



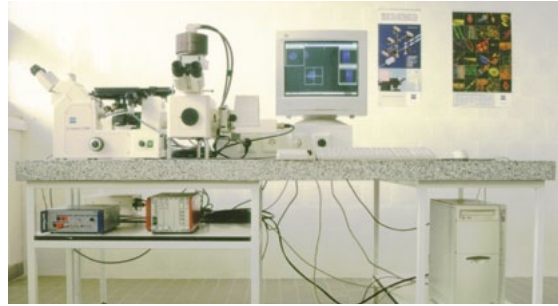
# Centre for Biomedical Image Analysis

/ Faculty of Informatics / Masaryk University

RESEARCH GROUP CONTACT >>

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## THEMATIC RESEARCH FOCUS >

### RESEARCH AREA

We focus our research and also clinical applications on 2D as well as 3D analysis of fluorescence-stained cells and/or their components observed using optical microscopy. The main aim is to contribute to the understanding of the chromatin organisation in human cell nuclei. Clinical applications are aimed at the study of mechanisms of induction, diagnostics and prevention of deleterious human diseases. We have also studied the function-structure relationship for human genome.

### EXCELLENCE

IT Automation of Biomedical Image Acquisition and Analysis using Optical Microscopy

### MISSION

To help researchers whose goal is to study the structure and function of cells and their components by providing suitable image acquisition and image analysis tools.

## DEVELOPED TECHNOLOGIES >

### CONTENT OF RESEARCH

- » Automated acquisition of multi-dimensional image data
- » Automated analysis of multi-dimensional image data
- » Image segmentation and object reconstruction
- » Image registration
- » Correction of aberrations and artifacts in light microscopy
- » Multiple view imaging using micro-axial tomography
- » Optical flow in live cell imaging
- » Applications in molecular/cell biology

### MAIN CAPABILITIES

We have developed a special experimental equipment and software in the field of optical microscopy – automated image cytometer. We have know-how in all aspects of digital image acquisition and digital image analysis (and also teach related courses). Hence, we can offer services to academic institutions as well as companies in this area. We are specialized in applied research and we can practise it over a wide spectrum of IT and software products. They can be used for molecular biology, biophysics, biochemistry and many other applications.

### FIELDS OF RESEARCH RESULTS APPLICATION

- » Research in Life-Science
- » Biomedicine
- » Biotechnology
- » Microscopy

### ALUMNI PROFILE

The student gains a comprehensive overview in the field of acquisition and processing of image information starting with simple image modifications using point transforms or linear filters and ending up with sophisticated tools such as mathematical morphology or deformable models. Graduates are able to design and coordinate development of software systems for image information processing in research (e.g., research in molecular biology using microscopy imaging techniques), in medicine (e.g., ultrasound imaging, magnetic resonance, CT) as well as in industry (e.g., fingerprint or retina recognition, processing records of security or traffic cameras).



**NUMBER OF RESEARCH POSITIONS** ↘

## SENIOR RESEARCH STAFF

7

## JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS)

15

**KEY RESEARCH EQUIPMENT** ↘

## LIST OF DEVICES

Automated optical microscopy equipment (so-called high-resolution cytometry instruments)

**BUDGET** ↘

## TOTAL (MIL. CZK/ MIL. EUR)

10 / 0.40

## PART OF THE TOTAL BUDGET FROM PRIVATE RESOURCES (%)

5

## PART OF THE TOTAL BUDGET FROM FOREIGN RESOURCES (%)

0

**MAIN PROJECTS** ↘

**2006–2011:** „Determination of markers, screening and early diagnostics of cancer diseases using highly automated processing of multidimensional biomedical images“ (Grant No. 2B06052, Ministry of Education, Youth and Sports)

**2005–2010:** „Chromosome dynamics and structure during the cell cycle“ (Grant No. LC535, Ministry of Education, Youth and Sports)

**2004–2006:** „High-resolution cytometry of living cells“ (Grant No. 202/04/0907, Czech Science Foundation)

**ACHIEVEMENTS** ↘

**2008:** Launch of our own freely available (GNU GPL licence) image acquisition and analysis package Acquiarium (being developed and improved up to now)

**2005:** 1st place in the national round of the Best of Biotech competition for the best business plan in the field of innovative research in biotechnologies with the project of “High-resolution cytometer”

**2001:** Czech Patent No. 288693: “Way of the determination of cell properties using the method of high-resolution cytometry and equipment for its realization”

**1999:** Prize of the Czech Minister of Education TALENT 1998 for work in the field of fluorescence microscopy and promoting interdisciplinary research

**1998 – now:** Over 50 research papers in journals with an impact factor and over 500 citations (excluding self-citations) to them according to the Web of Science database

**MAIN COLLABORATING PARTNERS** ↘

## COLLABORATION WITH ACADEMIC PARTNERS

- » Institute of Biophysics AS CR (Brno, CZ)
- » Faculty of Science, Masaryk University (Brno, CZ)
- » Faculty of Medicine, Masaryk University (Brno, CZ)
- » Faculty of Information Technology, University of Technology (Brno, CZ)
- » Czech University of Technology (Prague, CZ)
- » University of Heidelberg (DE)
- » University of Uppsala (SE)
- » University Hospital (Brno, CZ)

## COLLABORATION WITH COMPANIES

- » Camea (Brno, CZ)

**EXPECTATIONS** ↘

## REQUIREMENTS

We are looking for cooperation with research institutions as well as companies in the field.

## OFFERS

We offer know-how in the areas of digital image acquisition and processing in optical microscopy.