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Oxidative/Nitrosative Stress underlying neurotoxic mechanisms of paraquat

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Paraquat (PQ) neurotoxicity has not thoroughly investigated. Redox metabolism of PQ2+, results in superoxide anion radical ($O_2^{\bullet-}$) formation. Consequent free radical reactions escalate due to stable resonance radical structure ($PQ^{\bullet+}$). The OS/NS-associated neurotoxic pathways of PQ were investigated in striatum of Wistar rats after single intra-striatal administration of PQ+ and applied pretreatments, including: N-nitro-L-arginine-methyl ester (L-NAME); 2-amino-5-phosphonovaleric acid (APV); glutathione reductase (GR) and naloxone. Reversible Parkinson's disease symptoms were observed in PQ group. Contrary to PQ, APV+PQ and GR+PQ groups, initially high $O2^{\bullet-}$ reached the normal values in L-name+PQ and naloxone+PQ groups, on 7thday. Superoxide dismutase (SOD) activity declined in L-name+PQ, naloxone+PQ and APV+PQ groups. Initially low SOD activity reached normal values on 7th day in Pq and GR+PQ groups. Lipid peroxidation was the highest in PQ, L-name+PQ and GR+PQ groups. Glutathione (GSH) depletion was considerable in L-name, APV and naloxone pretreated rats across the time. Increased GSH values were achieved in PQ and GR+PQ group on the 7th day. Glutathione peroxidase (GPx) activity was inhibited by GR (within 24 hours) and naloxone; elevated GPx activity declined with the time in APV+PQ and L-name+PQ; while it was high in PQ group until the 7th day. In conclusion, inhibitors of NO-synthase, N-methyl-D-aspartate (NMDA) and opioid receptors, reduced SOD and GPx activities and depleted GSH. Rise of $O2^{\bullet-}$ occurred in APV and GR pretreated groups (twice higher than in PQ group), on 7th day, although APV did not influence LPO.

Biography

Mirjana Djukic has completed her PhD in 2001 at the Faculty of Pharmacy at the University of Belgrade. She became a full Professor of Toxicology in 2012. Her research interest has focused on free radicals-mediated mechanism pathways of drugs/poisonings. Accordingly, on oxidative stress-related topics she introduced an optional subject in the faculty study program (2008); wrote (author and editor) two books; published/presented 190 papers and has been reviewing articles to reputable journals. She spent two years in the Center for Free Radical and Antioxidant Health (Prof. Valerian Kagan lab) at the University Pittsburgh, USA (2002/3, 2010/11).

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