

PhD Thesis title: 'Assessment of gene expression changes of P53, INF-G, TGF-B, XPA, GOS2, PF4 in peripheral blood lymphocytes of medical radiation workers'

Author: Reza Fardid

Email: rfardid@gmail.com

Institution: Mashad University of Medical Sciences, School of Medicine

Supervisors: Professor Mohammad-Taghi Baheyni-Toosi

Graduation Date: October 18, 2012

Available on line: --

ABSTRACT:

Background: Aware of the damage caused by ionizing radiation and the increasing use of radiation in medical and industrial applications, occupational exposure measurement procedures are necessary. Physical methods of measuring radiation doses have the ability to accurately measure the amount of radiation in situations where there is no possibility of physical dosimeters to measure radiation dose. Such are situations where there is lack or inappropriate use of personal dosimeters in radiation accidents or occupational exposures, and hence development of biological methods for the detection of levels of radiation doses are necessary. Therefore, the use of biological changes related to radiation dose as a scientific method of research (biological dosimetry or biodosimetry) has been proposed. Biodosimetry would be useful to estimate the occupational dose of Radiation workers or dose of a group of people who were accidentally exposed to radiation.

Methods: In the current study, 36 radiation workers and 36 normal individuals were incorporated. 2 ml of peripheral blood was obtained from all subjects. Quantitative polymerase Chain Reaction (QPCR) tests for genes TP53, INF-G, TGF-B, Rad51, Rad52, BAX, BCL2, XPA, GOS2, PF4 were performed using an ABI StepOne real-time PCR system (Applied Biosystems™, ABI, USA) and the amplifications were performed with Takara SYBR Green PCR reagents (Takara, Japan).

Results: The values of the relative expression levels of BAX, BCL2, XPA, RAD52 PF4, IFN γ and TGF β genes were significantly different ($p < 0.05$) between the normal and radiation workers' groups. Logistic regression model was obtained using the expression levels of XPA, IFN γ , TGF β and BCL2 with 90% sensitivity and 90% specificity to be distinguished radiation workers from normal individuals.

Conclusion: The relative expression level changes of studied genes in blood lymphocytes of normal and radiation workers have been observed as effects of occupational exposure. Thus, gene expression levels can be used as biomarkers for biodosimetry.

Keywords: Ionizing radiation – occupational exposure - biodosimetry – gene expression

References to author publications that relate specifically to the dissertation:

Bahreyni-Toossi, M.T., Fardid, R., Rezaee, A., Sadr-nabavi, A., Rafatpanah, H., Bolbolian, B. (2011), 'Expression of apoptotic genes can distinguish radiation workers from normal population,' *Int. J. Low Radiation*, Vol. 8 No. 5/6, pp. 388 – 39.

Fardid, R., Bahreyni-Toossi, M.T., Mehrpouyan, M., Ghorbani, M. (2013), 'Evaluation of occupational radiation exposure of cardiologists in interventional radiography in Mashhad CATHLABs,' *Int. J. Low Radiation*, Vol. 9 No. 2, pp. 160 – 168.

Fardid, R., Bahreyni-Toossi, M.T., Rezaee, A., Sadr-nabavi, A., Rafatpanah, H., 'Expression of IFN γ and TGF β 1 genes can distinguish radiation workers from the normal population,' *Int. J. Low Radiation*, In Press.