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Immunocytochemical Identification of Cells belonging to the Diffuse AntiOxidant System (DAOS) in Human and Primate Brain.

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Super Oxide dismutase (SOD) Glutathione peroxidase (GPX) and Catalase (CA) are among the key enzymes that protect cells from destructive Reactive radicals (RR). There is a large body of evidence that implicates RR in a variety of diseases. Examples include the neurodegenerative disorders of Parkinson's disease, and Alzheimer's disease. Infectious diseases like AIDS are also believed to have a RR component. As RR can play a role in the pathogenesis of different diseases, understanding the enzymes that can neutralize or modulate RRs is an important step in clarifying the disease mechanisms. Biochemical analysis has shown that the distribution of SOD, GTP and CAT are found in virtually all tissues, albeit with different concentrations. Histochemical detection methods have yielded information on their histological localization. But, an important step in the localization of these substances was the development of antibodies for their immunocytochemical localization in humans [1,2]. There has been a continued growth in histological information on the cellular expression and distribution of these enzymes. Interestingly, in a given tissue, different cell types can present with different concentrations of these enzymes. It is now clear that the location and type of cells that contains these enzymes can vary. Another interesting fact is that the cellular environment can cause these cells to produce different amounts of the antioxidant enzymes.

Cells containing these enzymes in high concentrations may be viewed as a special subclass with unique properties. A classification system based on several points was developed [3]. First, the cell should contain a higher concentration of one or more of these enzymes. The second, it can regulate the level of these enzymes. Third, these enzymes confer special adaptive functions. Such cells make up the subclass: DAOS (**D**iffuse **A**nti**O**xidant **S**ystem) [3]. By giving widely divergent cell types a special classification, theoretical predictions that relate to antioxidant function may be formulated.

Immunoreactive cells for SOD and GPX were found through out the human and primate brain. Positive cells were of at least two cell types, neurons and microglia. The pyramidal cell in the cortex, granular cells in the hippocampus, Purkinje Cells of cerebellum, and Substantia Nigra neurons (SN) clearly demonstrated SOD staining.

References

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5. Acknowledgements: Grants: RCMI, NIH/NCRRG12 RR017581, NS31857, MS29494 and the Neuropathy Association.

Examples of SOD immunoreactivity were found in the SN. Figure 1: Low power, Human brain. DAB with cobalt intensification. Right arrow points to a microglia like cell. Left arrow points to a SN neuron. The neuron contains both the reaction product and melanin. Fig 2. Low power. Primate Brain. Arrows point to SN neurons. DAB with cobalt intensification. SOD immuno-labeled neurons.

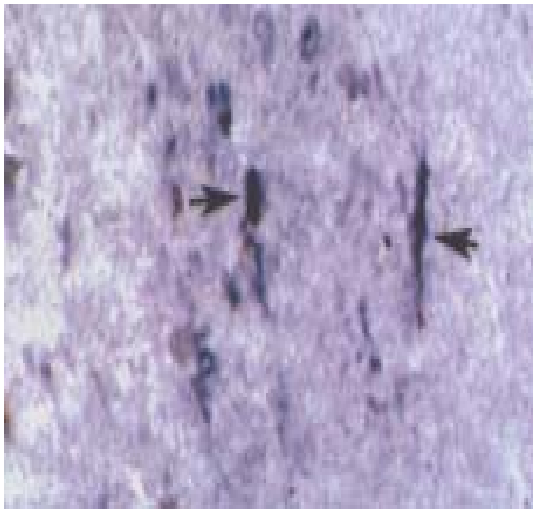

Figure1

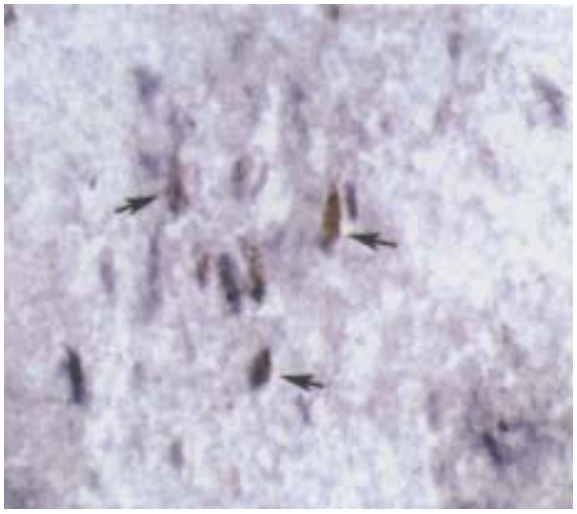

Figure 2

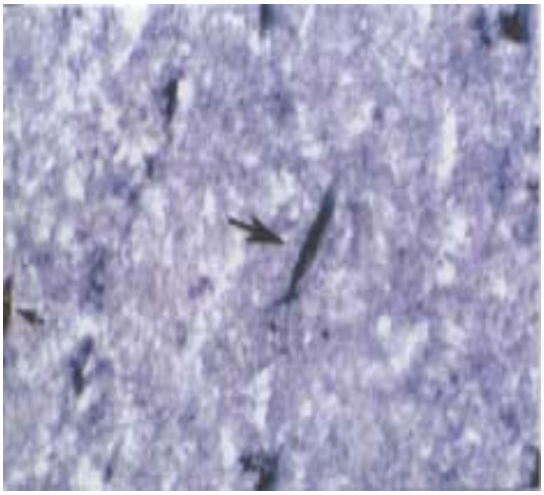

Figure 3

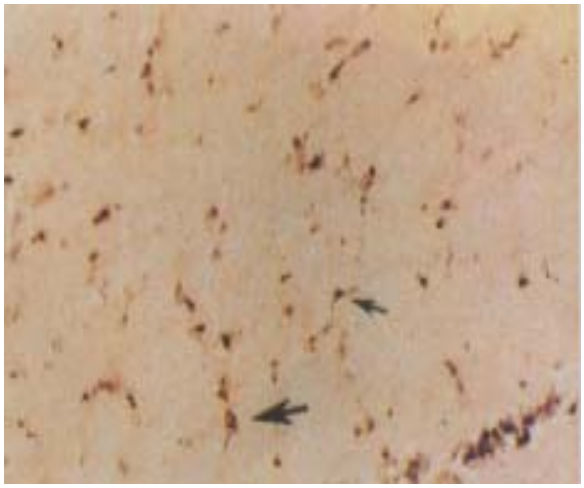

Figure 4

Figure 3: Medium power, Human brain. DAB with cobalt intensification. Arrows point to microglia like cells. Fig 4. Low power. Primate Brain. Arrows point to Cortical neurons. DAB Label. SOD immuno-labeled neurons.

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