

## 2-week training course on Molecular mechanisms of radiation carcinogenesis

30.04.2012 – 13.05.2012

Helmholtz-Center Munich

### General information:

DoReMi ([www.doremi-noe.net](http://www.doremi-noe.net)) is a Euratom-funded Network of Excellence set up to promote and integrate European research into the risks of exposure to low doses of ionising radiation. In addition, DoReMi facilitates and promotes training and education in support of the research programme within the project, and also makes more widely available training opportunities in order to help attract top-level students into the field. As part of this initiative, a 2-week training course on "**Molecular Mechanisms of Radiation Carcinogenesis**" is organised by the Helmholtz-Center Munich, University of Pavia and the University College London. It is open to postgraduate students and to scientists studying biological or medical aspects of ionizing irradiation in laboratories in the European Union.

### Scope of the course:

To provide advanced training by lecture and laboratory work in the molecular processes that are involved in the development of spontaneous and radiation-induced cancer.

Our course will place special emphasis on cancers of tissues where there is strong evidence for radiation-induced cancers (e.g. the lymphopoietic system, thyroid, breast). The course will consist of 4 teaching and 1 laboratory units dealing with:

- Basics of cancer
- Research tools
- Radiation-induced cancers
- Key issues facing radiation cancer research\*
- Molecular techniques for analysis of radiation-induced changes in the transcriptome, epigenome and proteome.

The course will be completed by a field trip to the radiation oncology facilities of the Technical University medical school.

## Structure of the course

### **Unit 1: Basics of cancer (8 hours)**

- Lecture 1 Histopathology of cancer
- Lecture 2 Introduction to history of cancer research, cancer terminology, processes
- Lecture 3 Disruption of regulatory pathways in cancer formation
- Lecture 4 Apoptosis and cell cycle regulation
- Lecture 5 Angiogenesis, metastasis, senescence

### **Unit 2: Research tools (8 hours)**

- Lecture 6 Biological models of multistage carcinogenesis
- Lecture 7 Mechanisms of individual sensitivity
- Lecture 8 Animal models in radiation research
- Lecture 9 Modern technologies in cancer research (proteomics, microarrays)
- Lecture 10 Deep sequencing and the individual cancer genome

### **Unit 3: Radiation-induced cancers (8 hours)**

- Lecture 11 Radiation induced thyroid and breast cancer
- Lecture 12 Radiation induced lymphoma/leukaemia
- Lecture 13 Radiation induced osteosarcoma
- Lecture 14 Second cancer after radiotherapy

### **Unit 4: Key issue tutorials (6 hours)**

- Tutorial 1 The key questions identified by MELODI / HLEG
- Tutorial 2 Cancer stem cells and radiation effects
- Tutorial 3 Epigenetics and radiation

### **Unit 5: Laboratory and field trip (16 hours)**

Lab 1 will be the use of high throughput screening for mRNA quantification (Illumina platform) and real time PCR quantification (TaqMan and LightCycler).

Lab 2 will use immunohistochemical techniques (immunofluorescence, proximity ligation assay) to detect alterations in epigenetic marks. The analysis of microRNA expression will be studied by low density microfluidic arrays (Applied Biosystems).

Lab 3 will use quantitative analysis to study changes in the cell proteome (SDS-PAGE, western blotting).

A field trip to the radiation therapy, radiology and nuclear medicine facilities at Klinikum rechts der Isar (Technical University Munich) will be arranged during the course to illustrate benefits and risks of radiation exposure.

### **Evening seminar topics**

- Seminar 1 Genetic risk estimation after radiation exposure
- Seminar 2 Radiation exposure and long-term health consequences from radiation accidents: comparison of the Chernobyl accident and the Fukushima disaster

## Organisation of the course:

The course is organised by the Helmholtz-Centre Munich (Professor Mike Atkinson). The course is open to any postgraduate student or scientist working in an EU academic Institution. Participants from DoReMi member institution will get free accomodation in a shared 2 bed rooms (for single-bed rooms an extra 20 € will be charged). Public transport and travel fees to the site visits will be covered. There is no course fee. A certificate of attendance will be issued to each participant at the end of the course.

People wishing to apply should submit the following documents by e-mail to the organiser [atkinson@helmholtz-muenchen.de](mailto:atkinson@helmholtz-muenchen.de) including

1. A letter of application
2. A CV with a description of the scientific career
3. A supporting letter from the supervisor/head of laboratory (only for PhD students)

The **deadline for applications** is January 31<sup>th</sup> 2012. Information confirming the acceptance as course participant will be sent by February 29<sup>th</sup> 2012.

Updated information on the course will soon be available at the web-site <http://www.helmholtz-muenchen.de/isb/doremi/index.html>

Please note, that due to limitations at laboratory space there is a maximum number of 12 participants.