Silica Nanoparticles Sensitize Human Multiple Myeloma Cells to Snake (Walterinnesia aegyptia) Venom-Induced Apoptosis and Growth Arrest

Douaa Sayed, Mohamed K. Al-Sadoon, and Gamal Badr

Abstract:

Background. Multiple myeloma (MM), an almost incurable disease, is the second most common blood cancer. Initial chemotherapeutic treatment could be successful; however, resistance development urges the use of higher toxic doses accompanied by hematopoietic stem cell transplantation. The establishment of more effective treatments that can overcome or circumvent chemoresistance has become a priority. We recently demonstrated that venom extracted from Walterinnesia aegyptia (WEV) either alone or in combination with silica nanoparticles (WEV+NPs) mediated the growth arrest and apoptosis of prostate cancer cells. In the present study, we evaluated the impact of WEV alone and WEV+NPs on proliferation and apoptosis of MM cells. Methods. The impacts of WEV alone and WEV+NPs were monitored in MM cells from 70 diagnosed patients. The influences of WEV and WEV+NPs were assessed with flow cytometry analysis. Results. WEV alone and WEV+NPs decreased the viability of MM cells. Using a CFSE proliferation assay, we found that WEV+NPs strongly inhibited MM cell proliferation. Furthermore, analysis of the cell cycle using the propidium iodide (PI) staining method indicated that WEV+NPs strongly altered the cell cycle of MM cells and enhanced the induction of apoptosis. Conclusions. Our data reveal the biological effects of WEV and WEV+NPs on MM cells that enable these compounds to function as effective treatments for MM.

Published In:

Oxidative Medicine and Cellular Longevity, 2012 (12), 1-10