

**ELECTRON MICROSCOPIC STUDY OF SUB CHRONIC NINETY DAYS
NEUROTOXICITY OF TOCP(TRI ORTHO CRESYL PHOSPHATE) OF SCIATIC
NERVE IN ADULT HEN**

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Abstract

In 90 days neurotoxicity the number of degenerate myelinated nerve fiber were fewer than in acute neurotoxicity. The study consist of 4 groups as untreated control, low dose, intermediate dose and high dose. Control group was dosed orally daily for 90 days with corn oil, low dose group dosed with 1.25 mg/kg of TOCP, intermediate group dosed with 2.5mg/kg of TOCP and high dose group dosed with 5mg/kg in corn oil for 90 days. Electron microscopic changes were varying stages of degenerate myelin increase in severity with the dose and the character of degeneration myelin as spheroid body formation, lamellated body of degenerate myelin and clumps of degenerate myelin, exoplasm with vaying degrees of increase of neurofilament and presence of darck stanied degenerate lamelated mitochondria. furthermore evidence of degenerate of myelinated nerve and engulfment of degenerate myelin by Schwanns cells.

Keywords: Sciatic Nerve, sub chronic, Electron Microscope and Hen.

Introduction

[1] reported electron microscopic changes of TOCP in adult hen. [2]investigated biochemical, neuropathological and behavioral studies in hens by acute exposure to TOCP.[3] studied the delayed neurotoxicity of organophosphorus compound as acute. [4] studied the CNS and PNS system induced by Di iso propyl phosphorofluoridate in adult hen as acute neurotoxicity.[5] studied neurotoxicity on two organophosphorus ester flame retardants in hen and found changes in acetylcholine asterase as acute neurotoxicity. [6] studied the effect of single oral dose of TOCP on neurotoxic estrase and acetylcholine estrase in the nervous system of swine. [7] did delayed neurotoxicity of phenylphosphnothioate ester in adult hen as acute and found changes in the sciatic nerve.

[8] expression changes of neurofilament subunit in nervous system of hens treated with triorthocresylphosphate. [9] did acute delayed neurotoxicity of TOCP in cat.[10]published paper on mechanism of organophosphorus ester induced delayed neurotoxicity typeI and typeII. [11]did delayed neurotoxicity of o. Ethyl o.4. nitrophenyl phosphonothiate: subacute 90 days oral administration.[12] did delayed neurotoxicity of o. Ethyl o.4. nitrophenyl phosphonothiate :toxic effect of a single oral dose on nervous system of hen.[13] studied the absorption of TOCP through the skin of hens and its neurotoxic effect.[14] studied degenerate pattern of chicken in acute neurotoxicity study.[15] studied the sub chronic ninety days delayed neurotoxicity of tri ortho cresyl phosphate(TOCP) of spinal cord adult hen by oral gavage.[16]did teasing of acute neurotoxicity of tri ortho cresyl phosphate(TOCP) in sciatic nerve of adult hen.[17]studied of acute delayed neurotoxicity of tri ortho cresyl phosphate(TOCP) of spinal cord light microscope of adult hen.

Materials and Methods

The study consist 4 groups, every group of 20 adult hen with the different dose level of TOCP, 1.25, 2.5 and 5 mg/kg respectively In corn oil for 90 days. At the end of the experiment hens were sacrificed and sciatic nerve was taken and fixed in special fixation (glutaraldehyde) for electron microscope, sample were taken and were made cut and resin blocks by ultra microtome. Thin section of 1µg for histological orientation and stained with toluidine blue to select areas for electron microscope, then Copper grids were made and stained with uranyl acetate and lead citrate for electron microscope.

