Contribution ID: **258** Type: **oral (invited speaker)**

Biomarkers - the challenge to personalize radiation risk

Wednesday, 17 October 2012 09:00 (1 hour)

All radiation-late effects after sub-lethal exposure are mediated by additional confounding factors, which can be inherited, or exogenous or purely stochastic in nature. In their combination, they form a network of a few known, but to a large degree yet unknown parameters that make radiation-associated late effects appear as non-deterministic events.
During the pathogenesis of radiation-associated late events, pre-existing genetic determinants can have a profound influence onto individual risk, such a sever germline-mutations in DNA repair pathways (Brca1/2, Fanc,Nbs, XP), stress-response genes (ATM, Rb1, Cdkn2a) or genes that regulate other cellular functions (P53, Ptch, Blm). In their most sever forms, mutations in these genes cause clinical syndromes that will contra-indicate any unnecessary radiation exposure. The big challenge in the new genetic era, however, is the discovery of low-penetrance variations in these genes or the associated molecular pathways, which can increase radiation-risk without a pre-existing syndromic condition. In addition to hypomorphic mutations, even bigger challenges are genetic variants in regulatory elements of such genes or in non-coding mRNAs that can influence the protein level.
In a more direct relation of the disease pathogenesis after radiation-exposure are biomarkers which can signal early or intermediate steps of the disease progression. More a challenge for the future than current medical practise are the identification and validation of markers to diagnose cancer and non-cancer disease at an early pre-clinical stage, when therapeutic interventions might still block a further disease progression. Abnormal levels of certain cytokines in the peripheral blood, but also tumor markers from disseminated tumor cells or the detection of rare, disease-specific miRNA species in serum might have the potential to identify persons, who are not only under an increased risk following a radiation-exposure and/or a congenital susceptibility, but who warrant an immediate medical care.
This network of early genetic and later disease-based biomarkers can therefore help not only to prevent high-risk persons from any unnecessary radiation exposure, but also to reduce the health consequences of an accidental or unavoidable irradiation.

Primary author: Dr ROSEMANN, Michael (Institute of Radiation Biology, Helmholtz-Center Munich, Germany)

Presenter: Dr ROSEMANN, Michael (Institute of Radiation Biology, Helmholtz-Center Munich, Germany)

Session Classification: Keynote Lecture 2

Track Classification: Modulation of Radiosensitivity