

Three new Group Leaders join IMB to investigate epigenetic processes during development and disease

Mainz, January 2012. *The Institute of Molecular Biology (IMB) in Mainz has marked the start of 2012 with the groups of Drs Jean-Yves Roignant, Natalia Soshnikova and Vijay Tiwari beginning their research into epigenetic process that control development and the occurrence of disease.*



Dr Jean-Yves Roignant: The limited information found in genomes can be significantly increased in to a process known as alternative splicing. This allows a vast number of proteins to be produced from a single gene and it is estimated that 90% of our genes undergo such splicing. As a consequence, alternative splicing is essential for complex organisms to develop from a limited number of genes.

Although up to 50% of disease-causing mutations affect splicing, little is known about the processes that ensure genes are correctly spliced during development. Dr Roignant has joined IMB from the NYU Langone Medical Center in New York, where he identified the involvement of a cellular machinery involved with this process, the exon junction complex (EJC). At IMB Dr Roignant and his team are now investigating the mechanism by which this machinery acts. A better understanding of splicing may lead to future therapeutic treatments of disease-causing mutations.



Dr Natalia Soshnikova: Although all cells in an organism have the same genome, there are over 200 different cell types, such as skin, muscle and nerve cells. This diversity is generated from stem cells through the establishment and maintenance of different transcriptional programmes, which activate specific genes in different cell types.

At IMB, Dr Soshnikova's research group will use stem cells to identify the epigenetic changes and associated alterations in transcription factor activity that occur during the establishment of different cell types. Her group will also investigate the transformation of healthy cells into tumorigenic ones. By studying the epigenetic control of cell identity and lineage commitment this research will shed light upon how cells become cancerous. Dr Soshnikova previously worked at the University of Geneva, where she investigated the epigenetic control of genes responsible for the regulation of development.



Dr Vijay Tiwari: When different cell types are established, cells need to respond to development-associated external cues. Epigenetic processes are crucial in regulating the activity of specific genes that mediate this response. Therefore, for a cell to convert such external cues into specific gene activity, signalling events triggered by these cues need to be coordinated and translated by the cell's epigenetic machinery. Dr Tiwari joined IMB from the Friedrich Miescher Institute in Basel, where he identified a mechanism by which cell signalling directly influences chromatin in response to development-associated external signals.

At IMB, Dr Tiwari's research group will study stem cell differentiation to determine exactly how chromatin structure is modulated by the interplay of cell signalling pathways and regulatory factors, how these mediate transcriptional activity and cell differentiation, and how these effects are altered in diseases such as cancer. This will provide fundamental knowledge regarding cell-fate programming which in turn will be relevant to both regenerative therapies and anti-cancer treatments.

Webpage

For more information about IMB's new Research Groups and their projects please visit: www.imb-mainz.de/research

Further reading

Roignant JY and Treisman JE (2010). Exon junction complex subunits are required to splice *Drosophila* MAP kinase, a large heterochromatic gene. *Cell*, 143, 238-250.

Soshnikova N, Montavon T, Leleu M, Galjart N and Duboule D (2010). Functional analysis of CTCF during mammalian limb development. *Developmental Cell*, 19, 819-830.

Tiwari VK, Stadler M, Wirbelauer C, Paro R, Beisel C and Schübeler D (2011). A Chromatin-modifying Function of JNK during Stem Cell Differentiation. *Nature Genetics*, 44, 94-100.

The Institute for Molecular Biology gGmbH (IMB)

The Institute of Molecular Biology gGmbH (IMB) is a new research centre in the life sciences, which was established in March of this year. Research at IMB concentrates on three cutting-edge research areas: Developmental Biology, Epigenetics and DNA Damage Response. The research centre is a prime example of successful collaboration between public authorities and a private foundation: The Boehringer Ingelheim Foundation has dedicated 100 million Euro for a period of ten years to cover the scientific running of IMB, while the state of Rhineland-Palatinate provided 45.5 million Euro for the construction of a modern building to house IMB. For more information about IMB please visit: www.imb-mainz.de.

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