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EFFECTS OF DEPRENYL, RESERPINE AND THEIR COMBINATION ON THE ANTIOXIDANT ENZYME ACTIVITIES IN THE RAT BRAIN

IVANA BOŽIĆ[1], ALEKSANDRA NIKOLIĆ[1], ZORICA S. SAIČIĆ[1], Č. D. MILJEVIĆ[2], M. B. SPASIĆ[1] AND V. M. PETROVIĆ[1]

[1]*Institute for Biological Research "Siniša Stanković", Department of Physiology,* [2]*Special Psychiatry Hospital "Dr Laza Lazarević",* 11000 Belgrade, Yugoslavia

Abstract - Antioxidant enzyme activities: superoxide dismutases (CuZn SOD and Mn SOD), catalase (CAT), glutathione peroxidase (GSH-Px), glutathione-S-transferase (GST) and glutathione reductase (GR) were determined in different brain regions: striatum, hippocampus, hypothalamus with thalamus, as well as in the rest of the brain of rats treated subchronically with L-deprenyl, after a single dose of reserpine and in animals subchronically treated with L-deprenyl and then with reserpine. Our results show that reserpine ($p<0.02$), as well as, the combination of deprenyl+ reserpine ($p<0.01$) induced a significant decrease in CAT activity in the rest of the brain and a significant decrease in GSH-Px activity in the hypothalamus with thalamus ($p<0.05$). Deprenyl expressed no significant effect on antioxidant enzyme activities in the examined brain regions. In experimental group treated with deprenyl and then with reserpine a significant decrease of CuZn SOD activity ($p<0.05$) in the hippocampus, Mn SOD activity ($p<0.05$) in the striatum and an increase of CnZn SOD activity ($p<0.01$) in the rest of the brain were observed. Our results support the opinion that depletion of neuronal catecholamine pool (due to the treatment with reserpine) has a direct influence on antioxidant enzyme activities, while deprenyl probably exerts its effects through interaction with some trophic factors.

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INTRODUCTION

Investigations of monoamine oxidase B (MAO-B) selective inhibitor L-deprenyl, applied in the treatment of Parkinson's disease demonstrated its direct effects on the activity of antioxidant enzymes in some brain regions (Carrillo *et al.* 1994). It was also shown, that deprenyl treatment leads to an increase of SOD and CAT activities in the striatum (Carrillo *et al.* 1991, 1992). However, the mechanism of such an effect is still unknown. L-deprenyl (Selegiline, Elpedryl, Movergan, Novamex, Jumex and Juprenil) is N-methyl-N-propargyl-ethylammonium chloride (Knoll *et al.* 1965). It is used as antidepressive drug in the treatment of various diseases (Knoll 1993). Increased intraneural dopamine (DA) concentration after deprenyl treatment is completely due to the inhibition of monoamine oxidase-catalyzed DA oxidation.

Reserpine represents an alkaloid of the plant *Rauwolfia serpentina*. This alkaloid depletes biogenic amines (catecholamines, 5-hydroxytryptamine) both in the central nervous system and in the peripheral adrenergic nervoes (Lorenc-Koci *et al.* 1995). It is commonly used for the induction of Parkinson's disease symptoms in laboratory animals (Wolfarth *et al.* 1992; Ossowska 1994) and these symptoms could be the consequence of striatal DA depletion and an increased DA oxidation by MAO (Klockgether and Turski 1990).

Dopamine represents a catecholaminergic neurotransmitter. Its catabolism *via* MAO may be a potential biological stressor (Southorn and Powis 1988). Produced hydrogen peroxide (H_2O_2) can damage proteins directly through the oxidation of sulfhydryl groups or indirectly by producing free radicals such as superoxide anion radical and hydroxyl radical (Halliwell 1995). Similar to other catecholamines, dopamine may be oxidized autocatalytically producing reactive oxygen species (ROS). Activity of antioxidant enzymes may be affected by reactive oxygen species and their effect (increase or decrease) depends of ROS generation.

Deprenyl and reserpine express an opposite effect on brain catecholamine metabolism and the action of their combinations was rarely examined. In the present study we decided to study the effects of deprenyl, reserpine and their combination on antioxidant enzyme activities in the rat brain.

