



# research core facilities

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Faculty of Biology and Medicine

# research core facilities



## genomics

Genomic Technologies Facility – GTF

## human studies

Clinical Research Center – CRC  
Clinical epidemiology Center – CepiC

## imaging

Cellular Imaging Facility – CIF  
Electron Microscopy Facility – EMF  
Flow Cytometry Facility – FCF

## animal models

Transgenic Animal Facility – TAF  
Mouse Pathology Facility – MPF  
Mouse Metabolic Facility – MEF  
Cardiovascular Assessment Facility – CAF

## proteins & mass spectrometry

quantitative Mass Spectrometry Facility – qMSF  
Protein Analysis Facility – PAF  
Protein and Peptide Chemistry Facility – PPCF

## bioinformatics, molecular modeling & computational biology

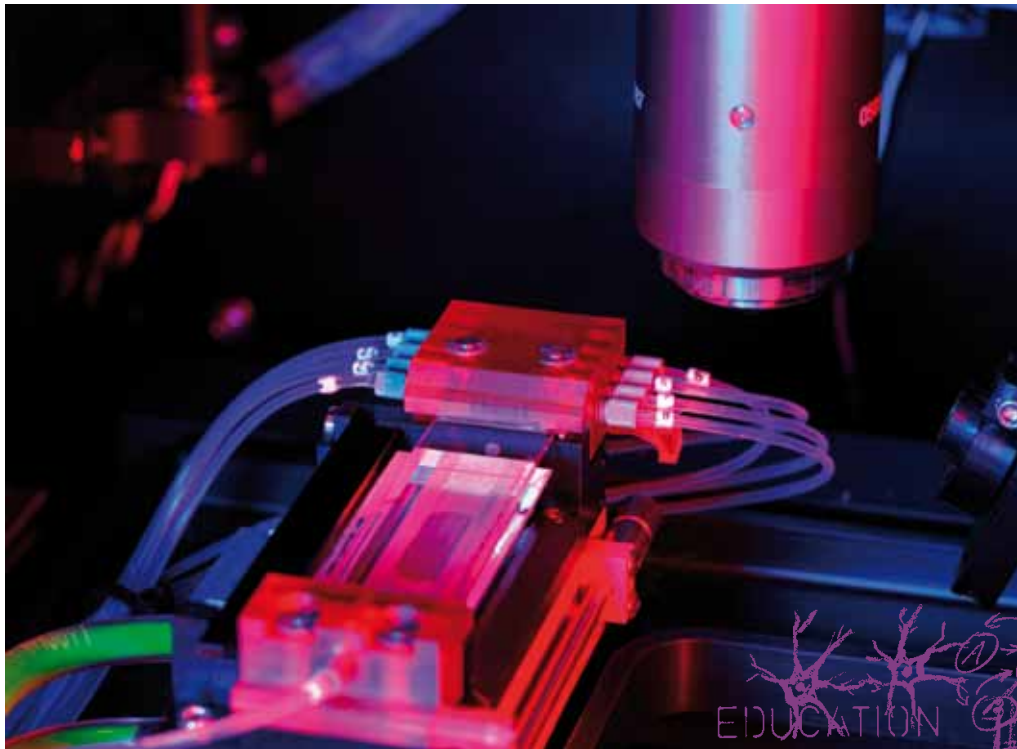
Protein Modeling Facility – PMF  
Vital-IT

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Faculty of Biology and Medicine



Genomics

# genomic technologies facility (GTF)

## OVERVIEW

The Genomic Technologies Facility (GTF) is a service laboratory with the mission to provide the Lemanic region scientific research community access to state-of-the-art instrumentation and methods for measuring quantitative and qualitative variations in nucleic acids. To this end, the GTF supports a number of different technologies with a broad range of analytical applications.

The GTF, which is located in the Genopode Building on the UNIL's Dorigny campus, provides users with all the necessary laboratory and bioinformatics infrastructure required for the use of its technologies.

## INFORMATION & CONTACT

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## SERVICES

- Complete experimental sample processing and data analysis for ultra high throughput nucleic acid sequencing projects as well as array-based mRNA and miRNA expression profiling projects.
- Bioinformatics support and consultation at the stages of experimental design, data collection and storage, image analysis and higher level data analysis.
- Training and supervision in all aspects of the laboratory manipulations, molecular biology steps and data analysis protocols needed to perform array- and qPCR-based mRNA and miRNA expression analysis.
- Training in nucleic acid isolation, purification and characterization methods.

## APPLICATIONS

- A wide range of genome and transcriptome analysis applications using short-read and long-read ultra high throughput sequencing platforms from Illumina, Pacific Biosciences and Life Technologies.
- mRNA expression profiling using Affymetrix GeneChip and Illumina BeadChip oligonucleotide arrays.
- miRNA gene expression profiling using Agilent Technologies miRNA gene arrays.
- Quantitative real-time PCR analysis of mRNA, miRNA and DNA using the Applied Biosystems 7900HT Sequence Detection System.
- DNA polymorphism analysis using Affymetrix GeneChip oligonucleotide arrays.
- Array analysis using the Agilent Technologies DNA Array Scanner.
- RNA and DNA analysis using the Agilent Technologies 2100 Bioanalyzer microfluidic electrophoresis system.
- Functional analysis and visualization of experimental data using a variety of software packages.





Human Studies

# clinical research center (CRC)

## OVERVIEW

The new Clinical Research Center / Centre de recherche clinique (CRC) meets an institutional need. It was created to provide investigators with methodological, logistical, and educational support, premises and beds, as well as dedicated and specialized personnel. This center is used for research relating to healthy and sick human beings in a variety of different areas, in order to promote the design and performance of clinical trials by adhering to ethical standards and regulations of Good Clinical Practice. The CRC also constitutes a useful core facility for under-graduate and post-graduate teaching for health professionals.

## INFORMATION & CONTACT

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Human Studies

# clinical epidemiology center (cepic)

## OVERVIEW

The Clinical epidemiology Center (CepiC) offers methodological and statistical support for optimal design of clinical investigation projects and programs.

The facility is open to researchers in need of statistical and methodological support. However, the clinical epidemiology support is more appropriate for patient oriented research.

The Clinical epidemiology Centre works in close collaboration with the Clinical Research Centre. The support to clinical trials is proposed by the Clinical Research Centre.

## INFORMATION & CONTACT

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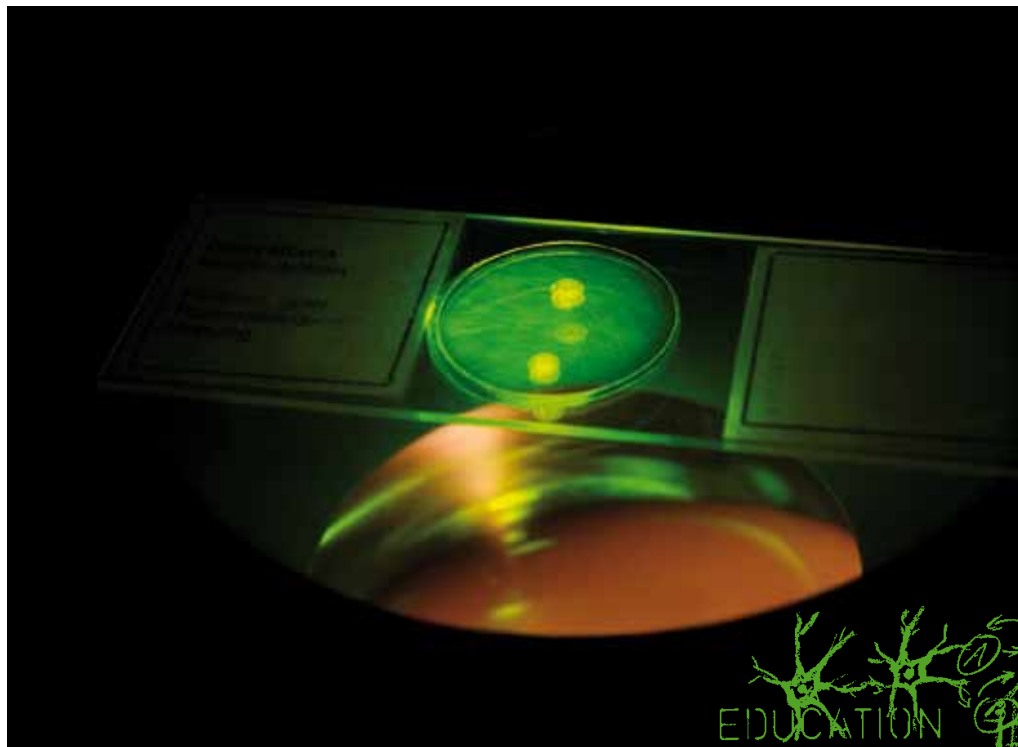
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Clinical epidemiology Center – CepiC  
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[www.unil.ch/fbm](http://www.unil.ch/fbm)





Imaging

# cellular imaging facility (CIF)

## OVERVIEW

The Cellular Imaging Facility (CIF) assists researchers with imaging needs such as widefield fluorescence and transmission optical microscopy, confocal microscopy, time-lapse and ion imaging, to digital image processing and analysis.

