CHAPTER - 5
HISTOLOGICAL CHANGES IN THE CAUDAL NEUROSECRETORY SYSTEM IN RESPONSE TO SALINE AND UROPHYSIAL HOMOGENATE INJECTION

The *G. giuris* subjected to saline and urophysial homogenate for 1, 2, 3, 4 and 5 hrs showed histological changes in the caudal neurosecretory system.

DAHLGREN CELLS

After 1, 2 and 3 hrs. of saline injection (200 μl of saline 0.9%) the neurosecretory cells became larger when compared to control (Fig. 2). The most of the neurosecretory cells are granulated when the fishes are injected with saline solution during 1 hr and stained deeply with CAHP. The perikarya have large nuclei with diffused chromatin material (Fig. 63). However, the fishes injected with urophysial homogenate for the same period, most of the cells showed sparse granulation around the nucleus and inconspicuous cell boundaries. The neurosecretory material was densely stained in the axons of the perikarya (Fig. 64). The fishes examined after 2 hrs of saline injection the Dahlgren cells are increased in size and darkly stained with CAHP, indicating accumulation of neurosecretory materials.
(Fig. 65). The axons appear beaded throughout the neurosecretory process. The fishes treated with urophysial homogenate for 2 hrs the perikarya undergone cytoplasmic clumping and degeneration. The nuclei are in degenerating condition (Fig. 66). When the fishes injected with saline after 3 hrs the neurosecretory cells became hypertrophied and show feebly stained neurosecretory materials around the nuclei (Fig. 67). Few large vacuoles were also seen in the periphery of the cytoplasm. The outer cell membrane became irregular and inconspicuous. After 3 hrs of injection with urophysial homogenate, most of the perikarya are increased appreciably. They posses large nuclei with condensed chromatin material and stain deep blue with CAHP (Fig. 68).

After 4 and 5 hrs of saline injection, the Dahlgren cells are gradually increase in size, cytoplasm of perikarya became less granular. The nucleus was spherical with decreased volume of cytoplasm having varied amounts of neurosecretory material and stain lightly with CAHP (Fig. 69 and 71). When the fishes are injected with urophysial homogenate for the same period, the neurosecretory cells became hypertrophied and varied in shape (Fig. 70). While the fishes after 5 hrs of urophysial homogenate injection the Dahlgren cells were hypotrophied and stained feebly with CAHP (Fig. 72).
After 1 hr. of injection with saline the urophysis showed accumulation of various amount of neurosecretory granules and stained deeply with CAHP (Fig. 73). However, the fishes examined after 1 hr of urophysial homogenate injection the urophysis contained less Herring bodies, which were condensed, deeply stained with CAHP (Fig. 74) and highly vascularised with vacuoles, indicates the release of neurosecretion. After 2 hrs of saline injection the urophysis contain coarsely scattered granular NSM. The stainable Herring bodies are small and feebly stained with CAHP (Fig. 75). On the other hand, the fishes injected with urophysial extract for the same period the neurohemal organ contain condensed and darkly stained Herring bodies (Fig. 76). After 3 hrs of treatment with saline the CAHP positive materials are abundant towards medullary region of the urophysis. The Herring bodies are scattered and distributed throughout the neurohemal organ and are less vascularised (Fig 77). Where as after 3 hrs of urophysial homogenate injection the urophysis contain variable amount of coarse granules which stain deeply with CAHP. A few vacuoles and Herring bodies are also found towards the medullary region of the urophysis (Fig. 78).
After 4 hrs of treatment with saline solution, the Herring bodies are larger and more numerous than the control fish indicating the accumulation of neurosecretory material in the urophysis. A few vacuoles are also noticed in the cortical region (Fig. 79). The fishes treated with homogenate injections, the Herring bodies are decreased significantly which stain feebly with CAHP. The scattered neurosecretory material is clearly visible towards medullary region (Fig. 80). A large vacuoles and blood capillaries are also seen in the urophysis.