MATERIALS AND METHODS

Male Wistar rats 3.5 months old and weighing 300-350 *g* were used. They were kept in large open colony cages under controlled conditions of illumination (light on: 5 a.m.-5 p.m.) and temperature (23 ± 2 °C), and were allowed free access to water and food.

Animals were divided into four groups. Control group (C) consisted of 8 animals.

In group D, (deprenyl) 8 animals were treated intragastrally (*i.g.*) for seven days with L-deprenyl ("Juprenil", "Zorka Pharma"-Šabac; 10 *mg/kg* body mass) and on day eight received physiological saline *i.g.*

In group R (reserpine), 8 animals were treated for seven days with physiological saline *i.g.* and on the eight day were i.p. injected with reserpine ("Serpasil" CIBA; 5 mg/*kg* body mass).

Group D+R (deprenyl + reserpine) consisted of 8 animals treated for seven days with L-deprenyl (10 mg/*kg* body mass, *i.g.*) and on day eighth with 5 *mg/kg* body mass reserpine i.p.

On day 9th of the experiment all animals were decapitated always between 8 and 10 a.m. to avoid any possible rhythmic variations in the antioxidant level. Fresh brains were dissected out within 3 min. Brain regions such as striatum (caudate nucleus, nucleus putamen, substantia nigra and globus pallidum), hippocampus, hypothalamus with thalamus and the rest of the brain were obtained by dissection on an ice cold plate (Glowinski and Iversen 1966). Homogenization was performed with a Janke and Kunkel (Staufen, Germany) Ka-Werk Ultra-Turrax homogenizer at 0-4 °C in 0.25 M sucrose, 1 mM EDTA and 0.05 M Tris.HCl solution, pH 7.4 (Rossi *et al.* 1987; De Waziers and Albrecht, 1987). Brain regions (100 mg of tissue in 2 mL buffer) and the rest of the brain (100 *mg* of the tissue in 1 mL buffer) were homogenized and then sonicated for 30 sec with 10 kHz on ice to release enzymes from subcellular particles (Takada *et al.* 1982). The sonicates were centrifuged (90 min, 85 000g, 4°C) and the supernatants used for determination of antioxidant enzyme activities and total protein content.

All chemicals were Sigma (St. Louis, MO., U.S.A.) products.

Total SOD activity was determined by the epinephrine method (Misra and Fridovich 1972). This method is based on the capacity of SOD to inhibit autooxidation of adrenaline to adrenochrome. One unit of SOD activity was defined as the amount of protein causing 50% inhibition of the autooxidation of adrenaline at 26 °C (Petrović *et al.* 1982) in the volume of 3.2 mL. Reaction mixture contained $3x10^{-4}$ M adrenaline, $1x10^{-4}$ M EDTA and 0.05 M Na_2CO_3, pH 10.2. For determination of Mn SOD activity, the assay was performed after preincubation with 8 mM KCN. After the incubation (20 min) at room temperature, Mn SOD was determined in the same reaction mixture as total SOD with final concentration of 4 mM KCN. The CuZn SOD activity was calculated as the difference between total SOD and Mn SOD activities. CAT activity was assayed as suggested by Beutler (1982) and the activity expressed as (mol H_2O_2/min/mg protein. The method is based on the rate of H_2O_2 degradation by the action of CAT contained in the examined sample followed spectrophotometrically at 230 nm in 5 mM EDTA,Tris-HCl solution, pH 8.0. GSH-Px activity was measured using t-butyl hydroperoxide as a substrate (Paglia and Valentine 1967 as modified by Tamura *et al.* 1982) and the activity was expressed as nmol of NADPH oxidized/min/mg protein. For the determination of GST activity, 1-chloro-2,4-dinitro benzene (CDNB) was used as a substrate (Habig *et al.* 1974) and the activity was expressed as nmol GSH used/min/mg protein. GR activity was assayed as suggested by Glatzle *et al.* (1974) and expressed as nmol NADPH oxidized/ /min/mg protein.

Protein content was determined by the method of Lowry *et al.* (1951) using bovine serum albumin as a reference.

Statistical analysis of the results was based on the Student's t test, considering the significance at a level of $p<0.05$ (Hoel 1966).

