

Red-FISH, Blue-FISH, Q-FISH:

The Molecular Cytogenetics Group at the Institute of Human Genetics in Heidelberg goes FISHing

Overview

At the Institute of Human Genetics (Ruprecht Karls Universität, Heidelberg, Germany), fluorescence in situ hybridisation (FISH) techniques and digital image analysis using the Leica Fluorescence Microscope System is part of the everyday life of Dr. Anna Jauch and her co-workers.

FISH Methodology

The FISH method takes advantage of the capability of single stranded DNA to pair (hybridise) with a complementary DNA strand. Depending on the hybridised probes and appropriate fluorochrome labels, FISH allows the simultaneous staining of specific chromosomes or chromosomal subregions in different colours in metaphase spreads as well as interphase nuclei with a very high sensitivity. "That is the reason why FISH has emerged as a powerful technique to complement conventional cytogenetic analysis. In pre- and postnatal diagnosis we apply FISH for the detection of numerical and structural chromosome aberrations in over 400 patients per year" states Dr. Jauch. FISH techniques are also used by Dr Jauch and her team in the medical research of carcinogenesis. FISH experiments are used to identify chromosomal regions involved in the development and progression of tumours.

Using Leica CCGH for comparative genomic hybridisation (CGH), an advanced FISH technique, it is possible to undertake a genome wide screening for chromosomal imbalances. Currently the technique is used in the study of tumour specimens of patients with leukaemias (ALL in childhood, acute T-cell leukaemia) and solid tumours (breast cancer, pituitary tumours).

Multiplex Fluorescence in-situ hybridisation (M-FISH)

"In 1998 we established a technique developed by Dr. Michael Speicher (Institute of Anthropology and Human Genetics, University of Munich, Germany) called multiplex-FISH (M-FISH) in our lab. This method allows the painting of all human chromosomes in specific colours, with the aim to classify complex rearranged tumour metaphase spreads and characterise additional marker chromosomes in pre- and postnatal diagnosis. The M-FISH technique is also applied in patients with acute myeloid leukemia (AML), acute lymphatic leukemia (ALL) as well as cell lines established from hodgkin lymphoma, human adrenal cortex carcinoma, breast cancer and osteosarcoma".

The Digital Imaging Solution

The system comprises a Leica DM RXA microscope, Sensys CCD-camera, Leica Q-FISH-, LeicaCGH- and Leica MCK-software packages.

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