The facility is located on the Bugnon, Dorigny, and Epalinges campuses of the University of Lausanne.

The CIF is organized around primary missions of providing access to a wide panel of state-of-the-art imaging equipment and technology, and of diffusing and sharing the practical and theoretical know-how on these approaches through teaching and training.

## INFORMATION & CONTACT

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Cellular Imaging Facility – CIF

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- Génopode  
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- Bâtiment F  
Chemin des Boveresses 155  
CH-1066 Epalinges

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## SERVICES

### Microscopy/Imaging Equipment

- Confocal microscopy.
- Two photon microscopy.
- Wide-field fluorescence microscopy.
- Time-lapse imaging.
- Dynamic ion imaging.
- Fluorescence stereomicroscopy.
- Laser capture microdissection.
- Whole animal bioluminescence and fluorescence imaging.

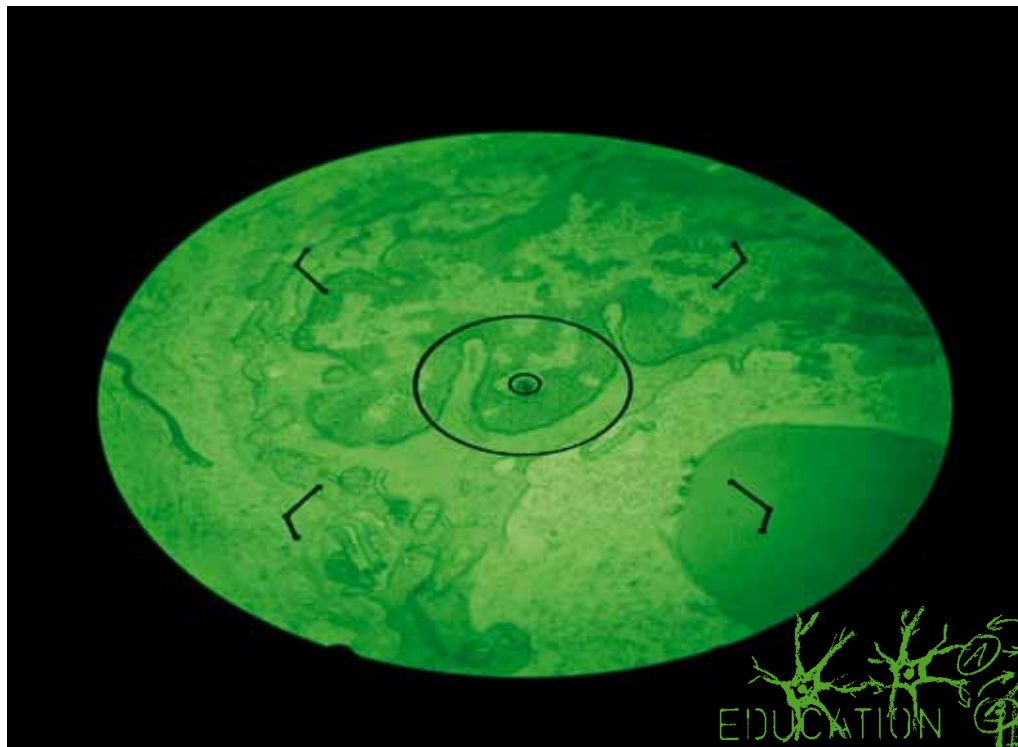
### Image Processing/ Computer Technologies

- Morphometry and 3D reconstruction.
- Image processing and image analysis.
- Centralized file server.

### Teaching/Training

- Lecture series on optics, microscopy and cellular imaging.
- Hands-on training on instruments and imaging software.
- Specialized workshops on selected imaging topics.





Imaging

# ELECTRON MICROSCOPY FACILITY (EMF)

## OVERVIEW

Electron microscopy provides the highest resolution in structural investigations of materials, macromolecules, cells and tissue. Besides of structural information, electron microscopy can locate macromolecules within cells and tissue. In addition it is used to analyse the chemical composition of the investigated structure at high spatial resolution.

Electron microscopy of biological systems requires expertise and skills in both the sample preparation methods and handling of the different types of microscopes and imaging modes. The team of the Electron Microscopy Facility (EMF) of UNIL has this expertise and in own research projects is expanding the technology in preparation, imaging and analysis.

Interested users will be taught in preparation methodology and instrument handling to make best use of the facility for their research projects either autonomously or under our supervision. A limited number of specimen can be fully processed and observed by the team.

## INFORMATION & CONTACT

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Electron Microscopy Facility - EMF  
Biophore  
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[www.unil.ch/fbm](http://www.unil.ch/fbm)

## Services

### TEM

- Philips CM100 with EDAX.
- Philips CM100 with cryo-stage.
- FEI Tecnai 12 for (cryo-)electron tomography.

### SEM

- Jeol 6300 FEG with EDAX.
- FEI Quanta 250 FEG.

### FIB-SEM

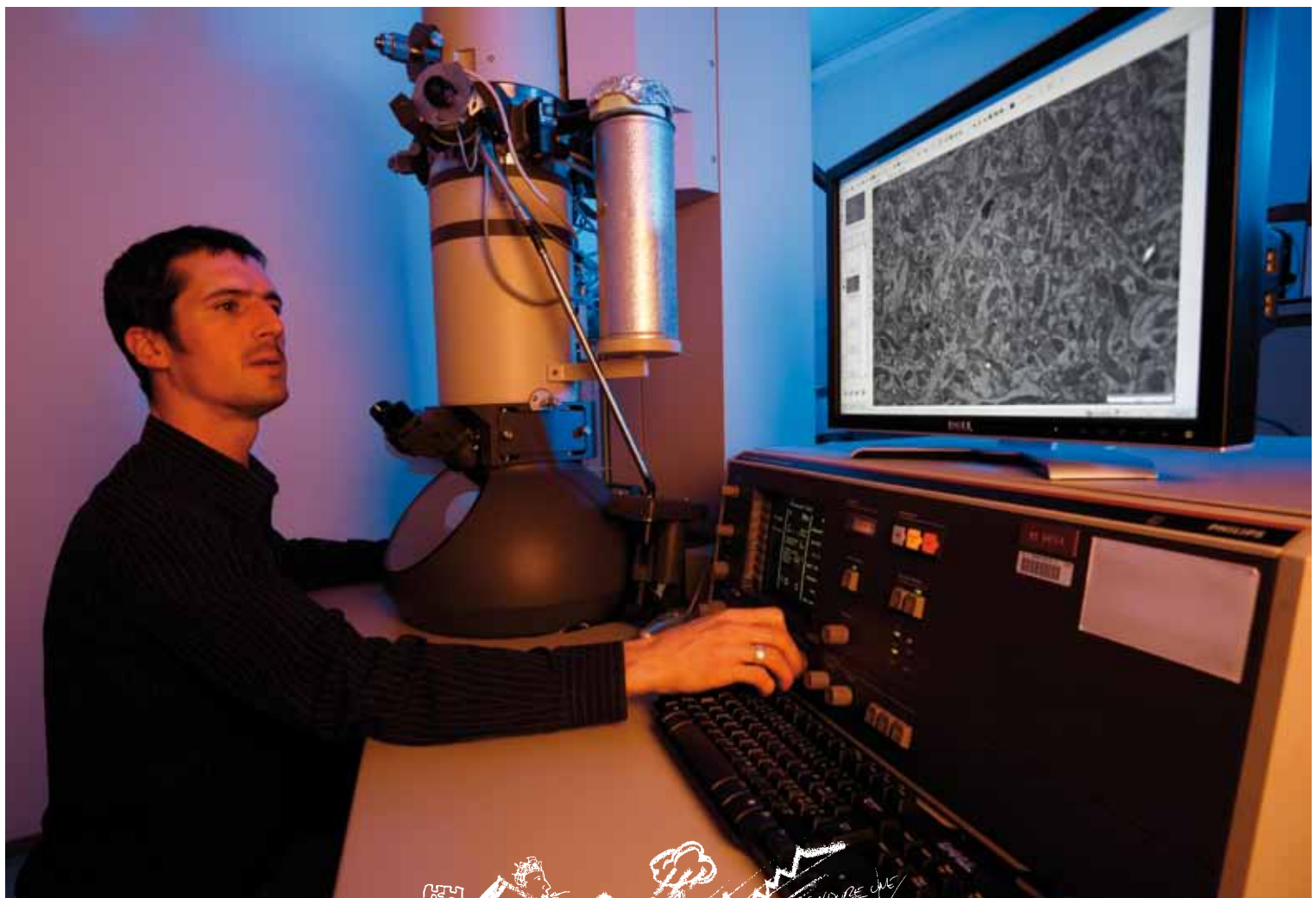
- FEI Helios 650.