RESULTS

As shown in Fig.1. CuZn SOD activity in the rest of the brain of animals from the group treated with deprenyl and then with reserpine was significantly increased as compared to the controls ($p<0.01$). Also, CuZn SOD activity in the hippocampus was significantly lower in D+R group ($p<0.005$) in comparison with the group treated only with deprenyl.

Activity of Mn SOD (Fig.2.) in the striatum of animals from the group treated with deprenyl and then with reserpine was markedly lower than in the group treated only with deprenyl ($p < 0.05$).

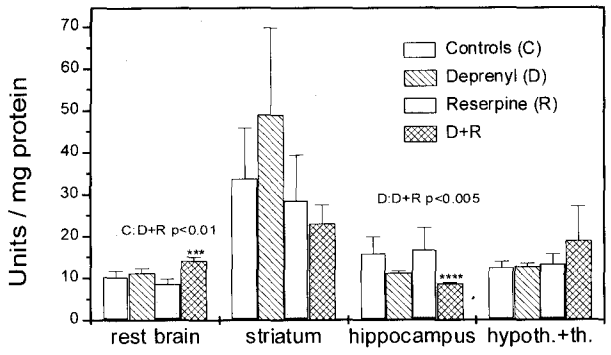

Fig.1. Activity of copper zinc superoxide dismutase (CuZn SOD) in the rest of the brain, striatum, hippocampus and hypothalamus with thalamus in: controls-(C), deprenyl-(D), reserpine-(R) and D+R- treated animals. The activity is expressed in Units/mg protein. The values are means ± SE from 8 animals.

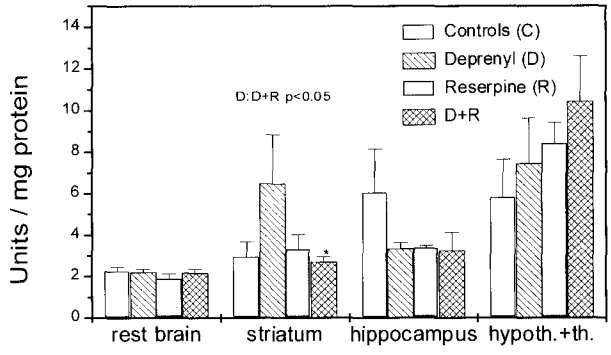

Fig.2. Manganese superoxide dismutase (Mn SOD) activity (Units/mg protein; means ± SE from 8 animals). The same brain regions and experimental groups were examined as in Fig.1.

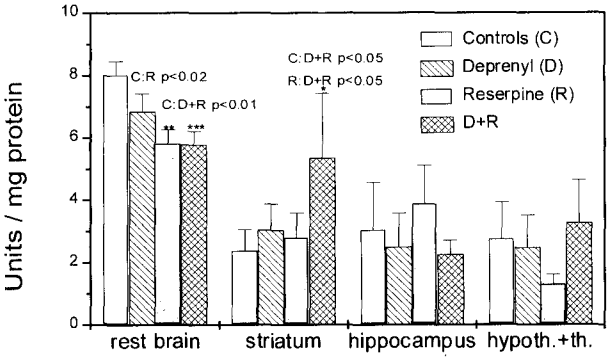

Fig.3. Activity of catalase (CAT), in Units/mg protein (means ± SE from 8 animals). The same brain regions and groups were examined as in the preceding Figs.

Catalase (CAT) activity (Fig.3.) in the rest of the brain was significantly lower in both experimental group treated with reserpine ($p<0.02$) and in the group D+R in comparison with control animals ($p<0.01$). The highest activity of CAT was found in the striatum of rats from the group D+R in comparison with the controls, as well as, in the group treated with reserpine, with statistical significance of $p< 0.05$.

In Table 1. the data on glutathione peroxidase (GSH-Px) activity are listed. GSH-Px activity was significantly lower in the hypothalamus with thalamus of R and D+R rats in comparison with control animals ($p<0.05$). In other examined brain regions no statistical differences were found in relation to the activity of this enzyme.

Table 1. Glutathione peroxidase (GSH-Px) activity in Units/mg protein in: controls - (C), deprenyl- (D), reserpine - (R) and D+R-treated animals, in the rest of the brain, striatum, hippocampus and hypothalamus with thalamus. The values are means ± SE from 8 animals. * C : R, $p < 0.05$ and *C : D+R, $p < 0.05$.

