A PRELIMINARY STUDY ON THE EFFECTS OF RADIATION EXPOSURE ON CHONDROCYTES: Sulphated Glycosaminoglycan (sGAG) Content Using Cellular Model

Nur Farhana Mat Nawi1, Zainul Ibrahim Zainuddin2, Munirah Sha’ban1
1Department of Biomedical Science and 2Department of Diagnostic Imaging and Radiotherapy, Kulliyyah of Allied Health Sciences, International Islamic University Malaysia, Jalan Sultan Ahmad Shah, Bandar Indera Mahkota, 25200 Kuantan, Pahang Darul Makmur, Malaysia

Introduction: Radiation is known to be harmful to human health. Effects of radiation on tissues and organs are well documented. However recently, radiation was used as an evaluation tool to assess newly formed engineered tissue reconstruction and regeneration. This raises questions on the positive application of radiation, amidst the usual discussions pertaining to the risks of radiation. Up to now, there is little to suggest of scientific evidence to relate the effect of radiation on the cell cultures.

Objective: To evaluate the possible effects of radiation on monolayer cultured chondrocytes.

Methodology: The study has been approved by the Institutional Animal Care and Use Committee (IIUM/ACUCApproval/2015/5[24]), International Islamic University Malaysia (IIUM). The experimental set up is shown in the Figure 1 below.

The isolated chondrocytes were counted and prepared for expansion in monolayer culture. It were divided into **two groups:** (1) irradiated and (2) non-irradiated. Cultured and expanded in a thermal container.

Both cell groups were exposed to X-ray room examination in a thermal container. The group 2 cells at different passages were exposed to radiation.

Both cell groups were transported back into incubator.

Cells in both groups were cultured and expanded in a serial passages from p0 to p3.

All groups were evaluated using morphological evaluation and sulphated glycosaminoglycan (sGAG) production at passages 0, 1, 2, and 3.

Acknowledgment: The authors thank Kulliyyah of Allied Health Sciences (KAHS), IIUM Kuantan Campus and eScience Fund SF14-012-0062 from MOSTI.

Result and Discussions: The results or morphological observation are shown in Figure 2 below.

In terms of cellular morphology, all cultured chondrocytes showed a spherical, chondrocytic morphology at P0. Regardless of treatment, the cells gradually changed to become more fibroblastic in shape, characterized by the presence of spindle and dendritic-like cells at later passages. There are no differences between all groups throughout passages. The results for sGAG concentration is given Figure 3 below.

Conclusion: Despite the harmful effect of radiation, this initial study suggested the probable application of radiation towards the growth of cells.