Radiosensitivity of Prostate Cancer and BPH Patients Studied by DNA Repair Capacity, CA and FISH.

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An individual's genetic constitution and lifestyle, e.g., diet and levels of physical activity, can affect the body's response to various exogenous agents including therapeutic treatment. There is a strong need to combine studies on variability in a cellular response to genotoxic exposure with predisposition of the patient to diseases development and healing. In this study a variation in responses to challenging dose of X rays in lymphocytes from healthy donors and prostate cancer patients were compared on the molecular and mitotic levels. Blood was collected from healthy donors BPH (Benign Prostate Hyperplasia), and prostate cancer patients. Among cancer patients 33% never smoke 46.7% were former smokers. Immediately after collecting the blood a challenging irradiation was performed followed by culturing procedures for classic cytogenetics and FISH techniques with a probe for the whole chromosome 1. In DNA damage investigations, isolated and cryopreserved lymphocytes were thawed and their viability examined before molecular studies. To evaluate individual susceptibility, defrosted lymphocytes were exposed to 4 Gy dose of X-rays and the extent of DNA damage was studied right after irradiation with the alkaline version of the single cell gel electrophoresis (SCGE) assay. To asses variability in the DNA repair competency the residual (unrepaired) DNA damage was detected again after one hour of incubation, during which irradiated cells had the condition allowing to complete the fast DNA repair process. Visible difference between DNA susceptibilities to the challenging dose was observed between investigated groups. However, variation between individuals in repair efficiency of the DNA damage induced by the challenging treatment was significantly higher in lymphocytes of prostate cancer patients than that of BPH and healthy donors ($p<.05$). That findings correlate with results from cytogenetic studies. Significantly higher amount of chromosomal damage was detected in irradiated lymphocytes of prostate cancer than that in BPH patients by classic cytogenetics. Results obtained by FISH technique have also shown a statistically significantly higher level of translocations frequency (4.3 ± 0.33 vs 2.9 ± 0.31, $p<.005$) in chromosome 1 of prostate cancer lymphocytes than that of BPH. Our results, clearly suggest that vulnerability of chromosome 1 and DNA repair competence assays have shown a possible potency as predictive assays in preclinical studies.

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