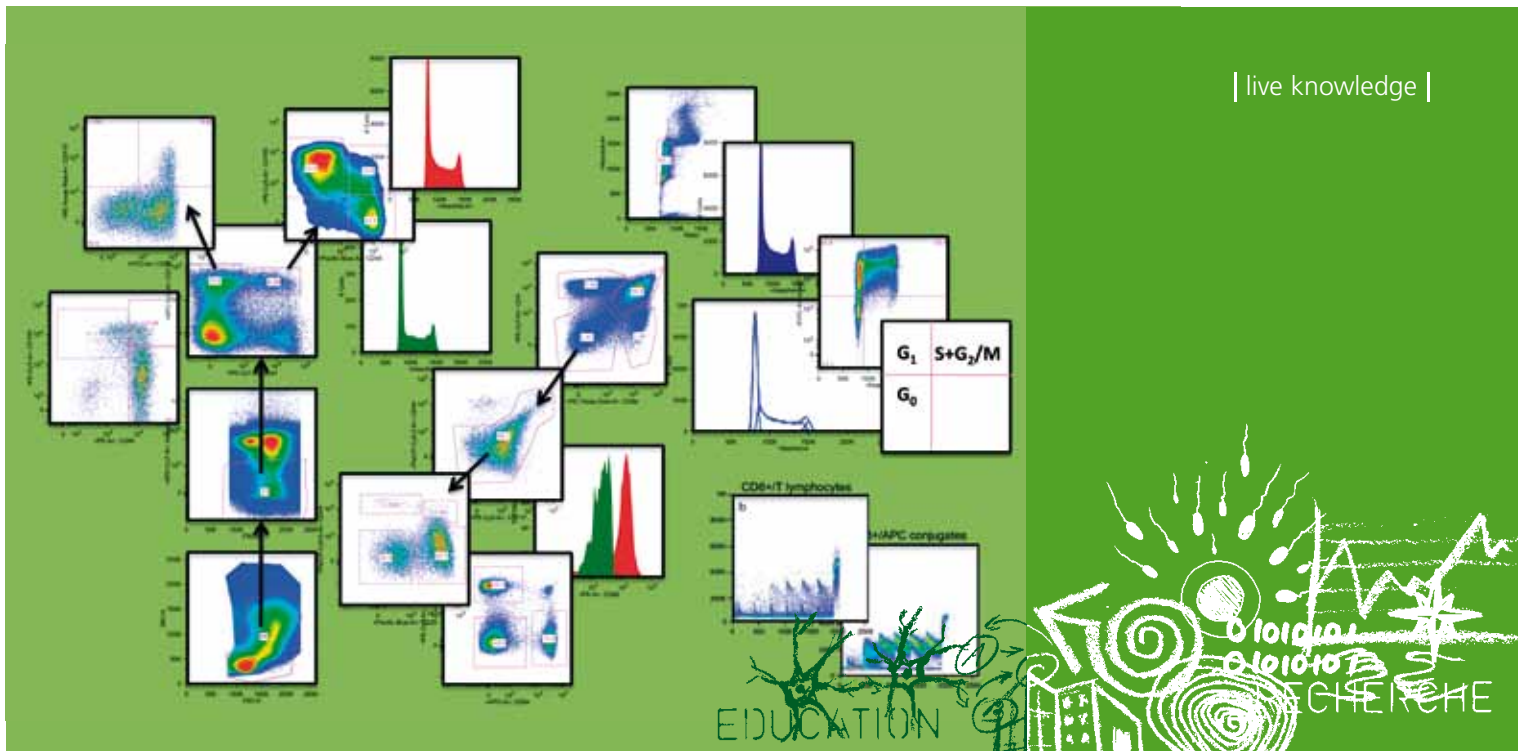
### EQUIPMENT

- High-pressure freezer.
- Freeze-substitution apparatus.
- Cryo-ultramicrotome.
- Sputter coater.
- Metal and carbon evaporator.
- Critical-point dryer.

### EXPERTISE OF THE TEAM

- Resin (serial) sectioning.
- Tokuyasu cryo-sectioning.
- Immunolabelling (LM & EM).
- Correlative light - electron microscopy.
- Cryo-preparation methods for cryo-EM.
- Electron tomography.





Imaging

# flow cytometry facility (FCF)

## INFORMATION & CONTACT

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<http://www.unil.ch/facs/>

## OVERVIEW

The Flow Cytometry Facility (FCF) is primarily located within the Ludwig Centre for Cancer Research (LICR@UNIL) at the Centre of Immunology and Infection of Lausanne (CIIL). A smaller unit can be found at the Bugnon site in the Orthopedic Hospital.

The Facility provides a cell sorting service (currently up to 12 parameters) in Epalinges, and also has a number of multi-color (up to 20 parameters) analytical machines available for use at both sites. Training in the use of these machines, as well as practical and theoretical advice for staining protocols are available for techniques such as multi-color analysis, cell cycle analysis, Ca<sup>2+</sup> flux and FRET. A high throughput system (HTS) for screening is also available in Epalinges.

