

POSTER PRESENTATION

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The combined use of platinum nanoparticles and hydrogen molecules induces caspase-dependent apoptosis

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We previously reported electrochemically reduced water (ERW), produced near the cathode by electrolysis, exhibits reductive activity. We also revealed that ERW contains Pt nanoparticles (Pt nps) derived from Pt-coated titanium electrodes in addition to high concentration of dissolved molecular hydrogen (H₂) by *in vitro* assay, and Pt nps exhibit powerful ROS scavenger activity and catalysis activity converting H₂ to active hydrogen. Our study investigates apoptosis inducibility of H₂ and synthesized Pt nps on human promyelocytic leukaemia HL60 cells. Human promyelocytic leukaemia cells (HL60) were cultured in RPMI 1640 medium supplemented with 10% FBS, 2.0 mM l-glutamine, 100 U/ml penicillin and 100 U/ml streptomycin. Cultures were incubated in an atmosphere of 75%(v/v) H₂/20%(v/v) O₂/5%(v/v) CO₂, 75%(v/v) He/20%(v/v) O₂/5%(v/v) CO₂ atmosphere or 75%(v/v) N₂/20%(v/v) O₂/5%(v/v) CO₂ atmosphere for 12-48 hr after incubated with Pt nps for 2 h. Untreated cultures were included as controls. Cytotoxicity was determined by cell-counter. Apoptosis pathway of HL60 cells was investigated by Sub G-1 assay.

Growth suppression was not observed when cells were treated with Pt nps or H₂ only. Analysis of cell cycle and activity of caspase-3 suggested that combination use of both Pt nps and H₂ induced apoptosis in HL60 cells. Our caspase activity experimentation suggests that apoptosis was caused via caspase-8 activation. These results suggested that atomic hydrogen from H₂ induces caspase-8 dependent apoptosis. The cytotoxicity was not detected in Pt nps or H₂ separately treated cells.

Apoptosis was determined only when cells were treated with both Pt nps and H₂, suggests caspase-8 dependent apoptosis was caused by atomic hydrogen produced from H₂ by catalyst activity of Pt nps.

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