

Myelin Sheath

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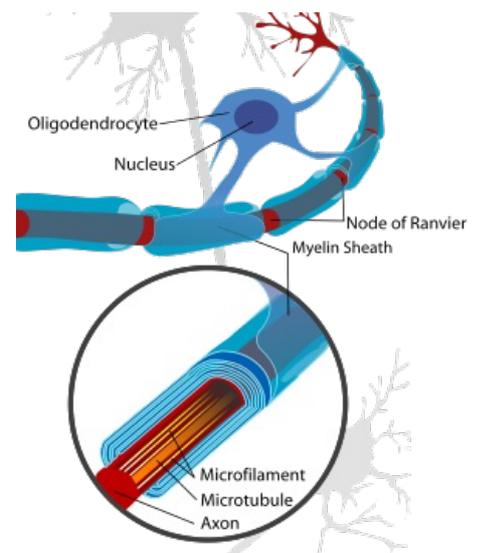
Myelin sheath is formed by oligodendrocytes in the CNS and by Schwann cells in the peripheral nervous system. These cells wrap layer upon layer of their own plasma membrane in a tight spiral around axon. Each myelinating Schwann cells makes myelin layers at a single axon, forming a segment (internodium) that is about 1 mm long and consisting of up to 300 concentric layers of membrane.

Between one segment of sheath and the next, small regions of axon membrane remain bare (node of Ranvier).

Oligodendrocytes form similar segments of sheath at many separate axons simultaneously.

The insulating layer of the myelin sheath reduces the effective capacitance of the axon membrane and prevents almost all current leakage across it. Practically all the Na^+ channels of the axon are concentrated at the nodes, giving the density of several thousand channels per 1 mm^2 . The sheathed portion of the axon membrane is not excitable, but has excellent cable properties. The membrane at the node of Ranvier is highly excitable and maintains the amplitude of the action potential → saltatory conduction, leading to acceleration of the conduction and conservation of the metabolic energy.

The following GIF (<http://lecannabiculteur.free.fr/SITES/UNIV%20W.AUSTRALIA/mb140/CorePages/Nervous/Images/Myelinani.gif>) schematizes the process of myelination by a Schwann cell.



Neuron with oligodendrocyte and myelin sheath

Links

Related articles

Sources

- Lecture Notes: Prof. MUDr. Jaroslav Pokorný DrSc.

Bibliography

- HALL, John E - GUYTON, Arthur Clifton. *Guyton and Hall Textbook of Medical Physiology*. 11. edition. Saunders/Elsevier, 2005. ISBN 0721602401.
- DESPOPOULOS, Agamnenon - SILBERNAGL, Stefan. *Color Atlas of Physiology*. 5. edition. Thieme, 2003. ISBN 3135450058.

Further reading

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