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## INSTRUMENTATION

### Flow Cytometry Equipment

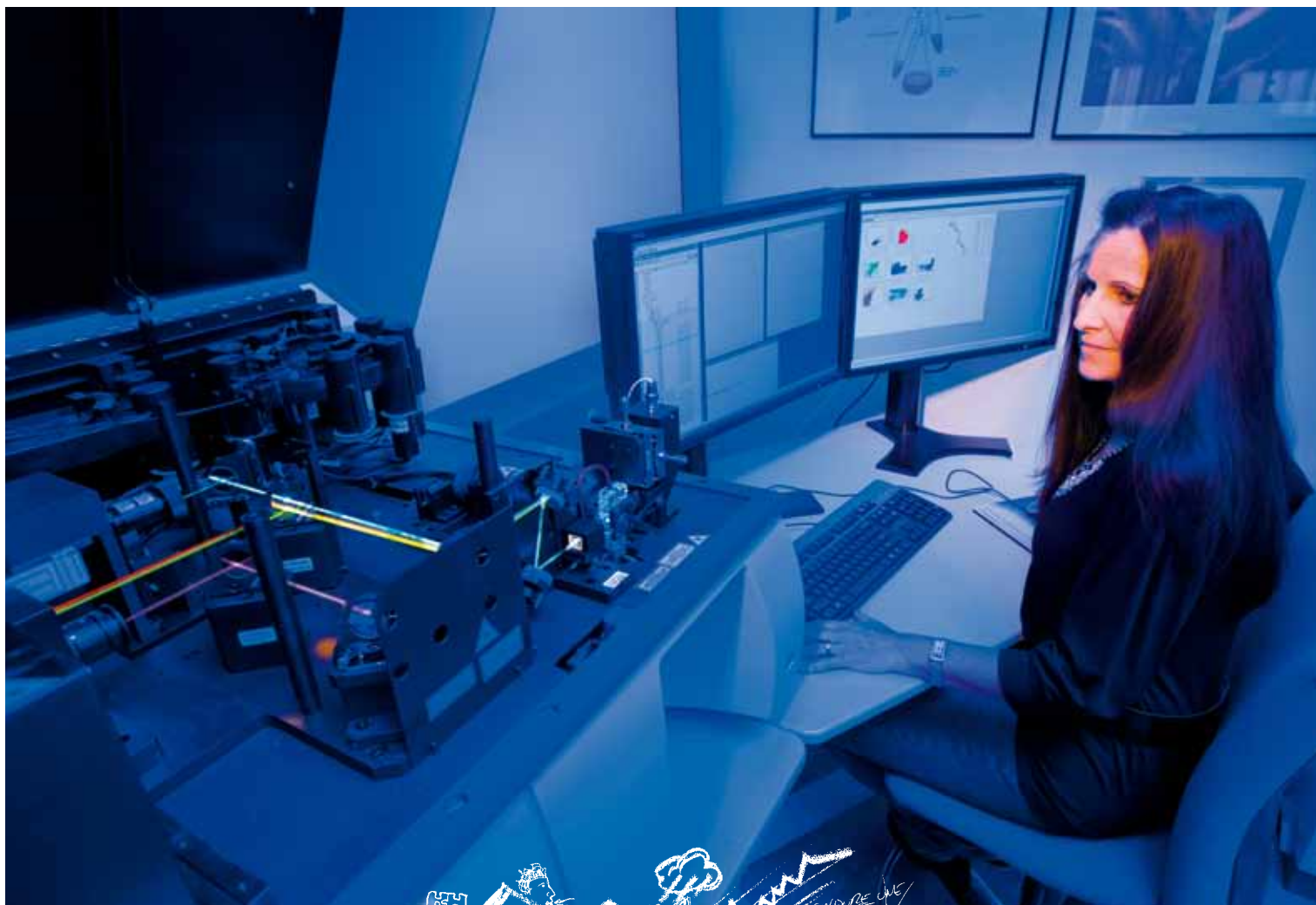
#### Epalinges

- 10-color, 3 laser (405nm, 488nm, 633nm) FACS Aria I sorter.
- 16-color, 4 laser (405nm, 488nm, 561nm, 640nm) LSR II with HTS.
- 18-color, 5 laser (355nm, 405nm, 488nm, 561nm, 640nm) LSR II SORP.
- 12-color, 3 laser (405nm, 488nm, 633nm) FACS Canto I.
- 4-color, 2 laser (488nm, 635nm) FACS Calibur.
- 2 x 3-color, 1 laser (488nm) FACScans.

#### Bugnon

- 2 x 10-color, 3 laser (405nm, 488nm, 640nm) Gallios.
- 4-color, 1 laser (488nm) LSR I.

A 18-color, 5 laser (355nm, 405nm, 488nm, 561nm, 640nm) sorter will be acquired during 2011.





Animal Models

# Transgenic Animal Facility (TAF)

## OVERVIEW

The TAF (Transgenic Animal Facility) is a service facility specialized in the generation of transgenic animals. Our mission is to provide access to transgenic technologies, reduce the effort and costs for the investigators and increase the know-how in the field of transgenesis. The main techniques used include generation of genetically-engineered mice, namely transgenic mice and knock-out/ -in mice.

The platform has been created in 2004 and is financially supported by the Faculty of Biology and Medicine of the University of Lausanne and the University Hospital (CHUV).

## INFORMATION & CONTACT

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Transgenic Animal Facility – TAF  
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## SERVICES

### Access to Transgenic technologies

- Providing advisory and technical support for local groups at any stage of experimental design of recombinant DNA constructs.
- Production of genetically modified mice (classical transgenesis) and homologous recombination (gene targeting).
- Performing re-derivation of established mouse lines (embryo transfer).
- Acting as an interactive center of experience, expertise and training in Southern blot and/or other PCR-based technologies. Laboratory space and instrumentation are available to users wanting to perform limited experiments and/or analysis in the facility.
- Providing a forum for sharing of methods, protocols and experience generated by the TAF and community scientists using analytical technologies.

### Classical transgenesis – Generation of transgenic mice

- Preparation of the DNA construct (provided by the investigator) for injection.
- Recovery of the fertilized oocytes from mice.
- Production of donor and recipient mice.

- Microinjection of the DNA construct into male pronucleus of fertilized oocytes.
- Transfer of the manipulated embryos into the oviducts of pseudopregnant recipients.
- Generation of transgenic lines under controlled conditions.
- Delivery of the founders to the investigator.

### Gene Targeting – Generation of gene knock-out/-in mice

- Electroporation of embryonic stem (ES) cells (e.g., 129 SvEv) with the DNA construct (provided by the investigator) and selection of the mutated stem cells.
- Production of donor and recipient mice.
- Recovery of blastocysts from C57BL/6 females.
- Injection of ES cells into the blastocysts.
- Transfer of the manipulated blastocysts into the uterus of pseudopregnant recipients.
- Generation of chimeric mice under controlled conditions.
- Delivery of the chimeric mice to the investigator.

### Embryo transfer

- Production of donor and recipient mice.
- Transfer of embryos into the oviducts/uterus of pseudopregnant recipients.
- Health control according to FELASA.
- Delivery of re-derived mice to the investigator.

## APPLICATIONS

### Services

- Generation of transgenic mice.
- Generation of gene knock-out/-in mice.
- Injection of ES cells into blastocysts.
- Re-derivation of transgenic lines.
- Isolation of embryos.
- Breeding strategies.

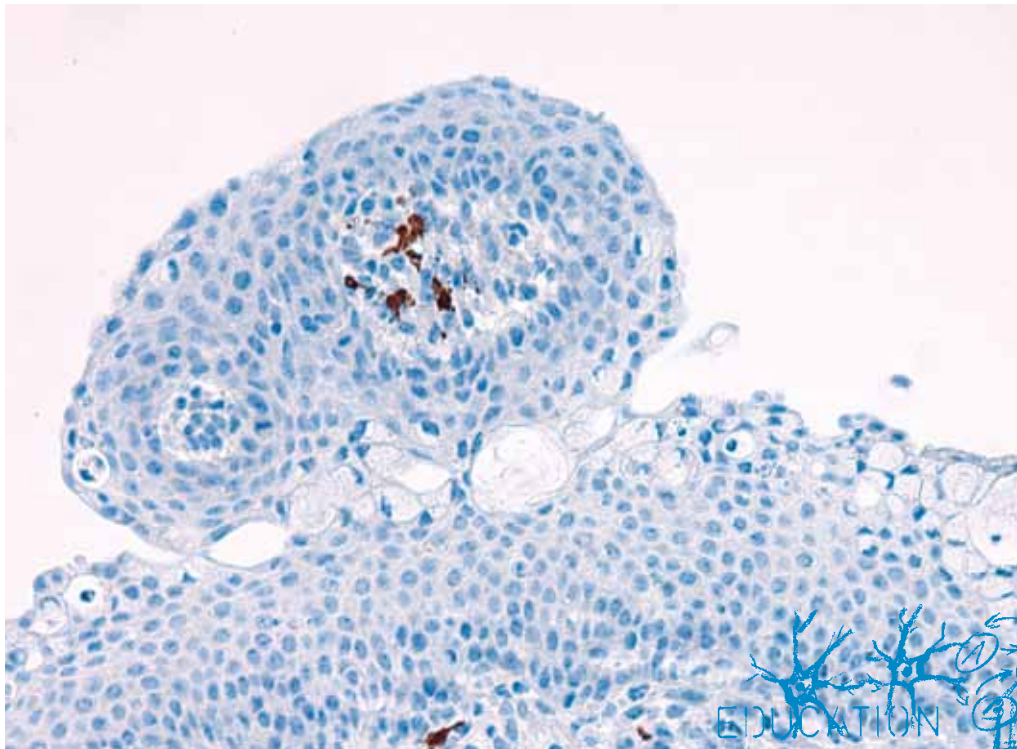
### Teaching

- Introduction to transgenesis.
- New transgenic techniques and their application in biomedical research.
- Demonstrations of transgenic and transgenic-related techniques.

### New developments

- BAC cloning.
- New hybrid ES cells lines.
- Sperm freezing.





