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Epigenetic Targets in Cancer

The development of new therapies for the treatment of cancer patients requires an understanding of the genetic and epigenetic mechanisms leading to cancer, and the identification and characterization of novel targets for the development of specific therapies. I have in the last 25 years worked on understanding the molecular mechanisms leading to cancer. As a PhD student I worked on signaling pathways (receptor tyrosine kinases), and as a postdoc at Harvard I started working on tumor suppressor genes, contributing with the cloning of the E2F transcription factors. As a group leader in Denmark and in Italy, I continued the work on two of the key pathways in cancer (the retinoblastoma and p53 pathways), contributing with the identification of the transcriptional targets for the E2Fs and the elucidation of their function in DNA replication, apoptosis and in the regulation of the chromatin environment.

In the last 10-12 years I have changed the focus of my lab to the understanding of how transcription factors and epigenetic enzymes contribute to the regulation of cellular identity and differentiation. Importantly, cancer is a disease of stem cells and differentiation, and results from our lab and others have shown that disruption of epigenetic control is a frequent event in cancer. In my seminar, I will present a short overview of our work on epigenetic control in cancer, and discuss some of our recent data on the understanding of the biological functions of chromatin-associated proteins and how they contribute to cancer.

Recent reviews on the topic

1. Laugesen A and Helin K (2014). Chromatin Repressive Complexes in Stem Cells, Development and Cancer. Cell Stem Cell *14*, 735-751.
2. Helin K and Dhanak D (2013) Chromatin proteins and modifications as drug targets. Nature, *502*, 480-488.
3. Højfeldt JW, Agger K, and Helin K (2013). Histone Lysine Demethylases as Targets for Anti-Cancer Therapy. Nature Rev Drug Disco**v**, *12*, 917-930.
4. Kooistra SM and Helin K (2012). Molecular mechanisms and potential functions of histone demethylases. Nature Rev Mol Cell Biol, *13*, 297-311.