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Alpha 1-antitrypsin inhibits apoptosis in human peritoneal mesothelial cells

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Objectives: Alpha 1-antitrypsin (AAT) is one of the important proteins that cause anti-inflammatory response. AAT is now known as a potent inhibitor of several serine proteases which is especially high activity against neutrophil preceptors, neutrophils, and protein-3. Apoptosis is precipitated by sequential activation of cysteine proteases in caspase family. The aim of this study was to evaluate the effect of AAT on formaldehyde-induced apoptosis in human peritoneal mesothelial cells (HPMC).

Methods: HPMC were cultured and the cells were treated with formaldehyde (250 uM) to induce apoptosis. In AAT group, the cultured HPMC were pre-treated with AAT (2 mg/mL) for 1 hour and thereafter treated with formaldehyde (250 uM). We used MTT assay to determine cell viability. TUNEL assay and flow cytometry were performed to detect cell apoptosis. Expression of caspase-3, Bcl-2, and Bad were estimated by Western blot.

Results: Exposure to formaldehyde significantly increased apoptosis compared with control, whereas pre-treatment with AAT significantly inhibited formaldehyde-induced apoptosis by TUNEL assay and flow cytometry. Caspase-3 activity was significantly increased and the ratio of Bcl-2 to Bad expression was significantly decreased compared with control by treatment with formaldehyde. However, pre-treatment with AAT significantly decreased the caspase-3 activity and increased the ratio of Bcl-2 to Bad expression compared with formaldehyde only treated group.

Conclusions: The results of the present study indicate that AAT inhibits formaldehyde-induced apoptosis in HPMC by a caspase-related mechanism. Further studies are needed to assess the effect of AAT for preventing apoptosis in animal model.