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STUDIES ON THE EFFECT OF DIMETHOATE ON BCHE ACTIVITY IN DIFFERENT LAYERS OF RETINA OF GALLUS DOMESTICUS IN VIVO

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ABSTRACT

The BChE activity was mainly localized in the inner segment, outer and inner plexiform layers, horizontal cells, amacrine cells, muller cell and layer of nerve fibers of retina of *Gallus dometicus*. The LRC, OPL, INL, IPL,GC and LNF revealed strong BChE activity in normal retina. An in vivo exposure condition has not shown any variations in the enzymatic activity in all layers of retina. BChE is very significant component of the layers of retina and might be playing significant role in neurotransmission of visual impulses especially in birds.

Key words- BChE, retina, Gallus *dometicus,*in-vivo, neurotransmission, visual impulses.

INTRODUCTION

Various workers home observed cholinergic pathway in the retina of vertebrates and also studied distribution of BchE histo-chemical and biochemical methods (Hebb *et al.,* 1953; Nichols and Koelle, 1968; Nichols *et al.;* 1972; Atterwill and Neal, 1978; Massoulie and Bon, 1982; and Meirami,1984).Moreover, comparative account on the distribution of BchE with reference to Rhotopic, Scotopic and duplex vision of different vertebrates has been reported by Jain (1983).Interestingly, avian esterase are largely of 'B' type and are inhibited by organophosphate pesticides (Maekness *et al.,* 1988). The organophosphate pesticides also have the ability to induce delayed toxic neuropathy, which is characterized pathologically by degeneration and secondary de myelination of nervous axons (Cavanagh, 1954, 1964, 1973). Study on the effect of dimethoate on BchE of retinal layers would be most suitable to correlate neuropathy induced by organophosphate pesticide and BchE enzyme associated with myelin metabolism.

MATERIALS AND METHODS

The healthy animals of about 20 – 25 days old were collected from local poultry farm. These animals were divided into three groups. The animals of first group were not exposed to any chemical, whereas the animals of second group were subjected to identical conditions of exposure that is kept in similar exposure conditions, but without any chemical. The animals of third group were exposed similar to second group, but with 2 gm of Dimethoate placed in the chamber in the present study. After about 45 minutes, animals of second and third groups died in the exposure chamber. The eyes of all the three groups were quickly removed and fixed in 10 %

chilled neutral formalin for 12-15 hours. Frozen sections of5-6 µ thickness of retina were cut and processed for the localization of BchE as described above.

RESULT AND DISCUSSION

Retina of *Gallus domesticus* composed of following layers:Pigmented epithelium (PE), layer of rods and cones (LRC), outer plexiform layer (OPL), inner nuclear layer (IPL), inner plexiform layer (INL), ganglion cell layer (GC), layer of nerve fibers (LNF). The photoreceptors are composed of OS, IS AND ONL. All the three conditions (N, H and E) revealed intense BchE activity in OS. IS depicted strong BchE activity in N, H and E. in ONL intense BchE reaction was reported in N, H and E.The next layer is OPL, showed strong activity in N, H and E conditions. In the INL layer BchE activity was observed in N, H and E conditions. The next layer is GC which was strongly positive for BchE in N, H and E. The layer of nerve fibers (LNF) is the last layer, exhibited strong BchE activity in N, H and E conditions .An in vivo exposure condition has not shown any variation in the enzymatic activity in all the layers of retina (Table 1).

Table 1 - Action of butyrylcholinesterase in the different layers of Retina (*in vivo*)

Layers of retina		**Normal (N)**	**Hypoxial (H)**	**Exposed to pesticide (E)**
L	**OS**	+++	+++	+++
R	**IS**	++++	++++	++++
C	**ONL**	+++	+++	+++
OPL		++++	++++	++++
INL		++++	++++	++++
IPL		++++	++++	++++
GC		++++	++++	++++
LNF		++++	++++	++++