GSH-Px U/mg protein	Controls (C)	Deprenyl (D)	Reserpine (R)	D + R
Rest of the brain	26.74 ± 2.06 (5.44)	23.35 ± 1.44 (3.82)	22.26 ± 2.33 (5.68)	23.02 ± 1.25 (2.29)
Straitum	11.24 ± 2.33 (4.03)	16.38 ± 4.42 (7.65)	9.95 ± 3.36 (5.82)	11.67 ± 2.57 (4.44)
Hippocamus	10.47 ± 1.45 (2.51)	7.82 ± 1.51 (2.61)	9.52 ± 3.02 (5.24)	9.15 ± 1.20 (2.08)
Hupoth. + Th.	8.45 ± 2.62 (4.54)	8.53 ± 1.40 (2.43)	3.87 ± 1.43* (2.49)	3.08 ± 0.92* (1.30)

Table 2. summarizes glutathione-S-transferase (GST) activity. No changes of GST activity in any experimental group and any brain region were detected.

Table 2. Activity of glutathione-S-transferase (GST), in Units/mg protein (means ± SE from 8 animals). The same brain regions and groups were examined as in Table 1.

GSH-Px U/mg protein	Controls (C)	Deprenyl (D)	Reserpine (R)	D + R
Rest of the brain	163.03 ± 8.85 (23.37)	160.45 ± 6.72 (17.74)	147.71 ± 14.05 (34.28)	149.38 ± 19.08 (50.37)
Straitum	89.68 ± 19.32 (33.45)	142.74 ± 49.99 (86.59)	97.01 ± 21.62 (37.45)	125.40 ± 29.63 (51.32)
Hippocamus	87.44 ± 30.94 (53.59)	92.00 ± 21.92 (37.96)	123.93 ± 12.98 (22.48)	109.78 ± 25.59 (44.33)
Hupoth. + Th.	126.35 ± 37.04 (64.15)	119.78 ± 26.12 (45.25)	109.61 ± 28.71 (49.71)	91.01 ± 24.47 (42.39)

Table 3. outlines the data on glutathione reductase (GR) activity. No statistical differences were found in any examined brain region.

Table 3. Glutathione reductase (GR) activity (Units/mg protein; means ± SE from 8 animals). The same brain regions and experimental groups were examined as in the preceding Tables.

GR U/mg protein	Controls (C)	Deprenyl (D)	Reserpine (R)	D + R
Rest of the brain	53.67 ± 6.07 (16.03)	50.03 ± 2.44 (6.43)	45.35 ± 5.37 (13.10)	50.59 ± 2.64 (6.98)
Straitum	126.62 ± 57.32 (99.25)	116.66 ± 32.12 (55.65)	61.03 ± 23.78 (41.19)	69.71 ± 11.85 (20.52)
Hippocamus	91.68 ± 26.17 (45.34)	76.01 ± 21.41 (37.09)	80.59 ± 8.55 (14.18)	88.76 ± 23.88 (41.37)
Hupoth. + Th.	97.00 ± 38.77 (67.16)	66.06 ± 16.63 (28.80)	99.46 ± 20.02 (34.68)	134.54 ± 51.98 (90.03)