Animal Models

# mouse pathology facility (MPF)

## OVERVIEW

The Mouse Pathology Facility (MPF) is a histology platform with a mission to provide an in-depth histological analysis of mice which have been genetically altered (either transgenic “knock-in” or “knock-out” mice). Following dissection and tissue preparation, slides are prepared for standard or special staining procedures. Immunohistochemical staining is also available, thus allowing an in-depth evaluation of any phenotype. Following specimen preparation, pathologists at the Institute of Pathology examine and evaluate the tissues.

The MPF is a joint effort of the Faculty of Biology and Medicine of the University of Lausanne (FBM) and the University Hospital (CHUV).

## INFORMATION & CONTACT

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Mouse Pathology Facility – MPF

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- Département de Biochimie  
Chemin des Boveresses 155  
CH-1066 Epalinges

[www.unil.ch/fbm](http://www.unil.ch/fbm)

## SERVICES

### Transgenic mouse analysis

This package involves the dissection of 19 organs, preparation of paraffin blocks and staining of sections (hematoxylin-eosin) of two genetically modified mice and two wild type littermates. The slides are evaluated by resident pathologists and a report of their observations is generated.

### Mouse organ analysis

Depending on the need of the researchers, individual organs of mice can be dissected, embedded in paraffin, sectioned, stained and examined by qualified pathologists for altered histology between control and experimental groups.

## APPLICATIONS

### Frozen tissue sections (Cryostat)

Some staining procedures and antibodies require the preparation of non-fixed tissue sections. This can be achieved by embedding frozen tissue in OCT and preparing sections on a cryostat.

### Histochemical staining techniques

Numerous staining techniques exist for the detection of specific molecules and structures.

There are approximately 50 alternative staining procedures available.

### Immunohistochemistry

The laboratory can optimize the use of previously uncharacterized antibodies and subsequently employ them in tissue sections analysis. Alternatively, any of the antibodies previously characterized by the MPF (approximately 40) can be employed for better understanding of an altered phenotype.

### Embedding and section preparation

If researchers simply wish to have the MPF prepare tissue sections of previously dissected mouse organs, this service is also available.





Animal Models

## mouse metabolic facility (MEF)

### OVERVIEW

The Mouse Metabolic Facility (MEF) is supported by the UNIL and CHUV Cardiomet Center. It comprises a mouse experimentation facility and a blood analysis platform.

The MEF proposes a wide repertoire of state-of-the-art metabolic analyses in the areas of Energy Metabolism and Glucose Homeostasis, to phenotype murine models of obesity and diabetes and to test the therapeutic efficacy of new pharmacological agents.

### INFORMATION & CONTACT

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Mouse Metabolic Facility – MEF  
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[www.unil.ch/fbm](http://www.unil.ch/fbm)

## SERVICES

The missions of the MEF are to:

- Provide services to researchers from Academic partners and from Industry.
- Ensure the on-demand development of new techniques.
- Teach some of the techniques.
- Support metabolic research by groups from the Center for Integrative Genomics.
- Perform its own research as well, thus ensuring a constant updating of equipments and expertise.

The MEF strives to provide affordable services to a maximum number of researchers, in a constant quest for the highest standards of excellence.

## TECHNIQUES

The MEF proposes primary screens to uncover metabolic alterations and secondary, gold-standard analyses. Secondary analyses include:

### Assessment of energy balance to detect variations in energy uptake, storage and energy expenditure

- Non-invasive analysis of body composition by MRS (EchoMRI).
- Analysis of metabolism by indirect calorimetry (CLAMS system from Columbus), including measurements of feeding, drinking, heat production, selective substrate oxidation (carbohydrates/ lipids) and locomotor activity.
- Energy content of stools by bomb calorimetry.
- Online measurements of food intake (BioDaq, Research Diet).
- Telemetric, online measurements of body temperature and locomotor activity (DSI).

### Assessment of metabolic responses to

- The nutritional status (fasting, western diet, by indirect calorimetry).
- Physical exercise (treadmill coupled to indirect calorimetry).

### Assessment of glucose homeostasis

- Insulin action: euglycemic, hyperinsulinemic clamp.
- Insulin secretion: hyperglycaemic clamp.
- Counterregulation: hypoglycaemic, hyperinsulinemic clamp.

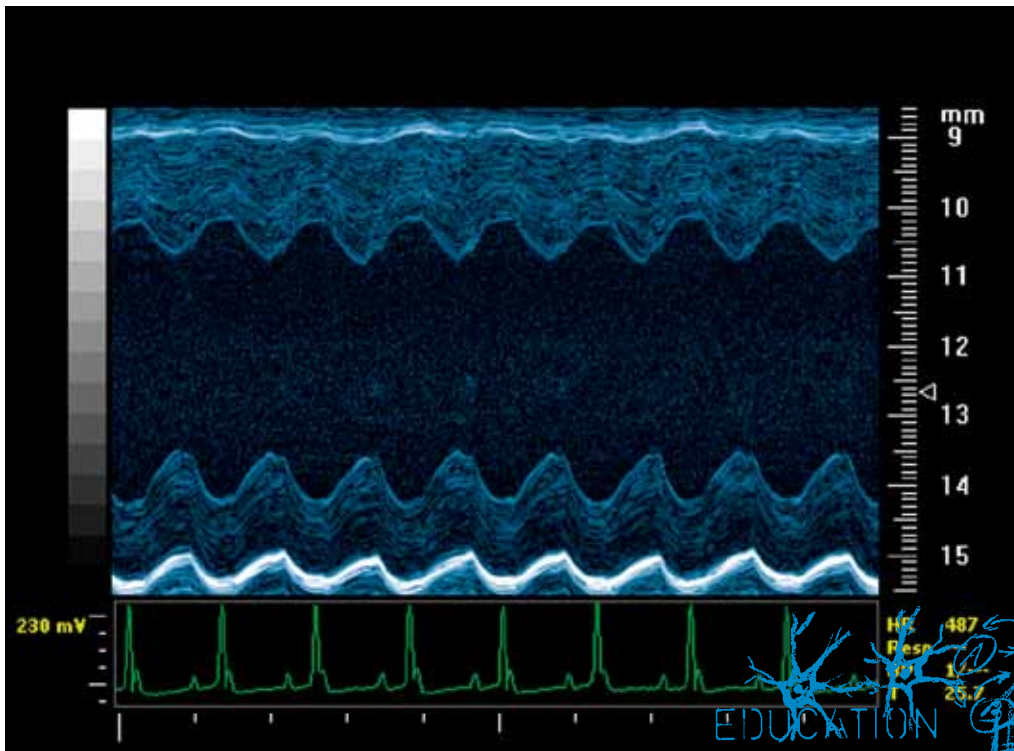
### Study of the brain – periphery crosstalk in the control of metabolism

- Intracerebral injections of drugs/ peptides/viruses.

### Blood analysis

- Blood chemistry (Hitachi robot).
- Multiplex analysis of cytokines/ hormones (BIOPLEX).
- Radioimmunoassays.
- ELISAs.





Animal Models

# cardiovascular Assessment facility (CAF)

## OVERVIEW

The Cardiovascular Assessment Facility (CAF) has been created to offer to the scientific community sophisticated techniques for the physiological assessment of the cardiovascular system in rodents.

Specifically, the CAF provides investigators with the latest equipment for cardiovascular imaging, in particular a high-resolution in vivo micro-imaging system (Vevo 770, Visualsonics), allowing determination of cardiac dimensions and performance. The CAF is also equipped for the functional evaluation of the cardiovascular system, such as measurement of blood pressure and heart rate.

In addition, the CAF offers a microsurgery service for producing pathophysiological models (transaortic constriction, myocardial infarction, renovascular hypertension etc.). Scientific support is provided for the design of experimental protocols as well as for the development of new techniques for the investigation of the cardiovascular system.

## INFORMATION & CONTACT

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## SERVICES (for mice and rats)

### Microsurgical services (pathophysiological models)

- Myocardial infarction.
- Transaortic constriction (pressure overload model).
- Goldblatt hypertensive models (1K1C; 2K1C).
- Myocardial injection.
- Balloon injury.

### Ultrasound imaging (VEVO770, VISUALSONICS)

- Left ventricular function and dimensions.
- Doppler.
- Abdominal, tumor and in utero imaging.
- 3D imaging of tumor or organs.

### Electrocardiography (EMKA)

- Detailed analysis of ECG complexes.
- Arrhythmias.

