Histopathological changes in internal organs under the action of C_{60}-Cis-Pt nanocomplex

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Cisplatin (Cis-Pt) is one of the most widely used drugs for cancer treatment, however, its usage is limited by severe toxicity (Dasari, 2014). C_{60} fullerene is one of the most powerful antioxidants, which makes it an attractive substance as the basis for drug design. Complexation of Cis-Pt molecule with C_{60} fullerene one might allow to enhance the antitumor activity of the former and to reduce its adverse effects as well (Prylutska, 2017). Therefore, possible toxic effects of the C_{60}-Cis-Pt nanocomplex compared to pure Cis-Pt were aimed to be discovered.

The study was conducted on adult male mice. C_{60}-Cis-Pt nanocomplex and pure Cis-Pt were injected intraperitoneally at doses of 15, 30, 45, 60, 75 and 90 mg/kg, control animals received saline instead. The mice were observed for the next 14 days, changes in looking and behavior if any were recorded. At the 15th day mice were sacrificed, autopsies of the main internal organs (liver, kidney, intestine, pancreas, spleen) were inspected visually and after histological processing on light microscopy slides.

Experimental animals' behavior was the same as the controls' one throughout the study. No significant anomalies were visually observed in the organs of all treated groups: size, sharp and color were unchanged, the organs weren't enlarged. Histological examination of the organs of animals showed an aggravation of histopathological changes in a dose-dependent manner in both groups. The organs of mice received C_{60}-Cis-Pt demonstrated the changes similar to those of ones received Cis-Pt but much less expressed. Moreover, C_{60}-Cis-Pt when applied in 15 and 30 mg/kg doses caused no significant morpho-functional changes in all examined organs unlike Cis-Pt.

The body weight (g) of mice after i.p. injections of Cis-Pt (n=6)

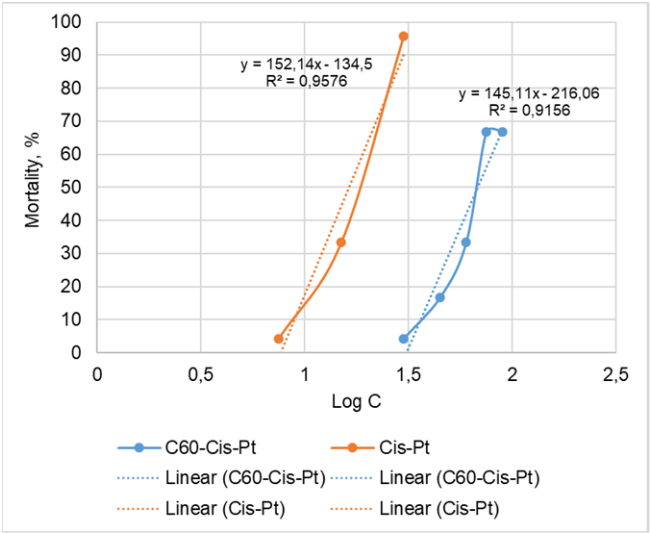
Group of mice	Days after i.p. injections		
	0	7	14
Control	24.3±2.2	26.3±2.8	27.8±2.1
7.5 mg/kg	24.0±2,0	26.3±2.5	27.7±2.1
15.0 mg/kg	24.2±1.9	20.1±2.1*	22.3±2.4*
22.5 mg/kg	24.0±2.4	-	-

*p<0.05 compared to control group

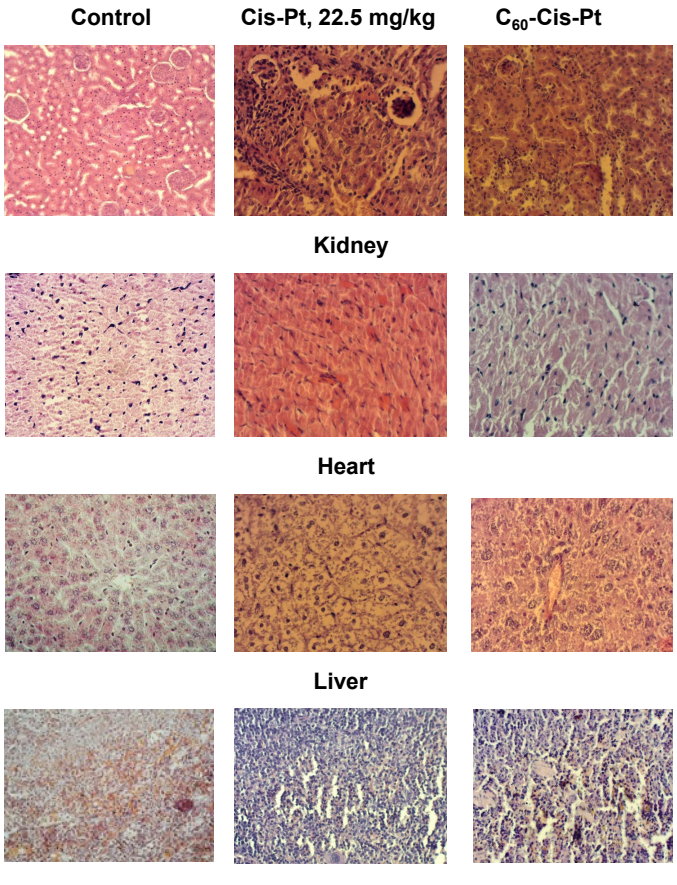
The body weight (g) of mice after i.p. injections of C_{60}-Cis-Pt (n=6)

Group of mice	Days after i.p. injections		
	0	7	14
Control	24.3±2.2	26.3±2.6	27.8±2.0
7.5 C_{60} + 7.5 Cis-Pt	24.1±2.1	26.2±2.4	27.7±2.2
15.0 C_{60} + 15.0 Cis-Pt	24.3±1.8	26.4±2.7	27.8±2.5
22.5 C_{60} + 22.5 Cis-Pt	24.0±1.4	26.3±2.9	27.9±2.7
30.0 C_{60} + 30.0 Cis-Pt	24.2±1.9	26.1±3.0	27.6±2.4
37.5 C_{60} + 37.5 Cis-Pt	24.0±2.0	26.2±2.3	27.5±2.9
45.0 C_{60} + 45.0 Cis-Pt	24.1±1.9	26.2±2.8	27.7±2.6

Mortality of mice received Cis-Pt alone or C_{60}-Cis-Pt



Microphotographs of organs of mice received Cis-Pt alone or C60-Cis-Pt in doses of 22.5 mg/kg or 22.5+22.5 mg/kg, respectively (HE, x200)



Thus, C_{60}-Cis-Pt nanocomplex caused the similar but much less expressed histopathological changes in main internal organs of mice compared to pure Cis-Pt. So the ability of C_{60} fullerene to attenuate Cis-Pt toxicity after being complexed with that was concluded.