

PHYSIOLOGY

Q6 – Wallerian Degeneration

Ans : 1 – Answer

Introduction

Wallerian degeneration is a pathological process that occurs in a nerve fiber following transection or severe injury. When a nerve is damaged, the part of the axon distal to the site of injury undergoes degeneration. This process is essential for removal of damaged nerve tissue and preparation for possible nerve regeneration.

Definition

Wallerian degeneration is defined as degeneration of the axon and its myelin sheath distal to the site of nerve injury due to loss of continuity with the neuronal cell body.

Changes During Wallerian Degeneration

Within 24–48 hours after injury, the distal axon swells and fragments. The myelin sheath breaks down into lipid droplets. Macrophages and Schwann cells remove the debris. Schwann cells proliferate and form bands of Büngner, which guide regenerating axons.

Changes in Proximal Segment

The proximal segment undergoes degeneration up to the first node of Ranvier. The neuron cell body shows chromatolysis, characterized by swelling, dispersion of Nissl substance, and eccentric nucleus, indicating increased metabolic activity for regeneration.

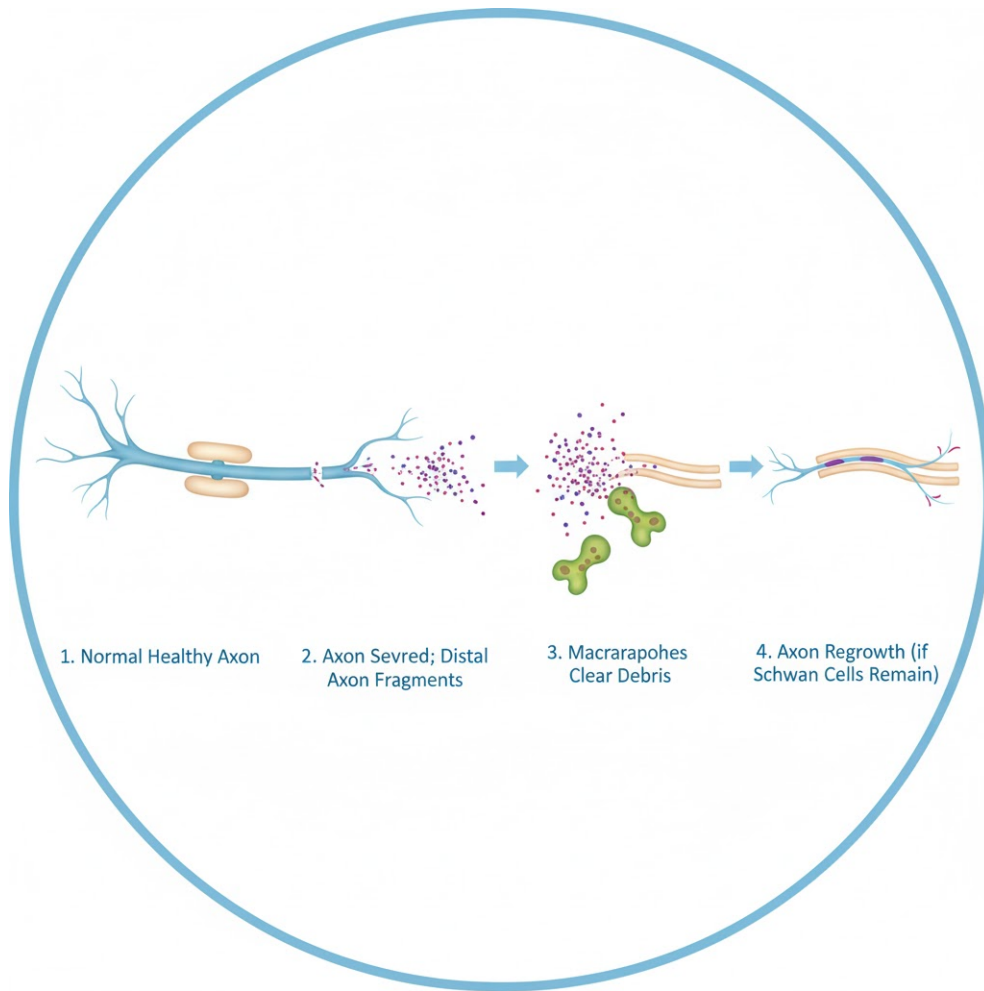
Regeneration of Nerve

Axonal sprouts arise from the proximal stump and grow along the bands of Büngner at a rate of approximately 1–3 mm per day. Successful regeneration depends on intact endoneurial tubes and proper alignment of nerve ends.

Clinical Importance

Wallerian degeneration explains recovery following peripheral nerve injury. It is important in nerve repair surgeries and does not occur effectively in the central nervous system due to absence of Schwann cells and presence of inhibitory factors.

Diagram – Wallerian Degeneration



Conclusion

Wallerian degeneration is a vital degenerative and preparatory process following nerve injury. It removes damaged axons and myelin and creates a favorable environment for nerve regeneration in the peripheral nervous system.