+++ = Strong activity
++++ = Intense activity

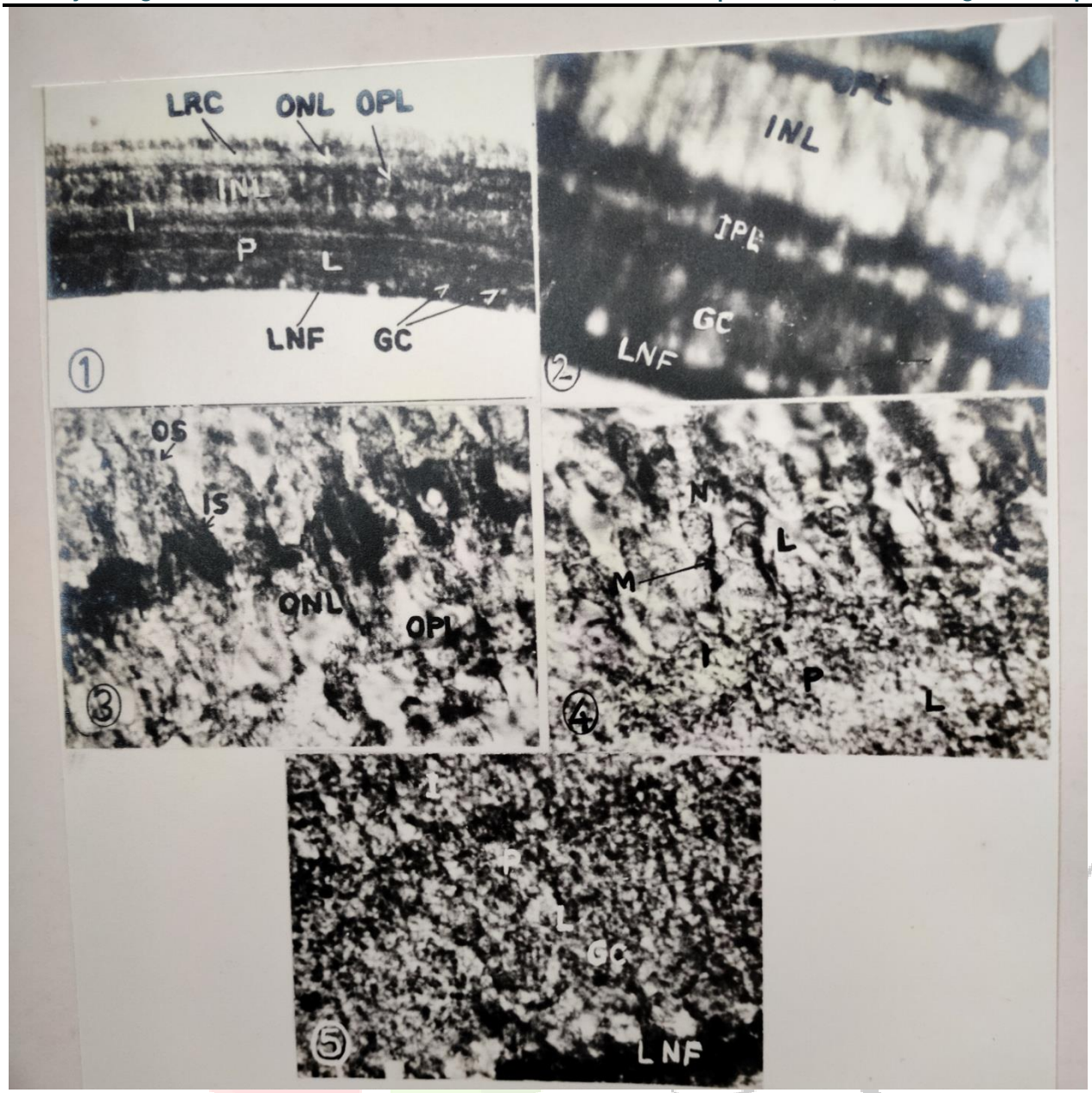

Figure A- (1) Low power photogmicrograph of retina showing BChE activity in the various layers in normal condition. Layer of rods and cones (LRC), outer plexiform layer (ONL), Inner plexiform layer (IPL), Ganglion cells (GC), Layer of nerve fibers (LNF); (2) High magnification showing strong BChE activity in OS, intense in IS, strong in ONL, intense in OPL and INL; (3) Intense BChE activity in IPL also observed three darkly stained subzones of IPL (S1, S2, S3); (4) Intense BChE activity in IPL, GC and LNF

