



**3rd Systems Radiation Biology workshop
12-14 January, 2009
Rovaniemi, Finland
Arctic Circle**

Application of Systems Biology in Radiation Research

Website: <http://www.sysradbio2009.org/>

Hosted by

STUK – Radiation and Nuclear Safety Authority, Helsinki, Finland

Supported by

NOTE - Non-targeted effects of ionising radiation Integrated project, Euratom, EC
CARDIORISK - Mechanisms of cardiovascular risks after low radiation doses, Euratom, EC
GENRISK-T - Defining the genetic component of the low dose risk of thyroid cancer, Euratom, EC
US-DOE Low Dose Research Program, Office of Biological and Environmental Research
NASA – the National Aeronautics and Space Administration, USA
Japan radiation research projects

International Programme Committee

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Workshop Objective

Although much is known about the quantitative effects of exposure to ionising radiation considerable uncertainties remain about the health effects at low doses and the importance of low dose risk is increasingly being recognised globally. Recent research findings implicate that the biological processes operating at low doses may be partly different from those acting at high doses. Furthermore, non-targeted effects such as bystander effects and genomic instability imply that the cellular and tissue responses to low dose radiation are very complex. Therefore, new systems biological approaches are needed to understand the low dose processes and to complement the biophysical research tradition of the radiobiological community. The workshop will bring together major European, US and Japanese research programmes on low dose risk as well as selected experts representing systems biological approaches to discuss how the new methodologies could be best exploited for low dose research.

A significant part of the workshop will be devoted to discussions organised as breakout group sessions. To facilitate discussions, the number of participants will be limited to 65.

Monday, 12 January

08.00-08.50 Registration

08.50-09.00 Welcome: Prof. Sisko Salomaa (*STUK - Radiation and Nuclear Safety Authority, Finland*)

09.00-09.30 Dr. Sampsa Hautaniemi (*University of Helsinki, Finland*): What is Systems Biology?

Session: Tissue systems

Chair: Prof. Kevin Prise (*Queen's University of Belfast, UK*)

09.30-10.00 Prof. Eric Wright (*University of Dundee, UK*): Radiation-induced genomic instability and systems biology

10.00-10.30 Coffee break

10.30-11.00 Dr. Oleg Belyakov (*STUK - Radiation and Nuclear Safety Authority, Finland*): 3D Tissue systems

11.00-11.30 Dr. Petri Salvén (*University of Helsinki, Finland*): Stem cells contributing to cancer

11.30-12.00 Dr. Yoshihiro Morishita (*Kyushu University, Japan*): Mathematical approach to developmental biology

12.00-13.00 Lunch

Session: Systems biology approaches related to radiation effects and disease ethiology

Chair: Dr. Ohtsura Niwa (*National Institute for Radiological Sciences, Japan*)

13.00-13.30 Prof. Matt Hurles (*Sanger Institute, UK*): Genome-wide analysis of copy number variation in humans with the special reference to our problems, i.e. deletions/insertions following exposure to ionising radiation

13.30-14.00 Dr. Heiko Enderling (*Tufts University, USA*): Improved understanding of Tumor Progression through computational tracking of Cancer Cell Dynamic

14.00-14.30 Dr. Tom Weber (*Pacific Northwest National Laboratory, USA*): Interrogation of cell transformation mechanisms to identify susceptibility factors for low dose radiation health risks

14.30-15.00 Dr. Rafi Benotmane (*Belgian Nuclear Research Centre, Belgium*): Microarrays and beta analysis in radiation biology

15.00-15.30 Coffee break

Session: Modelling and bioinformatics

Chair: Dr. Mark Little (*Imperial College, London, UK*)

15.30-16.00 Dr. Peter Jacob (*Helmholtz Center Munich, Germany*): Modelling of radiation carcinogenesis by inclusion of genomic instability and bystander effect

16.00-16.30 Dr. Francis Cucinotta (*NASA, Johnson Space Center, USA*): Modelling approaches to address radiation health risks of astronauts

16.30-17.00 Dr. Mika Ala-Korpela (*Computational Medicine Finland*): NMR metabonomics as a high throughput methodology to study vascular diseases

17.00-17.30 Dr. Caroline Hill (*Cancer Research UK*): Mathematical modelling of the TGF-beta/Smad signalling pathway

17.30-19.30 Reception at Arktikum:

- Presentation on the Physics of Aurora Borealis by Prof. Herwig Paretzke (*Helmholtz Center Munich, Germany*)
- Exhibition
- Wine and finger food

Tuesday, 13 January

Session: From molecular to ecosystem level - future visions in systems biology

Chair: Prof. Munira Kadhim (*Oxford Brookes University, UK*)

09.00-09.30 Prof. Olli-Pekka Kallioniemi (*Institute for Molecular Medicine Finland*): Canceromics

09.30-10.00 Prof. David Fell (*Oxford Brookes University, UK*): Modelling the cell cycle with the aim of accounting for the actions (and interactions) of anti-cancer drugs

10.00-10.30 Coffee break

10.30-11.00 Dr. Alison Dunning (*Strangeways Research Laboratory, UK*): Genome-wide SNPs mining, cancer predisposition and radiosensitivity

11.00-11.30 Dr. Tatsuo Shibata (*Hiroshima University, Japan*): Self-organisation in chemotactic signaling for spontaneous cell migration of Eucaryotic cells

11.30-12.00 Prof. Carmel Mothersill (*MacMaster University, Canada*): Evolutionary and ecological aspects of stress response

12.00-12.30 Dr. Isao Kawaguchi (*National Institute of Radiological Sciences, Japan*): Radiological impacts on model ecosystem: SIMCOSM

12.30-13.30 Lunch

Session: Questions to breakout sessions

Chair: Sisko Salomaa (*STUK - Radiation and Nuclear Safety Authority, Finland*)

13.30-13.50 Moderator lecture 1 by Prof. Mats Harms-Ringdahl (*Stockholm University, Sweden*):
Do “Omics” approaches and high throughput techniques motivate systems biology modeling of radiation response?

13.50-14.10 Moderator lecture 2 by Dr. Michael Atkinson, (*Helmholtz Center Munich, Germany*):
How can biomarkers bridge the gap between exposure and final health effects in terms of individual sensitivity?

14.10-14.30 Moderator lecture 3 by Dr. Mary-Helen Barcellos-Hoff (*New York University, USA*):
Can systems biology help to solve the issue of predicting low dose health effects?

14.30-17.30 **Parallel break-out sessions:**

1 hour discussion in three groups according to initial bookings; coffee break at 15.30-16; 1.5 hour discussion in three groups continue, with opportunity to change groups.

Breakout 1: Do “Omics” approaches and high throughput techniques motivate systems biology modeling of radiation response?

Breakout 2: How can biomarkers bridge the gap between exposure and final health effects in terms of individual sensitivity?

Breakout 3: Can systems biology help to solve the issue of predicting low dose health effects?

19.00-> Dinner at Restaurant Nili (City Centre)

Wednesday, 14 January

Session: Conclusions from breakout sessions

Chair: Prof. Christian Streffer (*University of Essen, Germany*) and **Dr. Pierre Legrain** (*CEA - Atomic Energy Commission, France*)

09.00-10.30 Moderators’ reports

10.30-11.00 Coffee break

11.00-12.00 General discussion

12.00-12.30 Conclusion and future perspectives by Prof. Sisko Salomaa, STUK

12.30-13.30 Lunch

13.30-17.30 Arctic Circle sightseeing: Reindeer farm Sirmakko and Santa Claus Village
17.00: Rovaniemi Airport;
17.30: Hotel Santa Claus