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Effect of Co-culturing both placenta-derived mesenchymal stem cells and HepG2 cells in cancer cell (HepG2) migration, damage through apoptosis, cell cycle arrest

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Human placental-derived mesenchymal stem cells (hPMSCs) are a promising candidate to inhibit the proliferation of hepatocellular carcinoma (HCC) cell lines such as HepG2. However, the effects of hPMSCs and their conditioned media on HepG2 are still elusive. Therefore, this study aimed to investigate the effects of hPMSCs and their conditioned media on HepG2 and elucidate the underlying mechanism of action. The percentage of cell death (early apoptosis, late apoptosis) was observed by fluorescence-activated cell sorting and MTT assay. The DIO and DID color were used to detect interaction and cell death of both cells through cell fusion. Co-treatment of HepG2 cells with hPMSCs or hPMSCs-conditioned medium (hPMSCs-CM) inhibited HepG2 proliferation and induced their apoptosis. Morphological changes were also observed in the case of 30%, 50%, and 70% co-culture of both cells together *in vitro*. Treatment with hPMSCs or hPMSCs-CM induced HepG2 cell death through apoptosis as detected by flow cytometry, caspase 9 immunofluorescence, qPCR (detection of Bax, Bcl-2, and B catenin genes), by western blot, immunophenotyping (detection of caspase 9, caspase 3 protein). The hPMSCs and hPMSCs-CM could induce HepG2 cell cycle arrest. HepG2 cell growth was arrested in the G0/G1 phase following treatment with hPMSCs or hPMSCs-CM. These treatments also inhibited the migration of HepG2 cells with maximum effect when using the highest ratio/concentration of hPMSCs (70%) and hPMSCs-CM (90%). Our results suggested that hPMSCs and hPMSCs-CM will be promising candidates to treat liver cancer..

Recent Publications

1. F A Dain Md Opo, et.al, (2022): Comprehensive Studies of Different Cancer Diseases among Less-Developed Countries. Healthcare (Basel) ;10(3):424

2. F A Dain Md Opo, et.al, (2021): Cytotoxicity Study of Cadmium-Selenium Quantum Dots (Cdse QDs) for Destroying the Human HepG2 Liver Cancer Cell. J Biomed Nanotechnol;17(11):2153-2164

3. F A Dain Md Opo, et.al, (2021): Structure based pharmacophore modeling, virtual screening, molecular docking and ADMET approaches for identification of natural anti-cancer agents targeting XIAP protein. Sci Rep ;11(1):4049..

Biography

F A Dain Md Opo is a Ph.D. Graduate at King Abdul-Aziz University in 2019. He is a member of the global collaborative research team based on the Novel Global Community Educational Foundation (NGCEF), Australia. Currently working in the cancer stem cell unit, King Fahd Medical Research Center from 2019. His research field includes stem cell biology, cancer biology, molecular biology techniques, animal handling (*in-vivo*), type 2 diabetes, cancer informatics, and Nano product modification for efficient drug delivery against cancer. His publication was included in several renowned journals (more than eight) from the beginning of his research career in 2014. He currently works on two projects, Stem cells effect against several cancers and the discovery of new natural compounds through EGFR targeting. His research interests are Stem cells, Cancer informatics, Cancer biology, Nano-products, and Cancer stem cell.

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