Histological observations reveal that the urophysis show signs of depletion of neurosecretory materials towards the cortical region of the urophysis of fish injected with saline solution after 5 hrs of treatment (Fig. 81). The blood capillaries are distributed in the urophysis and surrounded by an intense collection of CAHP positive neurosecretory materials. The Herring bodies are scattered in the different regions of the urophysis. However the fishes treated with urophysis homogenate after 5 hrs, the Herring bodies slightly decreased and scattered throughout the urophysial region. The blood capillaries are decreased when compared to the earlier period of treatment (Fig. 82). However, a few large vacuoles are also seen towards the cortical region of the urophysis.
Fig. 63: Saggital section of spinal cord, details of Dahlgren cells after 1 hr of saline injection indicating the hypertrophy and accumulation of neurosecretory granules in their cytoplasm.
Note: The accumulation of neurosecretory materials in the axons.
CAHP X 1000

Fig. 64: Saggital section of spinal cord, details of Dahlgren cells after 1 hr of urophysial homogenate injection indicating hypertrophy and granulation in their cytoplasm.
CAHP X 1000

Ax-Axon DC-Dahlgren cell

Nu - Nucleus
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Fig. 65: Saggital section of spinal cord, details of Dahlgren cells after 2 hrs of saline injection indicating deeply stained neurosecretory materials.

CAHP X 1000

Fig. 66: Saggital section of spinal cord, details of Dahlgren cells after 2 hrs of urophysial homogenate injection indicating degranulated cytoplasm.

CAHP X 1000

DC-Dahlgren cell  Nu-Nucleus
V-Vacuole
Fig. 67: Saggital section of spinal cord, details of Dahlgren cells after 3 hrs of saline injection indicating hypertrophy and depletion of neurosecretory granules in their cytoplasm.

CAHP X 1000

Fig. 68: Saggital section spinal cord, details of Dahlgren cells after 3 hrs of urophysial homogenate injection exhibit hypertrophy and accumulation of neurosecretory granules in their cytoplasm.

CAHP X 1000

Ax-Axon  DC-Dahlgren cell  Nu-Nucleus
Fig.69: Sagittal section of spinal cord, details of Dahlgren cells after 4 hrs of saline injection exhibit hypertrophy and degranulated cytoplasm.

CAHP X 1000

Fig.70: Sagittal section of spinal cord, details of Dahlgren cells after 4 hrs of urophysial homogenate injection indicating hypertrophy and granulated cytoplasm.

CAHP X 1000

DC-Dahlgren cell Nu-Nucleus
Fig. 71: Saggital section of spinal cord, details of Dahlgren cells after 5 hrs of saline injection indicating hypertrophy and depletion of neurosecretory granules in their cell cytoplasm.

CAHP X 1000

Fig. 72: Saggital section of spinal cord, Details of Dahlgren cells after 5 hrs of urophysial homogenate injection indicating hypertrophy and degranulated cytoplasm.

CAHP X 1000

DC-Dahlgren cell Nu-Nucleus
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Fig. 73: Saggital section of urophysis after 1 hr of saline injection, showing accumulation of neurosecretory materials and large Herring bodies.

Note: The neurosecretory materials distributed around the blood vessels.

CAHP X 250

Fig. 74: Saggital section of urophysis after 1 hr urophysial homogenate injection, showing very little amount of fine neurosecretory materials and Herring bodies.

CAHP X 250

Bv - Blood vessel  Hb - Herring bodies

V - Vacuole
Fig. 75: Saggital section of urophysis after 2 hrs of IN injection, showing distribution of coarse granules.

CAHP X 250

Fig. 76: Saggital section of urophysis after 2 hrs of urophysial homogenate injection, showing sparsely distribution of neurosecretory materials.

CAHP X 250

Bv-Blood vessel                  Hb-Herring bodies
V-Vacuole
Fig. 77: Sagittal section of urophysis after 3 hrs of saline injection, showing scattered neurosecretory material and less vascularised.

CAHP X 250

Fig. 78: Sagittal section of urophysis after 3 hrs of urophysial homogenate injection, showing variable amount of Neurosecretory material with few vacuoles.

CAHP X 250

Hb-Herring bodies V-Vacuole
Fig. 79: Saggital section of urophysis after 4 hrs of saline injection, showing increase in the accumulation of neurosecretory materials.

CAHP X 250

Fig. 80: Saggital section of urophysis after 4 hrs of urophysial homogenate injection, showing decrease in the amount of neurosecretory materials.

CAHP X 250

Bv - Blood vessel
Hb - Herring bodies
V - Vacuole
Fig. 81: Saggital section of urophysis after 5 hrs of saline injection, showing depletion of neurosecretory material in the axonomic ends.

CAHP X 250

Fig. 82: Saggital section of urophysis after 5 hrs of urophysial homogenate injection, showing depletion of neurosecretory materials.

CAHP X 250

Bv-Blood vessel  Hb-Herring bodies

NSp - Neurosecretory process  V - Vacuole