have pathologically reduced NCVs (below 30 m/s compared to normal values near 50 m/s in humans). Nerve conduction velocities can also be measured in the mouse as described below. However, significant decreases in axon diameter or internodal distance can also contribute to decreased NCV (1,2,3). Furthermore, NCVs record the fastest (largest) axons present and may therefore miss axonal pathologies that do not cause a marked decrease in these neurons. Therefore, this functional measure should again be combined with an examination of axon diameters, myelination, and intermodal distance to determine the underlying mechanism.

1. Anesthetize animal with isoflurane.
2. Monitor/maintain normal body temperature.
3. Insert a pair of stimulating electrodes at both the sciatic notch and the ankle for transcutaneous stimulation.
4. Insert a recording electrode and ground electrode on the rear footpad ipsilateral to the stimulating electrodes.
5. Record and store compound muscle action potentials produced in response to a stimulus delivered separately at each site.
6. Measure the conduction distance between stimulating electrodes and the latency of both CMAPs.
7. To calculate MNCV subtract the proximal latency (sciatic notch stimulus) from the distal latency (ankle stimulus) and divide by the conduction distance.
8. See reference (1,2) for details.

### Reference

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2. Occhi, S., Zambroni, D., Del Carro, U., Amadio, S., Sirkowski, E.E., Scherer, S.S., Campbell, K.P., Moore, S.A., Chen, Z.L., Strickland, S., et al. (2005). Both laminin and Schwann cell dystroglycan are necessary for proper clustering of sodium channels at nodes of ranvier. *J. Neurosci.* 25, 9418–9427.
3. Court, F. A., Sherman, D. L., Pratt, T., Garry, E. M., Ribchester, R. R., Cottrell, D. F., et al. (2004) Restricted growth of Schwann cells lacking Cajal bands slows conduction in myelinated nerves. *Nature* **431**, 191-195.