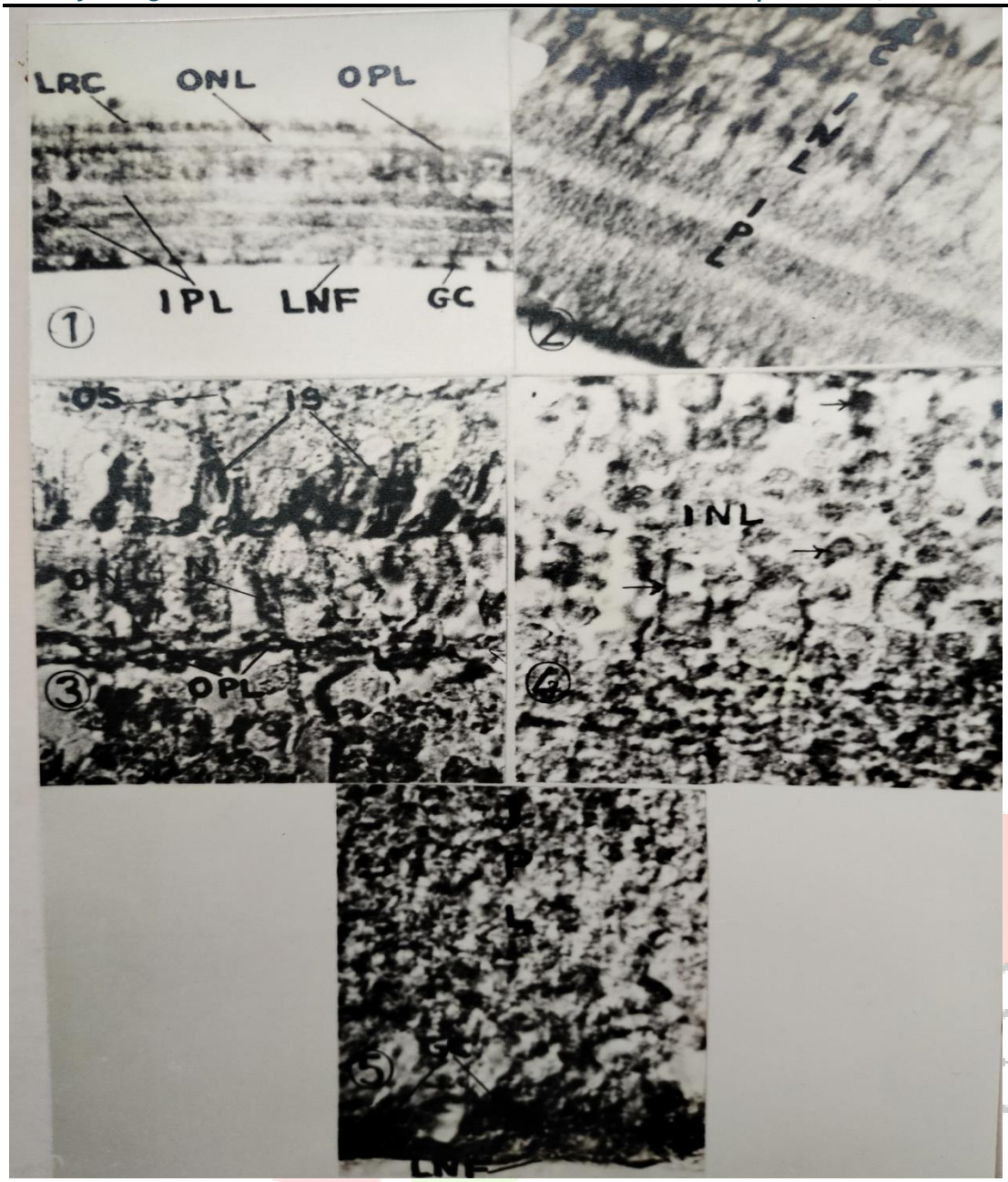

Figure B- (1)Low power photomicrograph of retina showing BChE activity in various layers in hypoxial condition of treatnent. Layer of rods and Cones (LRC), Outer nuclear layer (ONL), Outer plexiform layer (OPL), inner nuclear layer (INL), innuer plexiform layer (IPL), Ganglion cells (GC) and layer of nerve fibers (LNF); (2) Showing BChE activity in various layers. The ONL,OPL, INL,IPL,GC,LNF; (3) strong activity in OS, intense in IS, Strong in ONL, intense in OPL and INL; (4) Intensally stained bipolar cells; (5) intensly stained IPL,GC, and LNF.

