

# Investigating cellular effects following neutron radiations

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AECL's biological dosimetry group has recently completed scoring fast- and thermal-neutron dose response curves.

For this work, peripheral blood lymphocytes were irradiated and cultured according to IAEA's EPR-Biodosimetry-2011 guidelines. However, for the thermal neutron irradiations, sodium citrate was used as an anticoagulant to avoid adding extraneous Nitrogen. The major dose delivery route is through proton and carbon recoil nuclei following a thermal neutron capture reaction of nitrogen:  $^{14}N(p,n)^{14}C$ .

Sodium heparin was used as the anticoagulant for the Cf-252 irradiations. To enumerate dose, dicentric and ring chromosome aberrations were scored.

The fast neutrons were obtained from a Californium-252 (Cf-252) source (average energy of 2.1 MeV), while the

thermal neutrons were obtained from AECL's Natural Research Universal (NRU) reactor, in collaboration with the Canadian Neutron Beam Centre (CNBC).

Our experiments indicate that the relative biological effectiveness (RBE) of Cf-252 neutrons analyzed using the dicentric chromosome assay is 21.04, while the RBE of thermal neutrons was found to be 10.82. These values contrast with the expected RBEs given by ICRP 103 (Cf-252 neutrons are calculated to have an RBE of 15.54, and thermal spectrum neutrons are expected to have an RBE of 2.5).

## References

- [1] EPR-Biodosimetry 2011. International Atomic Energy Agency (2011)
- [2] ICRP Publication 103. International Commission on Radiological Protection (2007)

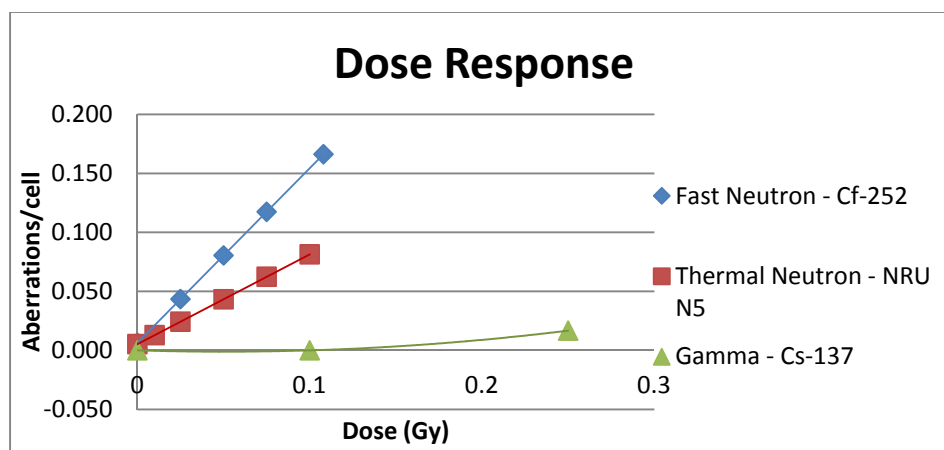


Figure 1 Comparison between dose responses.