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Head of Work Interdisciplinary Group: *Nanocarriers for medical applications*

Scientific work and Clinical Training

April 2009	Habilitation „Interaktion von Nanopartikeln mit Zellen“ in Transfusion Medicine
Since September 2009	Qualified Person and Head of Production at the „Herstellungslabor für Zelltherapien”, III. Medical Clinic, University Medicine, Mainz.
Mai 2008	Board certification for transfusion medicine
Sept. 2003 till Aug. 2008	Fellow in the Institute of Clinical Transfusion Medicine, University of Ulm (Prof. Dr. H. Schrezenmeier). Nanoparticles as contrast agents for MRI applications. Mesenchymal stem cells for clinical applications.
Dec. 2000 – Aug. 2003	Resident in the Department of Hematology, Onkology and Transfusion Medicine, Charité Campus University Clinic Benjamin Franklin, (Phase I/II study for vaccination of AML patients with Wilms tumorgene 1 peptides. Leukaemia associated antigens of MDS patients
June 1999 – Nov. 2000	Intern in the Robert-Rössle-Klinik, Charité Campus Berlin-Buch. Clinical studies with Her2neu antibodies for breast carcinoma. Neoadjuvant therapy of gastric carcinoma. Tamoxifen study in patients with multiple myeloma.
April 1997- April 1998	One-year research fellowship in the bone marrow transplantation lab of Prof. Robert Negrin and Prof. Karl G. Blume, University Stanford, California, USA. Studies on adoptive immunotherapy (cytokine induced killer (CIK) cells). Fas/FasL in CIK cells

Doctorate
University: University of Ulm, Department of Applied Physiology, Laboratory of Prof. Lehmann-Horn
Thesis: Mutations in the main muscular chloride channel gene (CLCN1) in patients with Myotonia congenital (dominat and recessive forms)
Date: 2001

Awards and Honors

10/2005	Poster prize of the „Deutschen Gesellschaft für Transfusionsmedizin und Immunhämatologie“ for the poster: „Influence of Surface Modification of Nanoparticles for Cellular Uptake and Adhesion“
1995 till 1999	Study scholarship of the „Studienstiftung des Deutschen Volkes“ (Scholarship Foundation of the German People)
1994-1996	Scholar of the „Graduiertenkolleg Biomolekulare Medizin“ in Ulm during doctoral thesis

Research interest

Nanocarriers for the application in biomedical applications
Nanocarriers offers a plethora of possibilities for enhancing the effectiveness of therapeutic molecules. Herefore nanosized capsules between 10 and 300 nm are used as carriers for drugs and diagnostic substances. Interdisciplinary research projects in this area include the design and synthesis of functionalized biodegradable nanoparticles/nanocapsules for imaging in vivo, site specific drug delivery, and controlled release of a drug within the targeted cells.

The ability to modify specific features of their physical, chemical and biological properties opens the way to manipulate the actions of nanoparticles in biomedical applications. We have investigated the contribution of different uptake mechanisms for the incorporation of nanoparticles into cells. While surface modifications with charged side groups alter the uptake behavior in different cell types specific uptake first needs the suppression of unspecific interactions with the non-target cells. Furthermore their behavior in plasma, blood as well as their distribution on a macro- and microscale is investigated in our group. All this enables us to specifically design nanocarriers for delivery of drugs and diagnostics to cells used in cellular therapeutics like stem cells or immune cells or in regenerative medicine where scaffolds are decorated with nanocarriers for a slow and sustained release of growth and differentiation factors. Furthermore these functionally enhanced scaffolds can be pre-seeded with cells ex vivo and then implanted in order to replace a diseased or injured tissue. This will lead to reliable regeneration of bone and cartilage, but also regeneration of skin can be achieved by these means.