

Development of Cesium-137 Irradiator for Radiation Studies on Low Dose Rate Radiation.

Dong Hoon Lee^{1,3)}, Young Hoon Ji¹⁾, Dong Han Lee¹⁾, Seong Yul Yoo¹⁾,
Chul-Koo Cho¹⁾, Soo Yong Rhee²⁾, Yoon Jong Kim³⁾, Seung Hong Hong³⁾

Lab. of Radia. Effect, Korea Cancer Center Hospital¹⁾

Dept. of Physics, College of Science, Hanyang Univ.²⁾

Dept. of Electronics, Inha Univ.³⁾

INTRODUCTION

Irradiator has been developed to irradiate uniform gamma rays to biological cell, blood and experimental animal for radiation effect studies on low dose radiation with convenient, easy and safe operation.

METHOD

A low dose irradiator(LDI-KCCH 137) using Cesium-137 was developed in our laboratory. During the operation, three rods of sources which have 10cm length turn around exact 180 degree, irradiate biological samples and return to its shielding position after the setting time. When the chamber door was opened and electric power was shut-downed during the irradiation, the sources were automatically returned their shielding position for safety.

RESULTS

The capacity of irradiation chamber is 4.5 liter. The dose rate is 0.13 cGy/min in air and 0.11 cGy/min in water equivalent material. Range of activity is about 0.5 Ci. The homogeneity of dose distribution in chamber is $\pm 7\%$. The actual radiation level on the surface is within permissible level. Programmable Logic Control (PLC) controls the sequence of operation, interlock, motor rotation and safety system. The rotation speed of biological sample varies up to 20 RPM. The real time monitoring system is also implemented to check and control the operation status of the irradiator. The isodose distribution in arbitrary vertical planes in measured using film dosimetry. The irradiator has the maximum 0.35 mR/min radiation leakage on its surface.

DISCUSSION

Nowadays, lots of medium and high dose rate irradiators have been developed from worldwide commercial companies but our laboratory have developed low dose rate irradiator using a cesium-137 to study biological effects by low dose rate radiation.

CONCLUSION

We plan to use the irradiator for irradiate uniform gamma rays to biological cell, blood and experimental animal for radiation effect studies on low dose radiation.

