# Training Course PCR-based Techniques in Radiobiology and Low-Dose Risk Research, the Integration of New Member States in EURATOM programs

#### Date: June 13-17, 2016

# Venue: National Public Health Center, National Research Directorate for Radiobiology and Radiohygiene 1221 Budapest, Anna u. 5, Hungary

#### June 13

- 9:00 Registration and welcome
- 9:30 Opening of the course
- 10:00 12:00 Introduction to PCR basics

Short lectures in the following topics:

- The principle of PCR
- The PCR template the DNA
- The components of a PCR reaction
- Designing the optimal primer
- Defining the optimal PCR conditions critical parameters
- How to avoid external contamination

12:00 - 13:00 - Lunch

13:00 - 15:00 - Introduction to quantitative PCR or real-time PCR

Short lectures in the following topics:

- Real-time PCR theory
- Primer and probe design
- Standard curves
- Melt curve analysis
- Amplification efficiency
- Data analysis
- RNA isolation basic practical knowledge

15:30 - 17:00 – Coaching workshop on how to improve the scientific know-how and institutional background of New Member States to improve their integration in European radiation research and Euratom-launched activities

- Jean-René Jourdain (IRSN, France, OPERRA consortium leader): From DoReMi to OPERRA the evolution of the participation of new Member State institutions in EURATOM projects
- Mike Atkinson (Helmholz Zentrum, Munich, Germany): Increasing the involvement of EU New Member States in European radioprotection research

### June 14.

9:00 – 13:00 – Practical session in small groups

- Group 1: Isolation of DNA (I) and quantification of DNA amount
- Group 2: Isolation of DNA (II) and quantification of DNA amount
- Group 3-4: Preparation of agarose gels, loading, electrophoresis

13:00 - 14:00 - Lunch

14:00 - 16:00 - Coaching workshop on how to improve the scientific know-how and institutional background of New Member States to improve their integration in European radiation research and Euratom-launched activities

- Sisko Salomaa (Univ. Kuopio, Kuopio, Finland): Participation in different Euratom Instruments: a coordinator's viewpoint and expectations from a consortium member
- Géza Sáfrány (OKK-OSSKI, Budapest, Hungary): Centers for Excellence in Radiation Research
- Ann Karin Olsen (Norwegian Institute of Public Health, Oslo, Norway): Norwegian Center of Excellence in Radiation Research

# June 15.

8:30 - 12:00 - Practical session:

- Group I: Mycoplasma detection by PCR
- Group II: Mitochondrial DNA detection by PCR
- Group III-IV: RNA isolation and quality control

During the PCR reaction short lectures about specific PCR techniques and specific applications:

- Detection of promoter methylation by PCR
- RT-PCR

12:00 - 13:00 - Lunch

- 13:00 17:00 Practical session:
  - Group I-II: RNA isolation and quality control
  - Group III: Mycoplasma detection by PCR
  - Group IV: Mitochondrial DNA detection by PCR
  - During the PCR reaction short lectures about specialized PCR techniques:
    - Nested PCR
    - Long PCR

# June 16.

8:30 – 12:00 – Practical sessions:

- Groups I-IV: evaluation of PCR results for mycoplasma and mitochondrial deletions; evaluation of RNA quality
- Groups I-IV: Setting up an RT-PCR reaction
- 12:00 13:00 Lunch
- 13:00 15:00 Practical session:
  - Groups I-IV: Setting up a PCR for methylation detection
  - Groups I-IV: RT-PCR analysis basic principles
- 15:00 17:00 Invited lectures on specific PCR techniques:
  - Bálint Szabó (ELTE, Hungary): Single cell isolations for PCR
  - Christophe Badie (PHE, UK): From quantitative PCR to revolutionary tools for absolute quantification: molecular counting and digital PCR
- 19:00 Dinner

# **June 17.**

- 8:30 12:00: Practical session:
  - Principles of analysis of RT-PCR data
  - Analysis of RT-PCR and methylation data
- 12:00 13:00 Lunch
- 13:00 Concluding remarks and closing of the training course