DISCUSSION

Effect of combined deprenyl+reserpine treatment on CuZn SOD activity is opposite in the rest of the brain (increase) in comparison with that in the hippocampus (decrease). Opposite effect of deprenyl on CuZn SOD activity in the brain and brain regions has also been recorded by other authors (Kitani *et al.* 1994). These authors postulated that deprenyl effects on CuZn SOD activity were due to an activation on some trophic factors which were selectively regionally distributed and not to inhibition of MAO B activity (Kitani *et al.* 1994). We have not recorded the changes in CuZn SOD activity in hippocampus of rats treated with deprenyl and this result is in accordance with the data of Knoll (1988) and Carrillo *et al.* (1991). In contrast, in the striatum not only increased CuZn SOD activity, but also CAT activity (but not GSH-Px) were observed in deprenyl-treated rats (Carrillo *et al.* 1991, 1992; Kitani *et al.* 1992). We have not found a statistically significant increase of CuZn SOD and Mn SOD activities in the striatum of rats treated with deprenyl. The insignificant increase may be ascribed to the dose of deprenyl applied in our study and according to the postulated mechanism of its action through trophic factors, to time of application. As acute deprenyl administration (10 mg/*kg* s.c.), which inhibits completely MAO B activity, and 50% of MAO A activity (Waldemeir *et al.* 1981), does not increase extracellular DA level and its content in the brain regions (Azzaro *et al.* 1985; Kato *et al.* 1986; Butcher *et al.* 1990), our results may be interpreted as a support for the influence of deprenyl on antioxidant enzyme activities through the interactions with trophic factors. It has recently been shown that L-deprenyl increases the survival of substantia nigra neurons even when the drug is given days after MPTP (1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine) treatment (Tatton and Greenwood 1991). L-deprenyl can also retard the degeneration of cholinergic facial neurons in the rat after axotomy (Salo and Tatton 1992). In addition to our results, these findings suggest a neuroprotective mechanism that can be related to the stimulation of neurotrophic factors or regenerative processes. L-deprenyl has been shown in various experimental studies to exert many effects besides MAO-B inhibition (Lange *et al.* 1994). Additional treatment with reserpine induced decreased Mn SOD ($p<0.05$) and increased CAT ($p<0.05$) activities in the striatum, indicating that this alkaloid acts changing catecholamine metabolism.

Reserpine influences antioxidant enzyme activities mainly through the mechanism based on the changes in catecholamine metabolism (increased extracellular catabolism and intracellular synthesis). Following the injection of a large reserpine dose, noradrenaline from the interscapular brown adipose tissue (IBAT) practically disappears both in the morning and in the evening experiments, thus indicating that this reserpine dose completely depletes noradrenaline (NA) content from the IBAT (Davidović and Petrović 1981).

This interpretation is further supported by our results showing that deprenyl expressed no effect on GSH-Px, GR and GST activities in all brain regions studied, while reserpine induced a significant decrease of GSH-Px activity in the hypothalamus with thalamus ($p<0.05$) in comparison with control animals.

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REFERENCES

Azzaro, A.J., King, J., Kotzuk, J., Schoepp, D.D., Forst, J. and *Schochet, S.* (1985). Guinea pig striatum as a model of human dopamine deamination: the role of monoamine oxidase isozyme ratio, localization, and affinity for substrate in synaptic dopamine metabolism. *J. Neurochem.* **45**, 949-956.

Beutler, E. (1982). Catalase. In: *Red cell metabolism,* A Manual of Biochemical Methods (Ed. E. Beutler), 105-106, Grune and Stratton, Inc.

Buchter, S.P., Fairbrother, I.S., Kelly, J.S. and *Arbuthnott, G.W.* (1990). Effects of selective monoamine oxidase inhibitors on the in vivo release and metabolism of dopamine in the rat striatum. *J. Neurochem.* **55**, 981-988.

Carrillo, M.C., Kanai, S., Nokubo, M. and *Kitani, K.* (1991). (-) Deprenyl induces activities of both superoxide dismutase and catalase but not of glutathione peroxidase in the striatum of young male rats. *Life Sci.* **48**, 517-521.

Carrillo, M.C., Kanai, S., Sato, Y., Ivy, G.O. and Kitani K. (1992). Sequential changes in activities of superoxide dismutase and catalase in brain regions and liver during (−)deprenyl infusion in male rats. *Biochem. Pharmacol.* **44**, 2185-2189.

Carrillo, M.C., Kitani, K., Kanai, S., Sato,Y., Miyasaka, K. and *Ivy,G.O.* (1994). The effect of a long term (6 months) treatment with (−)deprenyl on antioxidant enzyme activities in selective brain regions in old female Fischer 344 rats. *Biochem. Pharmacol.* **47**, 1333-1338.

Davidović, V. and *Petrović, V.M.* (1981). Effect of reserpine and noradrenaline on the catecholamine content in the interscapular brown adipose tissue and adrenal gland-diurnal variations. *IRCS Medical Science: Biochemistry; Cell and Membrane Biology; Drug Metabolism and Toxicology; Endocrine System; Metabolism and Nutrition; Nervous System; Pharmacology; Physiology* **9**, 991.

