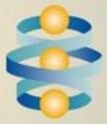


WP5

Shape of the dose-response for radiation-induced cancer

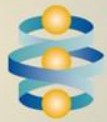
Radiation quality aspects

Christophe Badie, Deputy Leader
DoReMi WP5



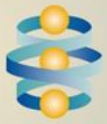
Major aims for WP5

- To improve knowledge of low dose/dose-rate radiation cancer risk in humans
- To improve risk projection models based on knowledge of processes that drive carcinogenesis



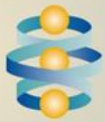
Main tasks

- Task 5.1 – Phase-shifts in responses and processes at high/low doses/dose-rates (SU)
- Task 5.2 – Assessing the contribution of non-targeted/systemic effects (STUK)
- Task 5.3 – Dynamics of pre-neoplastic change and clonal development (PHE)
- Task 5.4 – Mathematical models to link experimental findings and epidemiological data (HMGU)
- Task 5.5 – Assessing the risk from internal exposures (IRSN)
- Task 5.6 – Track structures and initial events: an integrated approach to assess the issue of radiation quality (UNIPV)
- Task 5.7 – Induction of chromothripsis by low dose radiation (LUMC)



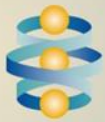
What about radiation quality?

- Are dose-responses for all radiation qualities of the same general shape?
- Clear evidence from radiobiology that cellular dose-responses can differ and biophysics suggest differences in lesion spectra



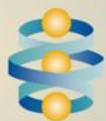
Task 5.3: transcriptome analysis of neutron and x-ray induced AMLs (CEA, PHE, SCK.CEN, HMGU)

- Transcriptome signatures of neutron AMLs differ from those of x-ray AMLs
- Analytical platforms differ but in future cross comparison for specific gene sets can be undertaken



Task 5.4: Modelling of radon-associated lung cancer risk in Eldorado miner cohorts (HMGU)

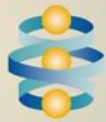
- Data supplied by CNSC Canada to HMGU, analysed by empirical risk models and carcinogenesis models
- Suggest a promotional effect of radon exposure may play a role – this, if validated, would likely affect shape of dose-response



Task 5.5: Assessing the risk from internal exposures (IRSN lead)

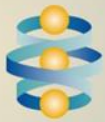
- Internal emitter studies often include consideration of radiation quality
- Study of leukaemia and non-melanoma skin cancer risk in Czech uranium miners (SURO)
- Internal dose calculations for UKAEA and AWE cohorts (Nuvia, AWE)
- Concerted action for an integrated (Biology-Dosimetry-Epidemiology) research project on occupational uranium exposure (IRSN plus 8 others)

CURE (Concerted Uranium Research in Europe)



Task 5.6: Track structures and initial events: an integrated approach to assess the issue of radiation quality dependence (UniPv, HMGU)

- Modelling of the effects of incorporated low energy β - emitters
- Modelling of γ - H2AX foci formation and repair following irradiations of differing quality
- Comparison of γ - and α - irradiation effects on mitochondrial function



Summary

- WP5 includes **experimental** and **modelling** studies related to improving the understanding of the effects of exposure to radiation of differing qualities
- Coverage is **not comprehensive** but a highlight is Task 5.5 that is paving the way for a large scale **multidisciplinary study** of uranium exposure risk in humans
- Task 5.6 is also **specifically** addressing issues related to the effects of radiations of different quality