### Blood pressure and heart rate measurements

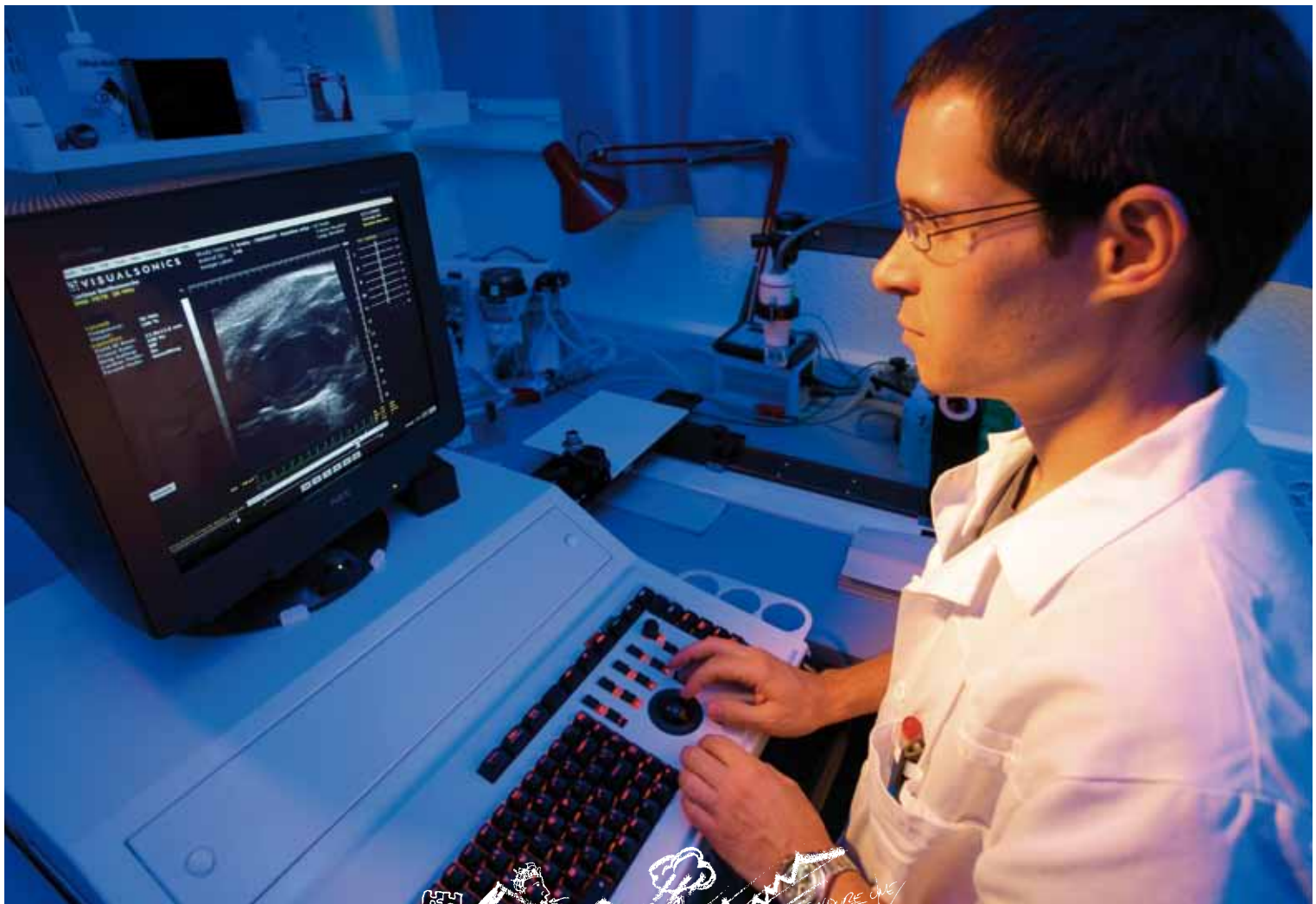
- Noninvasive method: Tail-cuff recordings (Visitech).
- Invasive method: direct arterial measurements (Notocord).
- Telemetric measurement (DSI).

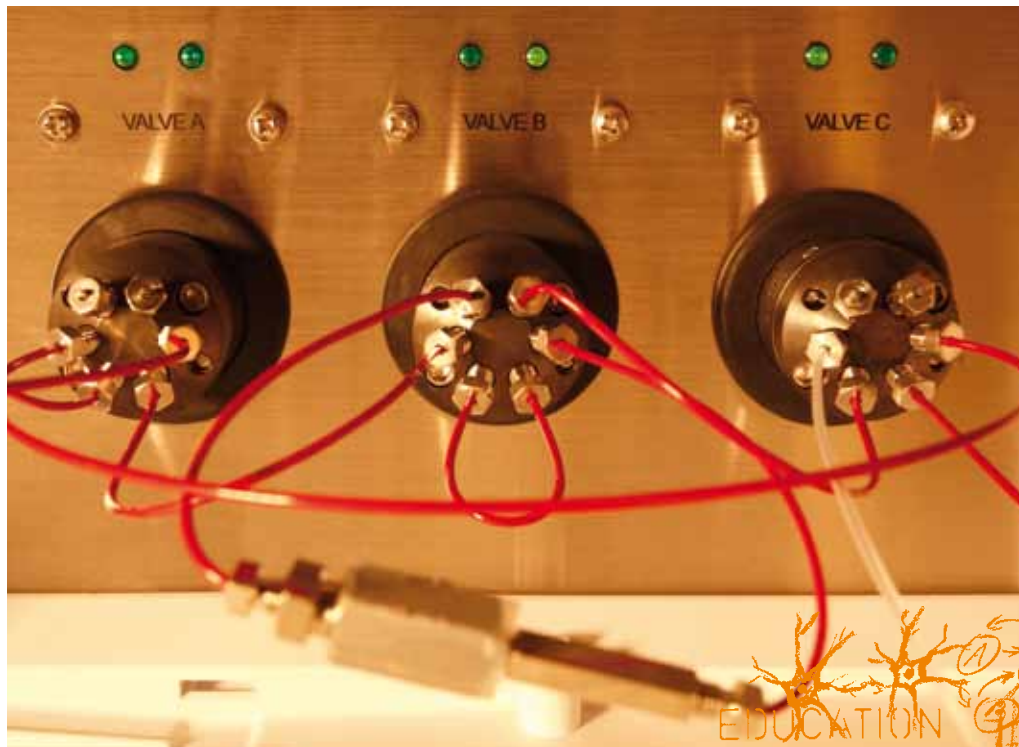
### Others

- Vascular catheter.
- Osmotic pump implants.
- Blood and tissue harvest.

### Coming soon

- Pressure/volume loop (intraventricular catheter).





Proteins & Mass Spectrometry

# quantitative mass spectrometry facility (qMSF)

## OVERVIEW

Since 2003, the quantitative Mass Spectrometry Facility (qMSF) located at the CHUV is available to all biomedical investigators, but mainly researchers from the Faculty of Biology and Medicine (FBM).

Its goal is to assist users in basic, clinical and biomedical research in the development of routine and diagnostic applications.

Its technology allows quantitative identification and analysis of small molecules (i.e. drugs), endogenous substances, hormones or even peptides.

## INFORMATION & CONTACT

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## SERVICES

### State of the art in LC-MS/MS analysis at qMSF

- Quantitative methods for drugs, peptides, endogenous compounds at very low levels in plasma or other matrices.
- Analyses following FDA guidelines.
- Identification of biotransformation products of drugs and peptides.
- Kinetic studies of the fate of drugs or peptides in in vitro incubations or patients.

### qMSF supports partners in their research

Project discussion and usefulness of LC-MS/MS.

### qMSF performs routine or research analyses for partners

- Quantification of biomarkers or drugs in biomatrices.
- Quantification of peptides at picomolar levels in human blood samples.
- Identification of metabolites of drugs or peptides.
- LC-MS/MS method validation.

### qMSF develops its own research

- Study the fate of anti-cancer agents in human and tumor cells.
- Study the biotransformation of anticancer drugs and identification of their metabolites.
- Upgrade in LC-MS/MS analysis and technology.

### Typical applications

- Quantification of neuropeptide Y, brain natriuretic peptide and substance P in cell culture medium, plasma and tissues.
- Structure elucidation of imatinib metabolites by MS/MS fragmentation.
- Fate of imatinib or neuropeptide Y in in vitro incubations and cell cultures.
- Routine analysis of antifungal drugs such as caspofungin, posaconazole, etc.

