Measurement of Micronuclei by Cytokinesis-block Method in Human, Cattle, Goat, Pig, Rabbit, Chicken, Fish Peripheral Blood Lymphocytes Irradiated *In Vitro* with Gamma Radiation

SUNG HO KIM[1], SE RA KIM[1], TAE HWAN KIM[2],
CHANG MO KANG[3] and SUNG KEE JO[4]
[1]*College of Veterinary Medicine, Chonnam National University,*
[2]*College of Veterinary Medicine, Kyungbook National University,*
[3]*Korea Institute of Radiological & Medical Science,*
[4]*Food Irradiation Team, Korea Atomic Energy Research Institute*

The frequencies of gamma-ray-induced micronuclei (MN) in cytokinesis-blocked (CB) lymphocytes at several doses were measured in three donors of seven species (human, cattle, goat, pig, rabbit, chicken, fish). Measurements performed after irradiation showed a dose-related increases in MN frequency in each of the donors of human, cattle, goat, pig and rabbit (Table 1). The relative sensitivity of cattle, goat, pig and rabbit in peripheral blood lymphocytes (PBLs) compared with human PBLs was estimated by best fitting linear-quadratic model based on the radiation-induced MN data over the range from 0 cGy to 400 cGy. In the case of MN frequency with 0.2, the relative sensitivities of cattle, goat, pig and rabbit PBLs were 0.86, 0.98, 0.41 and 0.39, respectively (Table 2). These data indicate that the induction of MN in CB cells following irradiation is similar in human, cattle and goat PBLs, and PBLs from pig and rabbit were much less sensitive to the MN induction effects of gamma-radiation than those from human. The micronucleus counts failed to show any evidence of radiation damage in the cells from chicken and fish. Measurements performed after irradiation showed a dose-related decrease in the formation of binucleated cells. We concluded that the use of CB cell from fish and chicken for detecting the results of radiation exposure was highly questionable. Our in vitro radiobiological study confirmed that the cytogenetic response obtained in blood from selected breeds of mammalian species can be utilized for application in environmental studies.

Table 1. Frequency of micronuclei (MN) in cytokinesis-blocked (CB) cells following treatment with gamma-rays (mean±SD).

Dose (cGy)	MN per CB		
Human		Pig	
0	0.010±0.004	0	0.013±0.002
100	0.129±0.016	100	0.053±0.007
200	0.335±0.019	200	0.093±0.005
400	0.780±0.079	400	0.287±0.007
Cattle		Rabbit	
0	0.015±0.001	0	0.010±0.004
100	0.115±0.014	100	0.060±0.005
200	0.275±0.017	200	0.104±0.014
400	0.609±0.044	400	0.250±0.026
Goat			
0	0.009±0.001		
100	0.147±0.003		
200	0.298±0.011		
400	0.619±0.017		