EULAR Research Center Database

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Current Fields of Research Experimental Rheumatology

Epigenetic modifications in rheumatic and cardiovascular diseases including methylation, acetylation, sumoylation and microRNA, represent the major focus of our current research. The molecular and cellular basis of joint destruction in rheumatoid arthritis, osteoarthritis and ankylosing spondylitis, involves especially the search for novel genes and their signalling pathways (“Functional Genomics”).

The laboratory explores the molecular and cellular mechanisms by studying the processes of synovial adhesion to cartilage and bone, the activation of synovial cells to invade and the cellular interactions with cells of the immune system. The role of microparticles and modulating gene expression are another focus of our interest.

Suppressive subtractive hybridization and arrays are used to establish cDNA libraries of genes which are induced by various stimuli, including signalling via cytokine receptors and TOLL-like receptors.

Somatic gene transfer is applied to inhibit synovial cell-mediated cartilage destruction in the SCID mouse model engrafted with normal human cartilage and rheumatoid synovial tissues or isolated cells. Anti-sense constructs, ribozymes, siRNA and antagonirs are used to identify specific targets for future therapeutic interventions. The model is further used to explore the effect of novel drugs from the pharmaceutical industry.

In close cooperation with the Department of Cardiology at the University Hospital of Zürich, we are studying the endothelial function in both rheumatic and cardiovascular patients. Novel investigations on fresh thrombi retrieved from myocardial infarcted patients explore the role of inflammation in the acute coronary syndrome.

A new clinical Research Program has been developed entitled “Molecular Analysis of Gene Expression modulated by Novel Drug Therapies” to study the molecular effects of drugs on individual cells. By evaluating most comprehensively these changes, novel modes of action as well as unwanted side effects can be discovered to develop safer therapeutics.

Current Fields of Research Systemic Autoimmune Diseases

We are focusing on two connective tissue diseases, systemic sclerosis and inflammatory myopathy. It is one of the internationally leading scleroderma research centres. It has research programs both in clinical research as well as in basic science research.

Systemic sclerosis (SSc) is an autoimmune disease characterized by widespread vasculopathy, inflammation and fibrosis of skin and internal organs. This leads to thickening of the skin as well as irreversible functional impairment of organ function. However the etiology of SSc is unclear and the molecular mechanisms underlying the disease are poorly understood. In several independent but cooperative projects, we aim to determine molecular mechanisms that drive the onset and progression of fibrosis in SSc skin or internal organs.
The term inflammatory myopathy (myositis) comprises a group of heterogeneous autoimmune diseases which are characterized by the presence of an inflammatory infiltrate within the muscle tissue. The skin, the musculoskeletal system, but also internal organs such as lung, heart, or gastrointestinal tract might also be affected. Thus, those orphan diseases have a high morbidity and a significantly increased mortality. Current research efforts in basic science are aimed at the identification of molecular key players of disease pathogenesis as potential therapeutic targets.

Selected Publications


IF: 9.111

IF: 10.377

IF: 13.853

IF: 10.377

IF: 9.771

IF: 14.776

IF: 8.435

IF: 8.435

IF: 14.429

Current Funding
- IAR (Institute for Arthritis Research) 2010-2016
- EC BTCure 2011-2016
- EC FP7-People-2011 Networks for Initial Training (ITN) Marie Curie Osteoimmune 2012-2016
- EC Health 2012 Innovation Euro-TEAM 2012-2016
- EC Osteoimmune
Training of Fellows in Research
We have established a molecular biology training course, twice a year, to train new international research fellows in cloning, sequencing, cell-culture, cell-sorting (FACS), TaqMan Real Time PCR, primer design, in situ PCR, in situ hybridization, analysis of acetylation, methylation and miRNAs and immunohistology.

WebPages
http://www.rheuma.unispital.ch
http://www.research-projects.unizh.ch/med/unit43300/area463/index.htm

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