De Waziers, I. and *Albrecht, R.* (1987). The effects of vitamin A, nutritional status on glutathione transferase and glutathione peroxidase activities in rat intestine. *Experientia* **43**, 394-395.

Glatzle, D., Vuilleumier, J.P., Weber, F. and *Decker, K.* (1974). Glutathione reductase test with whole blood, a convenient procedure for the assessment of the riboflavin status in humans. *Experientia* **30** , 665-668.

Glowinski, J. and *Iversen, L.* (1966). Regional studies of catecholamines in the rat brain. *J. Neurochem.* **13**, 665-669.

Habig, H.W., Pabst, M.J. and *Jakoby, W.B.* (1974). Glutathione-S-transferases. *J. Biol. Chem.* **249**, 7130-7139.

Halliwell, B. (1995). Superoxide-dependent depletion of reduced glutathione by L-DOPA and dopamine. Relevance to Parkinson' s disease. *Neuro Report* **6**, 1480-1484.

Hoel, P.G. (1966). In: *Introduction to Mathematical Statistics.* (Ed. J. Wiley and Sons), 402-403, New York.

Kato, T., Dong, B., Ishii, K. and *Kinemuchi, H.* (1986). Brain dialysis: in vivo metabolism of dopamine and serotonin by monoamine oxidase A but not B in the striatum of unrestrained rats. *J. Neurochem.* **46**, 1277-1282.

Kitani, K., Kanai, S., Carrillo, M.C and *Ivy, G.O.* (1994). (−) Deprenyl increases the life span as well as activities of superoxide dismutase and catalase but not of glutathione peroxidase in selective brain regions in Fischer rats. *Pharmacol. Aging Processes* **717**, 60-71.

Kitani, K., Kanai, S., Sato, Y., Ohta, M., Ivy, G.O. and *Carrillo, M.C.* (1992). Chronic treatment of (−)deprenyl prolongs the life span of male Fischer 344 rats. Further evidence. *Life Sci.* **52**, 281-288.

Klockgehter, T. and Turski, L. (1990). NMDA antagonists potentiate antiparkisonian actions of l-DOPA in monoamine-depleted rats. *Ann. Neurol.* **28**, 539-546.

Knoll, J. (1988). The striatal dopamine dependency of life spans in male rats. Longevity study with (−)deprenyl. *Mech. Ageing Dev.* **46**, 237.

Knoll, J. (1993). The pharmacological basis of the therapeutic effect of (−)deprenyl in age-related neurological diseases, In: *Pharmacology and Clinical Use in Neurodegenerative Disorders,* (Ed. I. Szelenyi), 145, Basel, Birkhauser Verlag.

Knoll, J., Ecseri, Z., Kelemen, K., Nievel, J. and *Knoll, B.* (1965). Phenyl-iso-propyl-methylpropinylamine (E-250), and new spectrum psychic energizer. *Arch. Int. Pharmacodyn. Ther.* **155**, 154-164.

Lange, K.W., Riederer, P. and *Youdim, M.B.H.* (1994). Biochemical actions of l-deprenyl (selegiline). *Clin. Pharmacol. Ther.* **6**, 734-741.

Lorenc-Koci, E., Ossowska, K., Wardas, J. and *Wolfarth, S.* (1995). Does reserpine induce parkinsonian rigidity? *J. Neural. Transm.* **9**, 211-223.

Lowry, O.H., Rosebrough, N.J., Farr, A.L. and *Randall, R.J.* (1951). Protein measurement with the Folin phenol reagent. *J. Biol. Chem.* **193**, 265-275.

Misra, H.P. and *Fridovich, I.* (1972). The role of superoxide anion in the autooxidation of epinephrine and a simple assay for superoxide dismutase. *J. Biol. Chem.* **247**, 3170-3175.

Ossowska, K. (1994). The role of excitatory amino acids in experimental models of Parkinsons disease. *J. Neural. Transm.* **8**, 39-71.

Paglia, D.E. and *Valentine, W.N.* (1967). Studies on the quantitative and qualitative characterization of erythrocyte glutathione peroxidase. *J. Lab. Clin. Med.* **70**, 74-77.

