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## Expression profile of NF- $\kappa$ B down stream target genes during heavy ion based tumor therapy

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Exposure to ionizing radiation occurs from natural sources (e.g. cosmic or terrestrial radiation) or man-made sources (e.g. radiation used in diagnosis and radiotherapy). Ionizing radiation being used in diagnostic procedures (X-ray or computed tomography) can increase the risk of development of ionizing radiation induced cancer even at low doses. A better understanding of biological effects and cellular responses to ionizing radiation will lead to efficient use in radiotherapy and better protection. Up to now, it is not clear to what extent the different NF- $\kappa$ B target genes are activated in response to different doses and qualities of ionizing radiation. Therefore, the effect of heavy ions of a broad LET range (~ 0.3 - 9674 keV/ $\mu$ m) on cellular survival and activation of NF- $\kappa$ B were investigated. The biological relevance of the recently discovered LET dependency of NF- $\kappa$ B activation is also unknown, especially the resulting profile of NF- $\kappa$ B target gene expression. This study clearly demonstrates that NF- $\kappa$ B activation and NF- $\kappa$ B-dependent gene expression by heavy ions are highest in the LET range of ~50-200 keV/ $\mu$ m. The up-regulated chemokines and cytokines (CXCL1, CXCL2, CXCL10, IL-8 and TNF) might be important for cell-cell communication among hit as well as unhit cells (bystander effect). Hence, the expression profile was determined in this work. The results clearly show the role of LET in modulating radiation induced NF- $\kappa$ B activation and NF- $\kappa$ B dependent gene expression by ionizing radiation of different LET.

## Innovations to Prevent Injuries and Diseases in the Swedish Construction Industry

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In this research program we critically scrutinized an innovation system for innovation in occupational health and safety, which is an area with large external cost to society. The principles of action research were followed in that the researchers both participated in and observed the process. Data collection took place continuously from the presentation of an idea to the launch of a safety product on the market. The aim was to measure the flow of activities and the results of counseling and financial support, and to assess the commercial and health-economic effects. Our underlying supposition that a synthetic problem-solving style would be well suited to work-environment-related innovation was confirmed in the study. After 2-6 years, 134 initial ideas from the period 2000-2004 and 1.8 million SEK in innovation support had resulted in 14 product innovations on the market, which in 2008 had gross sales of 59 million SEK. Further, 30 new jobs had been created. During the period of the prospective study a further 37 ideas emanated from the specialized system, of which nine were out on the market after 2-3 years. Against the background of the high work-environment costs of social insurance and healthcare, the health-economic analysis showed that a reduction in injuries and ergonomic health problems of one percent is equivalent to a saving to society of 80 million SEK. We therefore regard the setting-up of a publicly supported innovation arena in accordance with the suggested criteria – in collaboration between researchers, inventors and market players – as well justified.

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