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Association of radiation-induced genes with non-cancer chronic diseases in Mayak workers occupationally exposed to prolonged radiation

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We examined the association of gene expression with non-cancer chronic disease outcomes in Mayak nuclear weapons plant workers who were exposed to radiation due to their occupation. We conducted a cross-sectional study with selection based on exposure status (either combined incorporated 239Pu or external gamma-ray [n=82], or external gamma-ray exposure only [n=18]) of Mayak plant workers living in Ozyorsk who were alive in 2011; and an unexposed comparison group (n=50) of Ozyorsk residents. Peripheral blood was taken and RNA was isolated, converted into cDNA and stored at -20°C. In a previous analysis, we screened the whole genome for radiation-associated candidate genes and validated 15 mRNAs and 15 microRNAs using qRT-PCR. Within the present analysis, we examined the association of these genes with 15 different chronic diseases on 92 samples (47 males, 45 females). We examined the radiation to gene and gene to disease associations in statistical models stratified by gender and separately for each disease and exposure. Unconditional logistic regression was used for genes that were significantly associated with radiation exposure and a specific disease outcome. Altogether 12 mRNAs and 9 microRNAs appeared to be significantly associated with 6 diseases, e.g. atherosclerotic diseases (4 genes, OR: 2.5-10, concordance: 70-75%), systolic blood pressure (6 genes, OR: 3.7-10.6, concordance: 81-88%) and body mass index (1 gene [miR-484], OR: 3.7, concordance: 81%). All associations were gender and exposure dependent. Hence, gene expression changes observed after occupational prolonged radiation exposures seem to increase the risk for certain non-cancer chronic diseases.

Biography

Michael Abend studied Human Medicine at the University Cologne and finished his medical examination for a Doctor degree (medicine) during the same time. He earned a Professorship for Radiobiology at the Technical University, Munich, Germany and a Master's degree in Epidemiology from Institute for Biometry, Epidemiology and Informatics at the Clinics of the Gutenberg University, Mainz, Germany. He worked at different scientific institutions outside Germany (e.g. Radiation Epidemiology Branch, DCEG, Bethesda, USA). He is currently the Deputy Director of the Bundeswehr Institute of Radiobiology and published almost 100 papers in reputed journals.

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