### Training in LC-MS/MS

Master students to post-doc fellows.

### Available LC-MS/MS instruments at qMSF

- 2D-UPLC – Triple Quadrupole (Thermo).
- 2D-UPLC – Linear Ion Trap (Thermo).



1 MSKPHSEAGT AFIQTQQLHA AMADYFLERM CRLDIDSPPI TANNTGIICF  
 51 IQPASREIVET LKEMIKSGM VARLNPSHGT HEYHAETIKH VRTATESFAS  
 101 DFILYRFPVAV ALDTYGFPEIR TGLINGSGTA EVELKKGATL KITLDMAYME  
 151 KCDENILMLD YKHICKVVEV GSKITVDOGL ISLQVQKGA DFLVTKVEHG  
 201 GGLGSEKGVN LPGAAVDLPA VSEKDIQQLK FVVEQVDMV FASFIRKASD  
 251 VHEVRRKVLGE KGHKIKLISK IENHEGVRRF DEILEASDGI MVARGDLGIE  
 301 IFAKVVFLAQ KMMIGRCHRA GKPVICATQM LESMIKKRFP TRAEQSDVAN  
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 451 IAVTRNPGTA RQAHLYRGIF PVLCKDFVQE AWAEDVDLEV NFAMNVOKAR  
 501 GFFKKGDDVI VLTGNRPDGG FTNTHRVVFP F



Proteins & Mass Spectrometry

# protein analysis facility (PAF)

## OVERVIEW

The Protein Analysis Facility (PAF) is a service and research laboratory specialized in the study of proteins and proteomes. Its primary mission is to provide the local academic community with state-of-the-art analysis of protein expression and function.

In addition, the PAF provides courses at the undergraduate and post-graduate level (coming soon) to train students and researchers in proteomics applications.

The PAF is organised in two separate laboratories, one on the Dorigny campus (CIG) and one in the Epalinges Research Center (Department of Biochemistry). Users can deliver samples to both laboratories.

## INFORMATION & CONTACT

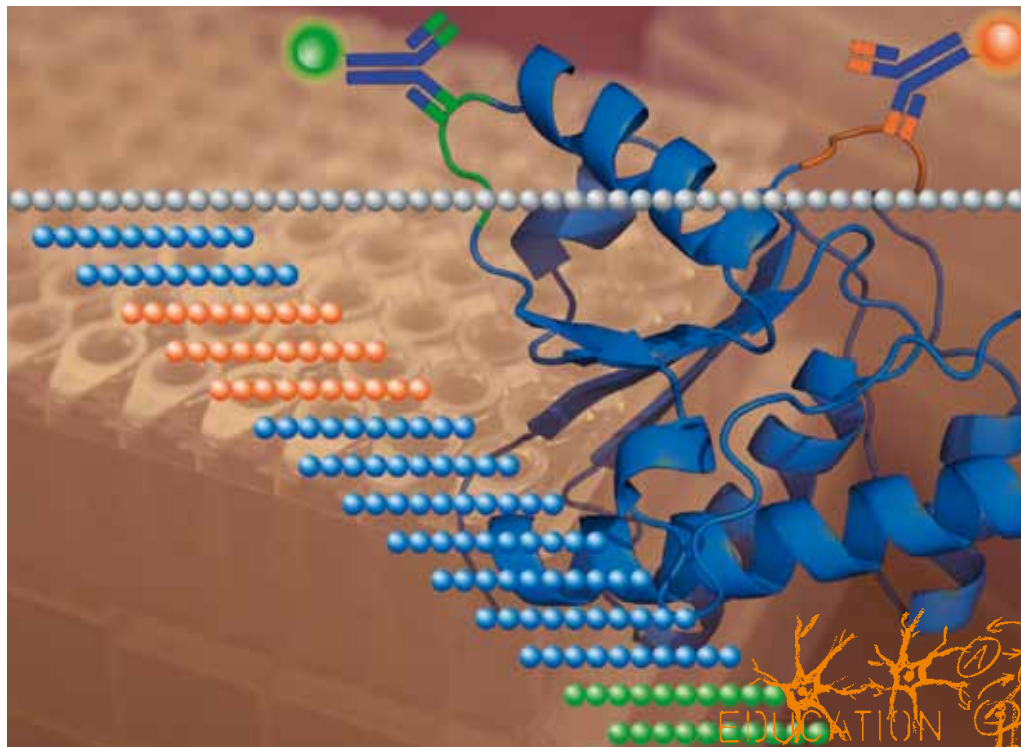
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[www.unil.ch/paf](http://www.unil.ch/paf)

Protein Analysis Facility – PAF

- Centre Intégratif de Génomique Génopode  
 CH-1015 Lausanne
- Département de Biochimie  
 Chemin des Boveresses 155  
 CH-1066 Epalinges





Proteins & Mass Spectrometry

# protein and peptide chemistry facility (ppcf)

## OVERVIEW

The mission of the Protein and Peptide Chemistry Facility (PPCF) is to provide information on selected aspects of peptide synthesis and protein structure and to create the resources for investigators requiring peptide synthesis, peptide/protein purification and mass spectroscopic analysis for basic and clinical research.

The Clinical Tumor Proteome Analysis Facility (CTPAF) is currently part of PPCF and will provide high-throughput preparation of clinical samples (biological fluids, cells, tissues) from cancer patients and healthy individuals and mass spectrometry to identify and quantify the proteins in these samples.

## INFORMATION & CONTACT

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[www.unil.ch/ib/page9229.html](http://www.unil.ch/ib/page9229.html)  
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## SERVICES

- Custom peptide synthesis

Peptides from 2 to 120 amino acids in the 1mg to 500 mg range. Purity from crude to >98%. Cyclic peptides, modified peptides, custom heavy peptides that are labelled with stable isotopes, (<sup>13</sup>C, <sup>15</sup>N) for Mass Spectrometry (MS) and Nuclear Magnetic Resonance (NMR) Spectroscopy applications.

- High Throughput Synthesis

Peptide sets:

We provide 96 different peptides, unbound, in 96 individual tubes or in 96-well plate format, length up to 25 amino acids at 2.5µm scale, biotin and fluorescein available, statistically significant QC of each individual plate.

Spot peptides:

Fully automated SPOT synthesis to make peptide arrays on cellulose membranes. Up to 1200 positions on freely defined grids can be addressed on the two synthesis membranes and peptide length from 8 to 25 residues. (Intavis Bioanalytical Instruments).

- Quality control assurance of synthesized peptides and expressed proteins by mass spectrometry.
- Detection and Absolute Quantification of Proteins in clinical samples (biofluids and tissues).
- HPLC and MS for the separation, identification and sequencing of peptides isolated from biological matrices and from protease digestion of pure proteins.
- Liquid chromatography methods for the separation of proteins from whole-cell and subcellular fractions.
- Amino acid composition analysis of peptides and protein for accurate quantification in solution.

