AvH International Course “Nuclear Architecture, Chromosome Territories, Chromatin Dynamics and Genetic Damage“

April 4-13, 2011

Programme

Monday, April 4

Lectures (9.30 – 12.30)

Thomas Cremer
Introduction. Towards an understanding of the functional integration of genetics, epigenetics and nuclear architecture.

Marion Cremer
Linking the linear DNA sequence organization of metaphase chromosomes with their 3D arrangement in interphase nuclei. Introduction in the basic principles of FISH techniques.

Laboratory demonstration (14.00 -17.30)

DNA probe generation by (DOP-) PCR or isothermal, multiple displacement amplification (MDA) reaction, probe labeling by Nick translation and setup of hybridization solution, pretreatment of cultivated cells for 3D-(immuno) FISH.

Seminar (17.30-18.30)

Tuesday, April 5

Lectures (9.30 - 12.30)

Marion Cremer
Strategies for the generation of DNA probes.

Jens Nagel
Strategies for efficient labelling of DNA probes.

Thomas Cremer
Chromosome conformation capture techniques – a biochemical approach to study nuclear architecture.

Laboratory demonstration (14.00 – 17.30)

Seminar (17.30-18.30)

Setup of hybridization; replication labeling by scratch labeling of fluorochrome-labeled dUTPs.

Wednesday, April 6

Lectures (9.30 – 12.30)

Thomas Cremer
Lamins and their function of chromatin organization.

Thomas Cremer
Chromatin dynamics during terminal differentiation.

Laboratory demonstration (14.00 – 17.30)

Monitoring of scratch labeled cells and identification of different cell cycle stages (in combination with immunodetection of cell cycle associated markers). Detection of FISH.

Seminar (17.30-18.30)

Thursday, April 7

Lectures (9.30 – 12.30)

Jens Nagel
Identification of different cell cycle stages by appropriate markers.

Thomas Cremer
Chromatin dynamics during the cell cycle.

Thomas Cremer
Chromosome territories and the interchromatin compartment: a functional marriage.
New insights by high resolution microscopy.

Laboratory demonstration (14.00 – 17.30)

Further monitoring of scratch labeled cells after several cell divisions. Evaluation of FISH slides by confocal microscopy.

Seminar (17.30-18.30)

Friday, April 8

Lectures (9.30 – 12.30)

Gustavo Folle
Nuclear architecture and genetic damage.

Gustavo Folle
Euchromatin, heterochromatin and genetic damage.

Laboratory demonstration (14.00 – 17.00)

Quantitation of DNA double strand break formation through immunodetection of gamma-H2AX foci in nuclei and metaphase chromosomes.

Invited Lecturer (17.30 – 18.00)

Máximo Drets
Structure and function of the subtelomeric/telomeric regions: Implications in human congenital syndromes

Saturday, April 9

Minipresentations (9.00 – 11.30)

Short presentation of research topics by Course local and regional participants.

Seminar (11.30-12.30)

Monday, April 11

Lectures (9.30 – 12.30)

Ricardo Benavente
Nuclear envelope, lamins and eukaryotic cell compartmentalization.

Ricardo Benavente
Molecular architecture and functions of the nuclear envelope.

Laboratory demonstration (14.00 – 17.30)

Dynamics of nuclear envelope (NE) components I. Immunostaining of NE components in cell cultures to ascertain their mitotic redistribution and contribution to nuclear reassembly.

Seminar (17.30-18.30)

Tuesday, April 12

Lectures (9.30 – 12.30)

Ricardo Benavente
Nuclear envelope and the cell cycle.

Ricardo Benavente
Nuclear envelope and cell differentiation.

Laboratory demonstration (14.00 – 17.30)

Dynamics of nuclear envelope (NE) components II. Confocal microscope analysis and discussion of results.

Invited Lecturer (17.30-18.30)

Juan Benech
Isolated nuclei as a model to study nuclear signaling

Wednesday, April 13

Lectures (9.30 – 12.30)

Ricardo Benavente
Nuclear envelope and human pathology I.

Ricardo Benavente
Nuclear envelope and human pathology II.

Laboratory demonstration (14.00 – 17.30)

Viewing isolated nuclei with the Atomic Force Microscope

Evaluation of Course Faculty (17.30-18.30)