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# 2,2′,5,5′-Tetrachlorobiphenyl Mediates Oxidative Stress-Induced Neuronal Apoptosis in Neuronal SK-N-MC Cells

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Polychlorinated biphenyls (PCBs) are ubiquitous environmental contaminants, some of which may be neurotoxic. The goal of this study was to determine if exposure to 2,2′,5,5′-Tetrachlorobiphenyl (PCB 52) leads to an induction of oxidative stress, and subsequently promotes apoptosis of neuronal SK-N-MC cells. Upon treatments with PCB 52, the time- and concentration-dependent inhibitions of cell viability were observed. The capability of PCB 52 to induce apoptosis was associated with proteolytic cleavage of specific target proteins, poly(ADP-ribose) polymerase and -catenin, suggesting the possible involvement of caspases. Reactive oxygen species (ROS) formation was examined in SK-N-MC cells after treatment of PCB 52 by concentrations (5, 10, 15, and 20 μg/ml) and incubation times (15, 30, 45, 60, 75, 90, and 120 min), respectively. It showed that the rate of ROS production in the cells was increased in a does-dependent manner to 45 min, followed by a return towards control levels after 120 min treatment. ROS formation was also measured in the presence of superoxide dismutase (inhibitor of oxygen free radical production) or mannitol (hydroxyl radical scavenger). Both the ROS scavengers exhibited significant inhibition effects of ROS generation in PCB 52-treated group, but mannitol had stronger scavenging effect of the ROS generated by PCB52 than superoxide dismutase had. We examined the association of PCB-induced apoptosis with the modulation of biomarkers of oxidative damage to lipids (malondialdehyde [MDA]) in SK-N-MC cells. Increased MDA was observed in cytosol treated with 10, 15, and 20 μg/ml of PCB 52 for 12 h. The activities of antioxidant enzymes, catalase, Cu/Zn-Superoxide Dismutase (Cu/Zn-SOD), were also examined. The neuronal cells showed a sustained increase in Cu/Zn-SOD activity with increasing concentrations of PCB 52. When treated with 10 μg/ml of PCB 52 for 24 h, the cells had a two-fold greater rate of change in catalase activity when compared to control group. These results suggest that PCB 52 induces