Results

Electron microscope study of sciatic nerve from hens treated with TOCP showed neuronal mitochondria with dark stained inclusions in its matrix(fig.1) , Axon terminal with degenerate mitochondria, note the dark stained multi-layered outer membrane (fig.2), early fiber degeneration characterised by vesicle formation, lamellated inclusion bodies in the axoplasm(fig.3), un myelinated nerve fibers with degenerate dark stained lamellated mitochondria (fig.4), degenerate myelin with vacuolated and ovoid body formation(fig.5 and fig.6), Schwann cell with degenerate myelin associated with cleft formation (fig.7), partial demyelination associated with degenerate mitochondria(fig.8), degenerate myelin ovoid body formation(fig.9), un myelinated nerve fiber with dark stained degenerate lamellated mitochondria(fig.10)

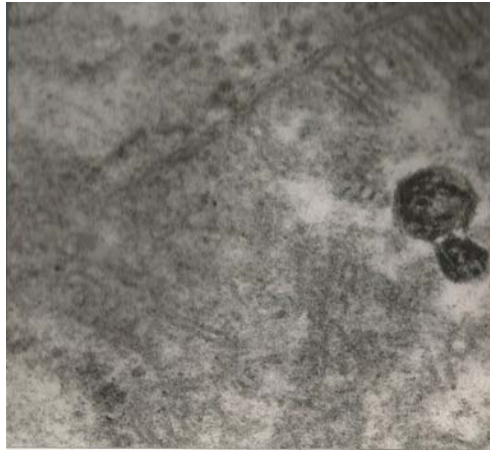


Fig 1:Sciatic neve, neuronal mitochondria with dark stained inclusions in its matrix (EM 15000X)



Fig 2 : Sciatic neve, Axon terminal with degenerate mitochondria, note the dark stained multi-layered outer membrane(EM 21000X)

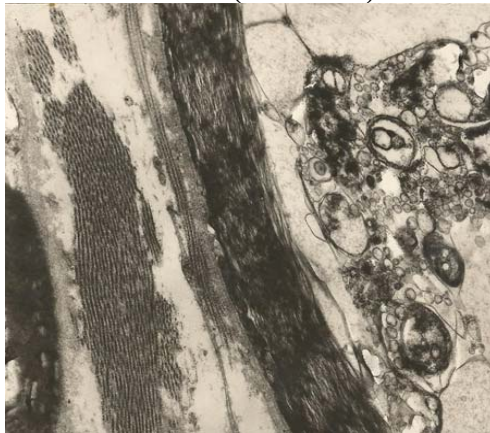


Fig3:Sciatic nerve, early fiber degeneration characterised by vesicle formation, lamellated inclusion bodies in the axoplasm(EM 21000X)



Fig4 :Sciatic neve, unmyelinated nerve fibers with degenerate dark stained lamellated mitochondria(EM 15000X)



Fig5: Sciatic neve,degenerate myelin with vacuolated and ovoid body formation (EM 15000X)



Fig6: Sciatic neve,degenerate myelin with vacuolated and ovoid body formation (EM 15000X)

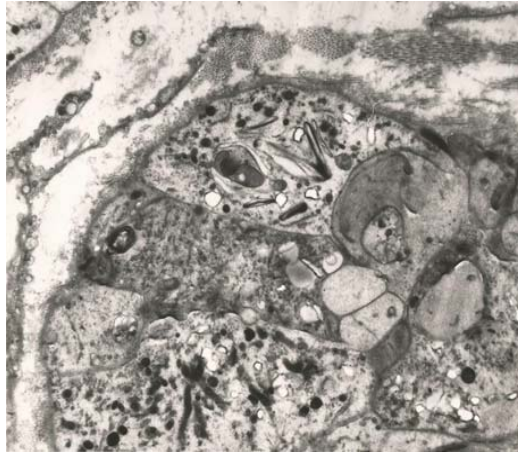


Fig 7: Sciatic neve, Schwann cell with degenerate myelin associated with cleft formation (EM 30000X)