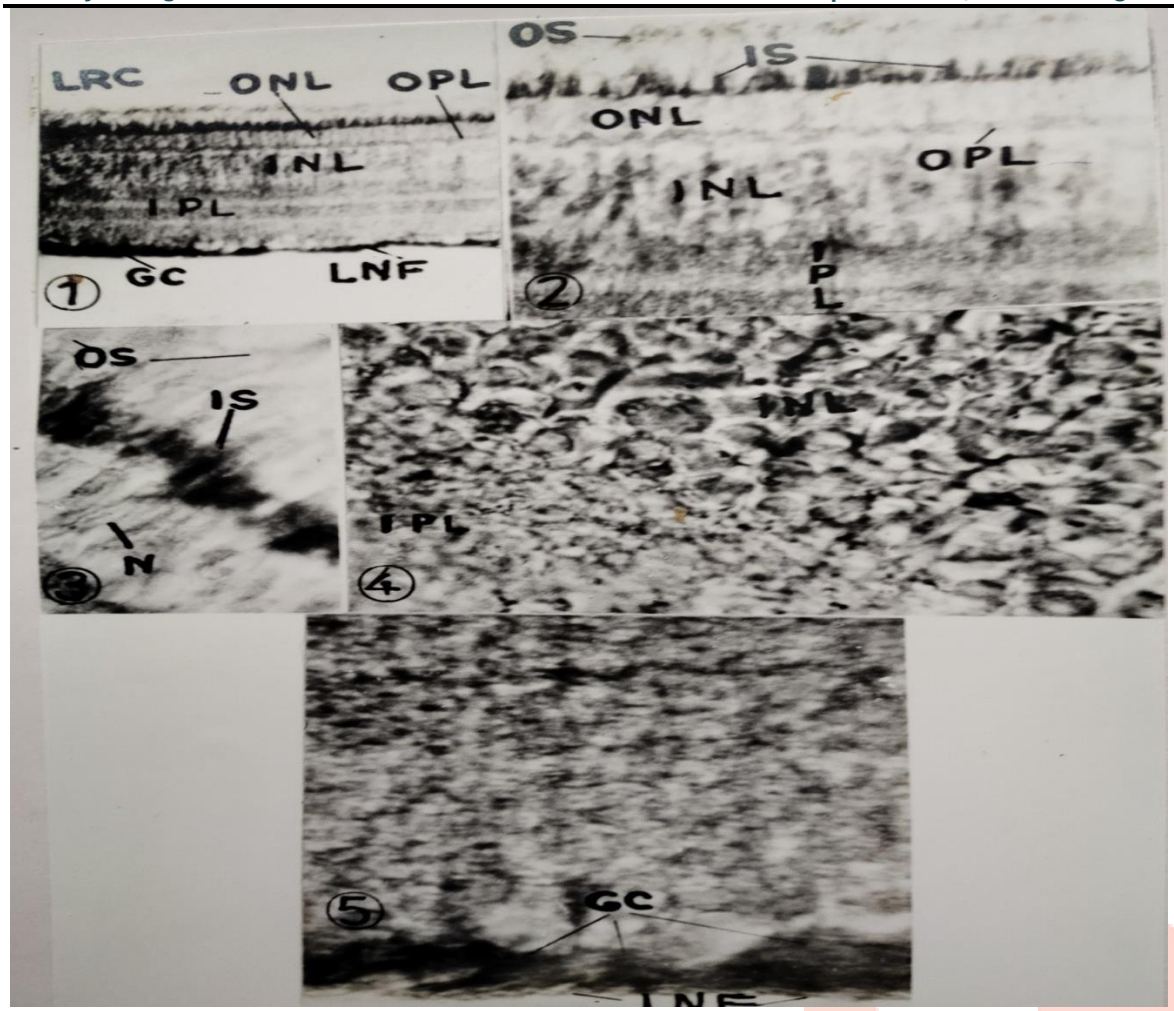

Figure C – (1)Low power photomicrograph of retina showing BChE activity in the various layers in exposure condition treatment. Layer of rods and cones (LRC), outer nuclear layer (ONL), outer plexiform layer (OPL), inner nuclear layer (INL), Outer plexiform layer (OPL), inner plexiform layer (IPL), Ganglion cells (GC), layer of nerve fibres (LNF); (2) BChE activity in different layers – LRC, ONL, OPL, INL, IPL,GC, LNF; (3) strong BChE activity in OS, intense in IS, strong in ONL; (4) Intense BChE activity in IPL also observe three darkly stained subzones (S1,S2,S3); (5) Intensely positive in GC and LNF layer

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