

Ex vivo experimental model in biodosimetry

pondělí 8. listopadu 2021 14:15 (3 minuty)

Individual biological dosimetry and acute radiation syndrome assessment are based on clinical signs development during first hours after exposition. Acute symptoms are useful for first fast triage of large numbers of irradiated people, nevertheless they are not characteristic for irradiation and they can be influenced also by other injuries as burns or lacerations. Laboratory methods allowing more precise retrospective dose assessment are conventionally based on analyses of peripheral white blood cells which sensitively response to irradiation by physiological cell death (apoptosis) induction. Our new ex vivo experimental approach eliminates a count of blood samplings and it could significantly decrease a sampling load of each irradiated person. MATERIAL AND METHODS: In our study we used ex vivo experimental biodosimetric approach of apoptosis detection. Ex vivo model comes from standardly in vivo irradiated animal experimental model. Six rats per group were in vivo whole-body exposed to homogeneous ionizing irradiation of 0 - 7 Gy (^{60}Co gamma source). Peripheral blood of each animal was collected 1 hour or 4 hours after exposition. Non-irradiated animals were served as controls. Peripheral blood mononuclear cells (PBMC) were isolated, washed in culture medium and finally cultivated (0-3-5-7-23 hours) under ex vivo conditions (37 °C, 5 % CO₂). Afterwards, cells were immunophenotyped by the antibody cocktail (CD45RA_PE, CD8_V450, CD3_APC, CD161_biotin_streptavidine_V500), stained by an apoptosis detection kit (Annexin V_FITC kit) and analysed data were acquired on a CyAn ADP flow cytometer.

RESULTS: All lymphocyte subsets incline to radiation-induced apoptosis with a dose-dependent manner, nevertheless with a different intensity and at a different time. B-lymphocytes went through apoptosis 6 hours after irradiation. T-lymphocytes decline not started until 8 hours and NK cell apoptosis was noted at 24 hours.

CONCLUSION: The pool of peripheral white blood cells consists from morphologic and functionally different populations in which lymphocytes prove the highest radiosensitivity differing a lot among functionally different lymphocyte subpopulations (T- and B-lymphocytes, natural killer cells) and their subsets. Ex vivo detection of apoptosis inducing lymphocyte subsets distinguishes between high (lethal) and low (sublethal) dose of irradiation already 6 hours after exposition and allows back estimate of absorbed dose.

Přihlásit do soutěže

Ne

Hlavní autor: ANDREJSOVÁ, Lenka (Fakulta vojenského zdravotnictví, Univerzita obrany, Hradec Králové)

Spoluautoři: FILIPOVÁ, Alžběta (FVZ UO); ČÍŽKOVÁ, Jana (FVZ UO); Prof. ŠINKOROVÁ, Zuzana (FVZ UO)

Přednášející: ANDREJSOVÁ, Lenka (Fakulta vojenského zdravotnictví, Univerzita obrany, Hradec Králové)

Zařazení sekce: Dozimetrie zevního a vnitřního ozáření

Tematická klasifikace: Dozimetrie zevního a vnitřního ozáření