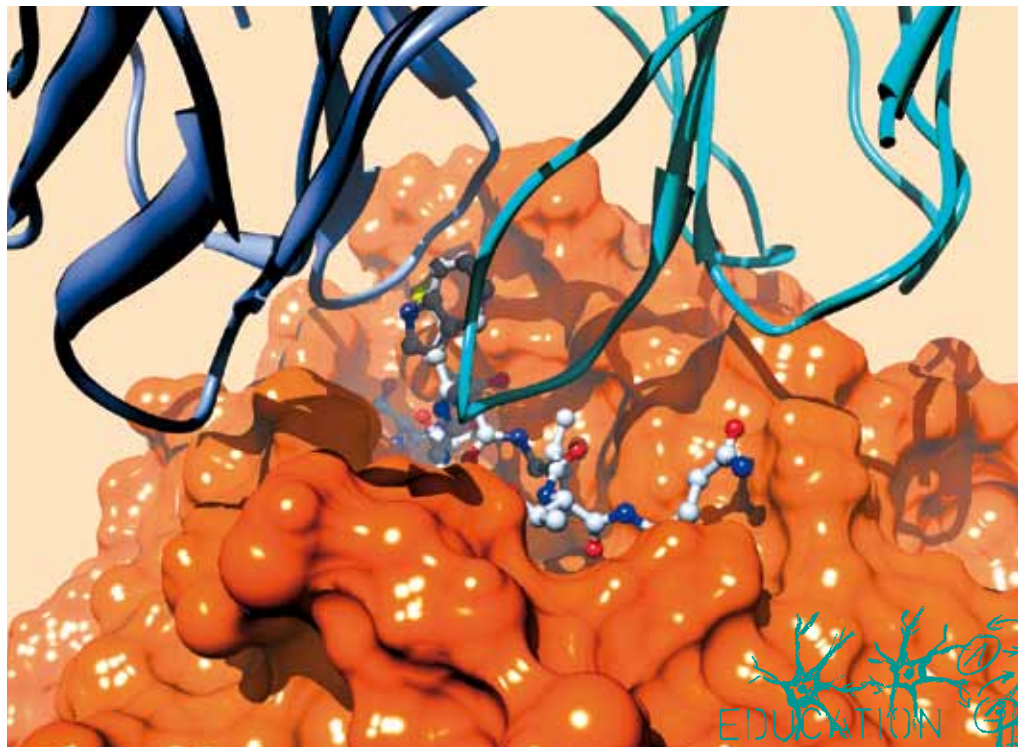
## APPLICATIONS

- Epitope mapping.
- Protein-protein interactions, receptor-ligand interactions, enzyme activities (e.g. kinases), metal binding studies.
- Detection and Absolute Quantification of Proteins in clinical samples (biofluids and tissues) by using heavy peptides as sequence-identical internal weight standards for quantitation of proteins and protein mixtures.

The PPCF provides advice and consulting to investigators related to different aspects of protein chemistry.

The PPCF participates in teaching (lectures and practicals) organized by the DB in the context of undergraduate, Masters and PhD programs.





Bioinformatics / Molecular Modeling / Computational Biology

# protein modeling facility (PMF)

## OVERVIEW

The objective of the Protein Modeling Facility is to provide the researchers with a competence center for three-dimensional protein structure prediction and analysis. The bioinformatics and biophysics data provided by the PMF offers in-depth understanding of the molecular phenomena behind the experimental results and facilitates design of new relevant experiments.

The PMF is organized around the Molecular Modeling Group of the Swiss Institute of Bioinformatics, and is located in the Genopode building of the Dorigny campus of the University of Lausanne. The background of the PMF employees covers medicine, biology, chemistry, pharmacy and physics and allows the PMF to provide all state-of-the-art techniques in molecular modeling and structural bioinformatics.

## INFORMATION & CONTACT

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## SERVICES

### Homology modeling

#### Protein engineering (qualitative and quantitative)

- Estimation of side chain contributions to the interaction between macromolecules.
- Estimation of side chain contributions to the structural stability of a macromolecule.
- Proposition of point mutations to modulate the biological function of the protein, e.g. to increase the binding for a ligand.
- Impact of mutations and SNP analysis.

#### Study of the dynamic behavior of macromolecules, in relation to sequence and structure

### Protein-protein docking

### Drug Design

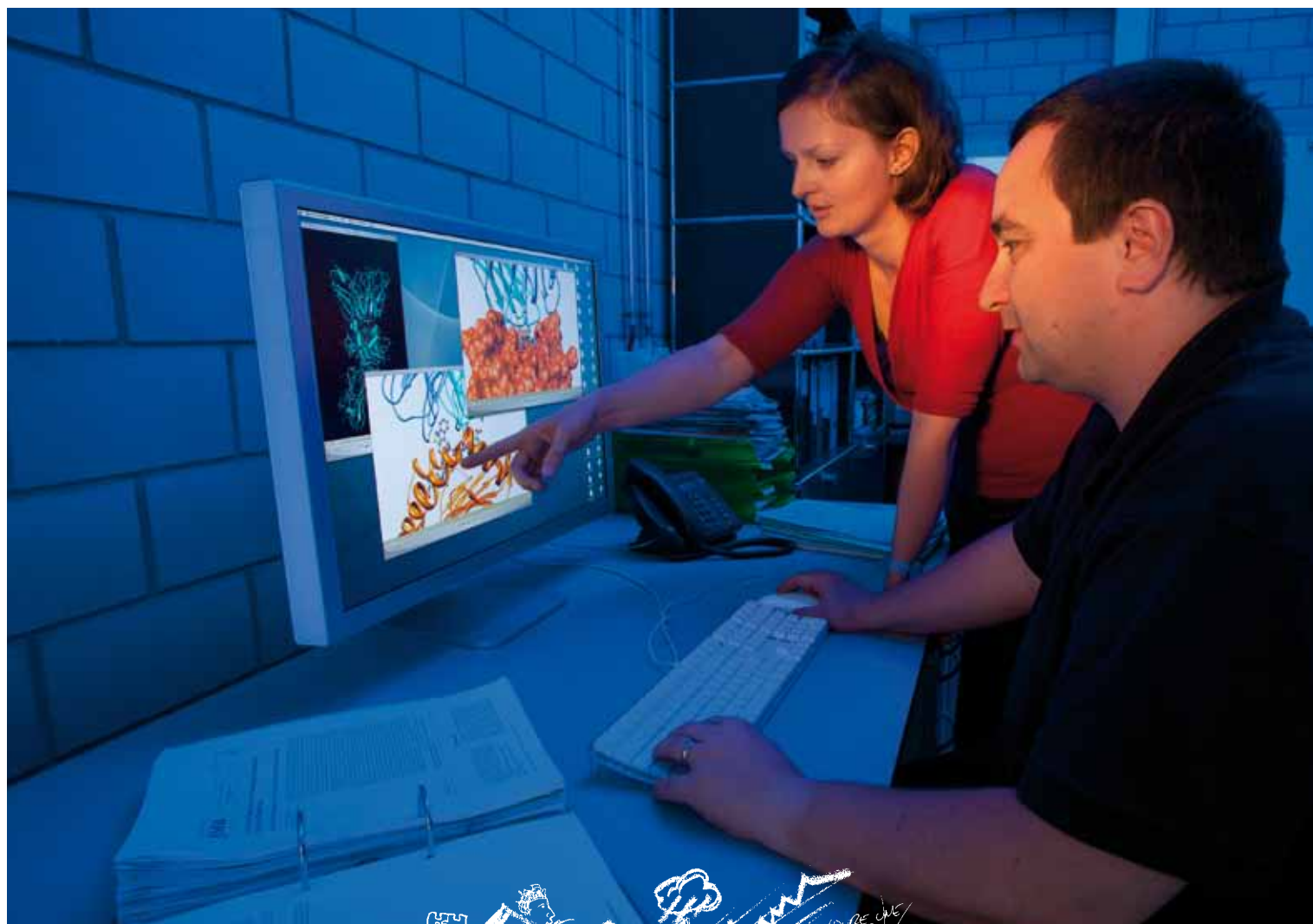
- Docking of small molecules. SwissDock web server.
- Study of interactions between small molecules and macromolecules.
- Design of new putative ligands.
- Selection of best ligands to be tested within a given database.
- Optimization of existing ligands.
- Estimation of physicochemical properties of ligands, in relation to their pharmaco-kinetic and dynamic properties.
- Suggestion of Biososteres of small molecules.
- Suggestion of small molecules with similar shapes and charge distribution to those of the users, and belonging to databases of existing or virtual molecules.

### Molecular graphics

- Production of figures or short videos for scientific communications (posters, articles, talks). Full HD videos may be provided.
- Support in macromolecule visualization.

### Teaching

- Molecular modeling courses.
- Molecular graphic tutorials.





Bioinformatics / Molecular Modeling / Computational Biology

# vital-IT ([www.vital-it.ch](http://www.vital-it.ch))

## INFORMATION & CONTACT

Vital-IT Platform

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## OVERVIEW

Vital-IT stems from the vision of the University of Lausanne (UNIL), the University of Geneva (UNIGE), the École Polytechnique Fédérale de Lausanne (EPFL) and the Swiss Institute of Bioinformatics (SIB) to create a scientific and technological center of competence in bioinformatics by teaming up with several industrial partners.

Vital-IT is a bioinformatics competence center that supports and collaborates with life scientists in Switzerland and beyond. The multi-disciplinary team provides human expertise, training as well as a high-performance computing (HPC) and storage infrastructure, to help develop, maintain and extend life science and medical science research.

Vital-IT is managed by the SIB Swiss Institute of Bioinformatics.

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