

HEALTH & ENVIRONMENT Seminar Series 2010

Functional genomics and proteomics in cancer research

Jörg Hoheisel, DKFZ Heidelberg, Germany

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Abstract

Research at the *Division of Functional Genome Analysis* aims at the development and immediate application of new technologies for an analysis, assessment and description of both the realisation and regulation of cellular function from genetic information. Analyses on tumour material are at the centre of attention, with a particular emphasis on pancreatic cancer. Parallel studies at a global level are under way, for example, on the epigenetic modulation of gene promoters, variations in transcription factor binding, changes of transcript levels of coding and non-coding RNAs, the actual protein expression, analysis of protein isoforms and the intensity of protein interactions. From the resulting data, we aim at an understanding of cellular regulation and its biological consequences. In combination with clinical facts, the knowledge is used for the creation of means of early diagnosis, accurate prognosis and the analysis of treatment results as well as the establishment of new therapeutic approaches.

A more recent line of work aims at an *in vitro* implementation of complex biological processes. Motivation is a utilisation in the area of *Synthetic Biology* for the production of molecules and the establishment of artificial molecular systems. Cell-free biosynthetic production will become important for many biotechnological and pharmacochemical challenges. Also, artificial experimental systems will complement current *Systems Biology*, evaluating biological models experimentally. Similar to physics, insight into cellular functioning will be gained by an iterative processing of information by experimental and theoretical systems biology. Eventually, this may lead to the establishment of a fully synthetic self-replicating system and – in the long run – an archetypical model of a cell.

www.dkfz.de/funct_genome/

Biosketch

Jörg D. Hoheisel is Head of the *Division of Functional Genome Analysis* at the Deutsches Krebsforschungszentrum (DKFZ; German Cancer Research Center) in Heidelberg, Germany. He also holds the position of Chairman of the Scientific Council of DKFZ. His scientific interests are in the areas of structure, organisation and interaction of the different molecule classes and the resulting regulative aspects. Apart from more than 300 publications in scientific journals, the division filed a large number of patents, of which several have been licensed out or are utilised in ongoing collaborations with commercial partners. Also, Jörg Hoheisel is co-founder of four companies. Another two companies were set-up by former members of the division.

Prior to joining DKFZ in 1993, Jörg Hoheisel worked for five years on genome-wide analyses and technical developments in this research field in the group of Hans Lehrach at the Imperial Cancer Research Fund in London, UK, the initial two years being funded by a post-doctoral EMBO fellowship.

Previously, he had been trained as a molecular biologist at the University of Constance, Germany. He did his diploma graduation and Ph.D. degree with Fritz M. Pohl at the Department of Physical Biochemistry on the subjects of analysing different, topologically induced DNA-structures and the functioning of DNA-binding enzymes.