Petrović, V.M., Spasić, M., Saičić Z.S., Milić, B. and *Radojičić, R.* (1982). Increase in superoxide dismutase activity induced by thyroid hormones in the brains of neonate and adult rats. *Experientia* **38**, 1355-1356.

Rossi, M., Grivetta, S.A. and *Dianzani, M.A.* (1987). Glutathione peroxidase, glutathione reductase and glutathione transferase in regenerating rat liver. *Med. Sci. Res.* **15**, 109-114.

Salo, P.T. and *Tatton, W.G.* (1992). Deprenyl reduces the death of motoneurons caused by axotomy. *J. Neurosci. Res.* **31**, 394-400.

Southorn, P.A. and *Powis, G.* (1988). Chemical nature and biologic reactions. *Mayo Clin. Proc.* **63**, 381.

Takada, Y., Noguchit, T., Okabe, T. and *Kayiyama, M.* (1982). Superoxide dismutase in various tissues from rabbit bearing the Vx-2 carcinoma in the maxillary sinus. *Cancer Res.* **42**, 4233-4235.

Tamura, M., Oschino, N. and *Chance, B.* (1982). Some characteristics of hydrogen and alkyl-hydroperoxides metabolizing systems in cardiac tissue. *J. Biochem.* **92**, 1019-1031.

Tatton, W.G. and *Greenwood, C.E.* (1991). Rescue of dying neurons: a new action for deprenyl in MPTP parkinsonism. *J. Neurosci. Res.* **30**, 666-672.

Waldmeier, P.C., Felner, A.E. and *Maitre, L.* (1981). Long term effects of selective MAO inhibitors on MAO activity and amine metabolism, In: *Monoamine Oxidase Inhibitors, The State of Arts,* (Eds. M.B.H Youdim and E.S. Paykel), 87-102, Willey, New York.

Wolfarth, S., Kolasiewicz, W., Ossowska K., and *Bober, M.* (1992). Direct mechanomyographic measurement of myorelaxant action of baclofen and diazepam in normal and reserpinized rats. Naunyn Schmiedebergs *Arch. Pharmacol.* **345**, 209-212.

ЕФЕКТИ ДЕПРЕНИЛА, РЕЗЕРПИНА И ЊИХОВЕ КОМБИНАЦИЈЕ НА АКТИВНОСТ АНТИОКСИДАТИВНИХ ЕНЗИМА У МОЗГУ ПАЦОВА

ИВАНА БОЖИЋ[1], АЛЕКСАНДРА НИКОЛИЋ[1], ЗОРИЦА С. САИЧИЋ[1], Ч. Д. МИЉЕВИЋ[2], М. Б. СПАСИЋ[1] и В. М. ПЕТРОВИЋ[1]

[1]*Институт за биолошка истраживања "Синиша Станковић", Одељење за физиологију,*
[2]*Специјална психијатријска болница "Др Лаза Лазаревић",* 11000 Београд, Југославија

Активност антиоксидативних ензима: супероксид дисмутазе (CuZn SOD и Mn SOD), каталазе (CAT), глутатион пероксидазе (GSH-Px), глутатион-С-трансферазе (GST) и глутатион редуктазе (GR) у стријатуму, хипокампусу, хипоталамусу са таламусом, као и остатку мозга, праћена је у експериментима субхроничног третирања пацова L-депренилом, акутног резерпином и у комбинацији оба. Наши резултати показују да резерпин ($p<0.02$), као и комбинација депренила и резерпина ($p<0.01$) доводе до смањења активности CAT у остатку мозга и активности GSH-Px ($p<0.05$) у хипоталамусу са таламусом. Депренил не изазива значајне промене ензимске активности у испитиваним регионима мозга. У експерименталној групи третираној депренилом, па резерпином долази до значајног смањења активности CuZn SOD ($p<0.005$) хипокампуса, активности Mn SOD стријатума ($p<0.05$) и повећња активности CuZn SOD ($p<0.01$) остатка мозга. Ови резултати указују да исцрпљење пула катехоламина (услед третмана резерпином) има директан утицај на активност антиоксидативних ензима, док су за ефекте депренила значајне интеракције са неким трофичким факторима.