World Academy of Science, Engineering and Technology
International Journal of Biomedical and Biological Engineering
Vol:12, No:07, 2018

Biochemical Effects of Low Dose Dimethyl Sulfoxide on HepG2 Liver Cancer Cell Line

Authors : Esra Sengul, R. G. Aktas, M. E. Sitar, H. Isan

Abstract : Hepatocellular carcinoma (HCC) is a hepatocellular tumor commonly found on the surface of the chronic liver. HepG2 is the most commonly used cell type in HCC studies. The main proteins remaining in the blood serum after separation of plasma fibrinogen are albumin and globulin. The fact that the albumin showed hepatocellular damage and reflect the synthesis capacity of the liver was the main reason for our use. Alpha-Fetoprotein (AFP) is an albumin-like structural embryonic globulin found in the embryonic cortex, cord blood, and fetal liver. It has been used as a marker in the follow-up of tumor growth in various malign tumors and in the efficacy of surgical-medical treatments, so it is a good protein to look at with albumins. We have seen the morphological changes of dimethyl sulfoxide (DMSO) on HepG2 and decided to investigate its biochemical effects. We examined the effects of DMSO, which is used in cell cultures, on albumin, AFP and total protein at low doses. Material Method: Cell Culture: Medium was prepared in cell culture using Dulbecco's Modified Eagle Media (DMEM), Fetal Bovine Serum Dulbecco's (FBS), Phosphate Buffered Saline and trypsin maintained at -20 ° C. Fixation of Cells: HepG2 cells, which have been appropriately developed at the end of the first week, were fixed with acetone. We stored our cells in PBS at + 4 ° C until the fixation was completed. Area Calculation: The areas of the cells are calculated in the ImageJ (IJ). Microscope examination: The examination was performed with a Zeiss Inverted Microscope. Daytime photographs were taken at 40x, 100x 200x and 400x. Biochemical Tests: Protein (Total): Serum sample was analyzed by a spectrophotometric method in autoanalyzer. Albumin: Serum sample was analyzed by a spectrophotometric method in autoanalyzer. Alpha-fetoprotein: Serum sample was analyzed by ECLIA method. Results: When liver cancer cells were cultured in medium with 1% DMSO for 4 weeks, a significant difference was observed when compared with the control group. As a result, we have seen that DMSO can be used as an important agent in the treatment of liver cancer. Cell areas were reduced in the DMSO group compared to the control group and the confluency ratio increased. The ability to form spheroids was also significantly higher in the DMSO group. Alpha-fetoprotein was lower than the values of an ordinary liver cancer patient and the total protein amount increased to the reference range of the normal individual. Because the albumin sample was below the specimen value, the numerical results could not be obtained on biochemical examinations. We interpret all these results as making DMSO a caretaking aid. Since each one was not enough alone we used 3 parameters and the results were positive when we refer to the values of a normal healthy individual in parallel. We hope to extend the study further by adding new parameters and genetic analyzes, by increasing the number of samples, and by using DMSO as an adjunct agent in the treatment of liver cancer.

Keywords : hepatocellular carcinoma, HepG2, dimethyl sulfoxide, cell culture, ELISA
Conference Title : ICCC 2018 : International Conference on Chemical Carcinogenesis
Conference Location : London, United Kingdom
Conference Dates : July 26-27, 2018