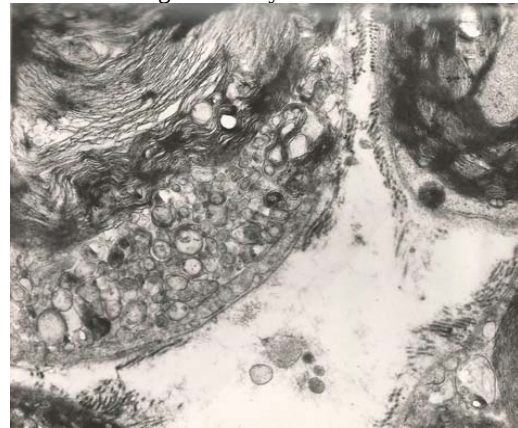


Fig 8: Sciatic neve,with partial demyelination associated with degenerate mitochondria (EM 15000X)

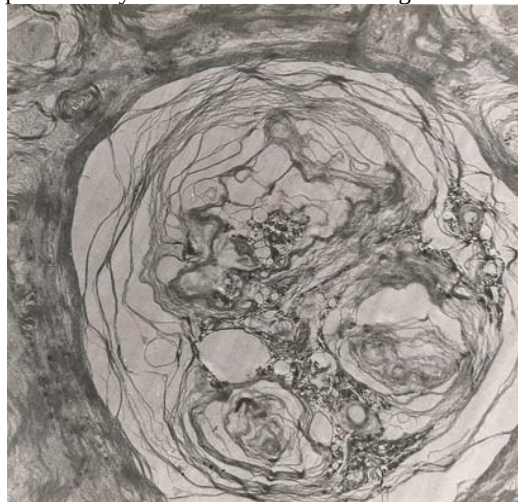


Fig 9: Sciatic neve,degenerate myelin ovoid body formation (EM 15000X)



Fig 10: Sciatic neve, un myelinated nerve fiber with dark staind degenerate lamellated mitochondria (EM 15000X)

Discussion

[1] did electron microscopic changes on sciatic nerve in acute neurotoxicity study. The present study was for 90 days TOCP neurotoxicity and reported electron microscopic changes characterised by degenerate myelin with ovoid body formation associated with dark stained degenerate mitochondria and increase neurofilament in axoplasm furthermore there was also changes in the un myelinated nerve fiber as dark stained bodies probably of degenerate mitochondria in origion.[2] studied only biochemical and in addition to neuropathological abnormalities in acute neurotoxicity of TOCP. The present study was on 90 days neurotoxicity of TOCP in sciatic nerve which showed degenerate fragminted myelin in compination with dark stained degenerate lamellated mitochondria in axoplasm.[3] did acute neurotoxicity study and reported histopathological changes in the sciatic nerve. The present study was done on 90 days neurotoxicity of TOCP reporting electron microscopic changes of myelin sheath associated with increase neurofilaments and degenerate mitochondria in axoplasm.[4]found changes in scatic nerve induced by the acute neurotoxicity of di isophosphorofluridate. The present study was done on adult hen in toxicated by TOCP for 90 days resulted in electron microscopic change in neurofilament and degenerate mitochondria in axoplasm.[5] studied the effect neurotoxic compound on acetylcholine esterase as acute neurotoxicity study. The present study was done for 90 days and showed electron microscopic changes in sciatic nerve characterised by degenerate lamellated myelin bodies associated with dark stained mitochondria in axoplasm, also evidence of degeneration in un myelinated nerve fibers.[6] reported changes in nervous system of swine treated by as acute neurotoxicity using swine as model. The present study the model for neurotoxicity is adult hen and the study was electron microscopic investigation on

