

Chromosome analysis for calibration curves creation for potential retrospective dose estimation

Manned space missions and ionizing radiation application recently increased in number and duration, thus it becomes important to estimate the biological risks encountered by people deal with radiation. In order to predict the consequences of the exposure it is necessary to estimate the dose. In addition to the measurements realized by physical methods, it becomes essential to estimate biologically effective doses. Biological dosimetry of radiation exposures becomes more important if the possibility to calculate or measure the dose by physical methods does not exist.

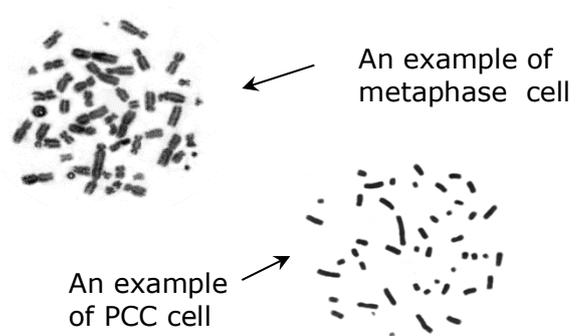
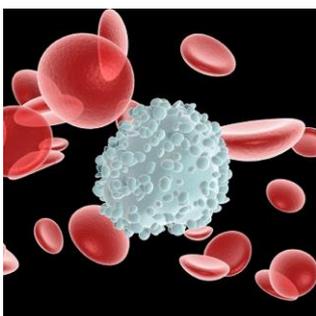
The most specific and the most sensitive technique of the present biological dosimetry based on estimating the frequency of chromosomal aberrations in peripheral blood lymphocytes of the exposed person.

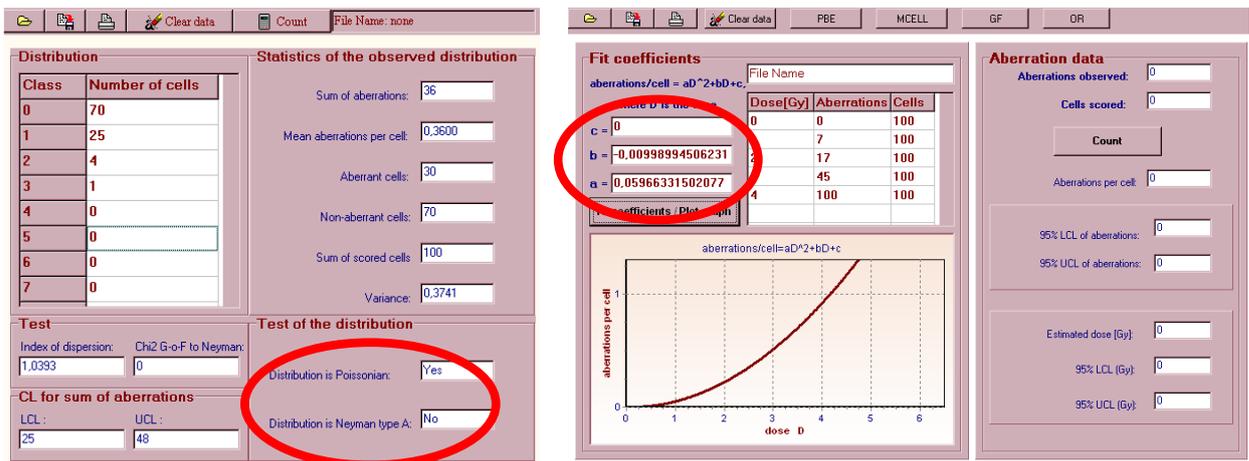
Numerous studies on animals and human have demonstrated the close correspondence between aberrations induced in peripheral blood lymphocytes *in vivo* and *in vitro*. This fact allows defining the radiation dose with the help of *in vitro* calibration curves. These curves are created by irradiation with several doses blood samples, collected from several control donors.

The aim of the project is to learn metaphase method and to create calibration curves.

During the practice students will become familiar with:

- human peripheral blood lymphocytes keeping *in vitro*;
- fixation and slide preparation of lymphocytes;
- chromosome aberration analysis by metaphase and PCC methods;
- the results processing with CABAS and NETA software.





Recommended:

- IAEA (2011) Cytogenetic dosimetry: Applications in preparedness for and response to radiation emergencies. A manual International Atomic Energy Agency
- Deperas J. et. al. (2007) CABAS - a freely available PC program for fitting calibration curves in chromosome aberration dosimeter. Radiat Prot Dosimetry 124:115-123
- Wojcik A. et. al. (2004) Cytogenetic damage in lymphocytes for the purpose of dose reconstruction: a review of 3 recent radiation accidents. Cytogenet Genome Res 104:200-205
- <http://www.iaea.org/>
- <http://www.ujk.edu.pl/ibiol/neta/>
- <http://www.ujk.edu.pl/ibiol/cabas/>

Project Supervisor:

Dr. Polina Kutsalo,
Laboratory of radiation Biology, JINR
polinkka@gmail.com