90 days in sciatic nerve which showed ultrastructural changes in the myelin sheath of nerve fibers associated with increased neurofilament and degenerate mitochondria in axoplasm.[7] reported neurotoxicity changes in sciatic nerve of acute study. The present study was research project on 90 days neurotoxicity of TOCP reporting electron microscopic changes in myelinated nerve fibers as degenerate myelin and dark stained mitochondria in axoplasm.[8]investigated changes in the neurofilament of the nervous system of acute neurotoxicity in hens. the present study was 90 days neurotoxicity of TOCP in adult hen and showed electron microscopic changes in sciatic nerve characterised by increased neurofilament and dark stained degenerate mitochondria in axoplasm associated with degenerate myelin.[9]studied the acute neurotoxicity in cat and reported histopathological lesions in the nervous system especially axons of sciatic nerve. The present study was 90 days neurotoxicity of TOCP in adult hen also showed electron microscopic changes in axon characterised by degenerate myelin associated with increase neuro filaments and dark stained degenerate lamellated mitochondria.[10]studied the mechanism of organophosphorus ester induced neurotoxicity reported changes in sciatic nerve. The present study was 90 days neurotoxicity of TOCP in adult hen and analysing the electron microscopic changes of myelin sheath associated with changes in the neurofilament and mitochondria in axoplasm.[11]reported changes sciatic nerve degeneration after 90 days, the present study also neurotoxicity of TOCP in adult hen for 90 days but reported electron microscopic changes as degenerate lamellated with ovoid body formation of myelin associated increase neurofilament and degenerate mitochondria in axoplasm.[12] reported neuropathological changes in the sciatic nerve. the present study was 90 days neurotoxicity of TOCP with electron microscopic changes in the sciatic nerve consisted of degenerate myelin, increase neurofilament and degenerate mitochondria in axoplasm.[13] Did acute neurotoxicity of TOCP single dose by absorption of skin and reported neuropathological changes. The present study was oral administration of TOCP to adult hen in 90 days neurotoxicity study showing electron microscopic changes in myelinated nerve fiber as degenerate myelin associated with dark stained degenerate mitochondria and increased neurofilament in axoplasm also evidence of degenerate un myelinated nerve fiber.[14] reported neurotoxicity changes in the nervous system induced by TOCP, the present study also done by application of TOCP in corn oil and studied the neurotoxicity of TOCP in sciatic nerve and found electron microscopic changes in myelin sheath, neurofilament and mitochondria of axoplasm.[15] showed evidence of recovery of peripheral neuropathy of the sciatic nerve, which was so prominent in case of

acute single dose of neurotoxicity of TOCP and while the peripheral neuropathy of the sciatic nerve was reduced there was progressive increase in severity of the central nervous system neuropathy of the spinal cord with increase in incidence and number of degenerate vacuolated nerve fibers associated with clumps of degenerate myelin in contrast to the lesion of the acute single dose of delayed neurotoxicity in which the severity of the central neuropathy in spinal cord was quite less than the peripheral neuropathy of sciatic nerve. The present study concentrated on electron microscopic changes in the mitochondria induced by neurotoxicity of TOCP.[16] which showed that sciatic of control untreated birds within normal limits with presence Ranvier node and normal myelin sheath while those hens given single dose of triorthocresyl phosphate (TOCP) as 500 mg/kg orally showed varying degree of fragmented degenerate myelin with area of demyelination. The severity of fragmentation and demyelination of sciatic nerve correspond with varying degree of ataxia, in coordination and paralysis clinically appearing in the treated hens. the present research topic did electron microscopic study on mitochondria in central nervous system of adult hen induced by TOCP.[17] did acute delayed neurotoxicity of spinal cord of adult hens treated with TOCP(triorthocresylphosphate) as positive control for organophosphorus, histopathology of light microscopy of Toluidine blue stains showed occasional nerve fibers with partial demyelination also nerve fibers with clumps or masses of degenerate myelin. The present paper studied the electron microscopic changes in the mitochondria of the nervous system of adult hen due to neurotoxicity of TOCP in acute study.

Conclusions

The result showed that electron microscope can give detail changes in the myelinated and unmyelinated nerve fiber of sciatic nerve which cannot be seen by light microscope

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