Doctoral College
Metabolic & Cardiovascular Disease

DEFINED PROTEIN PARTICLES AS SEEDS OF LIPID DROPLETS AND ADIPOGENESIS

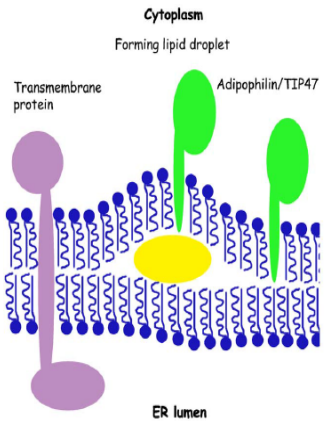
GUEST LECTURE by

Hans Heid, PhD

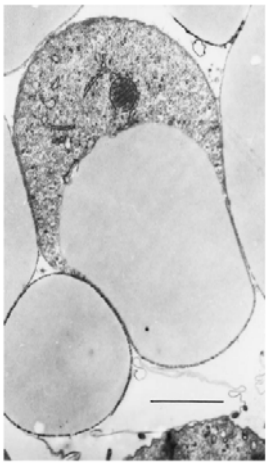
Helmholtz Group for Cell Biology
German Cancer Research Center (DKFZ)
Heidelberg / Germany

Friday, 18.11.2011
15:00h

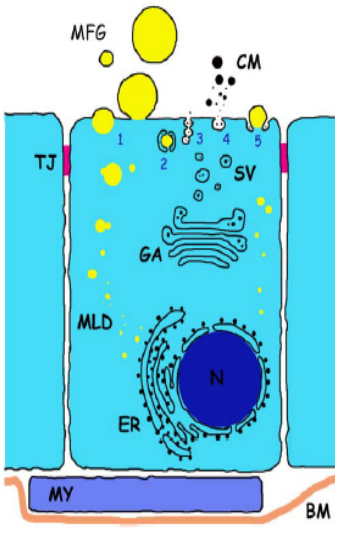
Department of Pathology, Lecture Hall
Auenbruggerplatz 25, ground floor



Scheme of lipid droplet formation within the endoplasmic reticulum membrane



Milk fat globules in the alveolar lumen in a specimen from rat mammary gland



The intracellular origin, growth, and secretion of milk fat globules

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Abstract

Lipid droplets (LD) i.e. spherical accumulations of apolar lipids and other hydrophobic substances, are generally surrounded by a thin cortical layer of specific amphiphilic proteins (APs), segregating the LDs from the mostly polar components of the cytoplasm. LDs are reported to be involved in many cellular processes, including lipid storage, membrane and other lipid material traffic, and signal transduction. We have studied these organelles in diverse cultured cells and tissues and have in particular characterized some of the associated AP proteins from an ancient gene family, identified in mammals, Drosophila and Dictyostelium. The sequence related LD-binding protein family, in mammals consisting of the proteins *Perilipin, Adipophilin, TIP47, MLDP and S3-12*, has been characterized for the biological specificities and the histodiagnostic value of these APs as markers of certain human diseases such as liposarcoma, lipoma, atherosclerosis, fatty liver steatosis and various tumors.

Using newly generated AP antibodies and improved LD and lipid complex isolation methods, we have enriched and characterized APs from human, rodent and bovine cell cultures and tissues, including adipogenic cells from human bone marrow and lipoaspirates, liver cells as well as various carcinoma cells. Lipid-AP complexes could be obtained in the top layer fractions of floating gradient separations of such cells and also in different combinations from somewhat higher densities fractions and were analyzed by ultracentrifugation, immunofluorescence microscopy, electron and immunoelectron microscopy, by freeze-fracture immuno-localization and with biochemical methods. Surprisingly we could identify different LD types - even in the same cell - by their AP patterns. The aim of our studies is to elucidate the molecular interactions between LDs and AP molecules as well as their potential regulatory roles during LD growth and the architectonic LD associations with cell components such as the vimentin intermediate filament arrays.

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Hans Heid, PhD

Helmholtz Group for Cell Biology, A991
Head: Prof. Werner W. Franke
German Cancer Research Center (DKFZ), Heidelberg / Germany

Curriculum vitae

1969 – 1974	Chemistry at the Technical University of Karlsruhe
1974	Chemistry Diploma, Technical University of Karlsruhe
1974 - 1977	Research and Teaching Assistantship at the Institute of Pharmaceutical Chemistry, University of Heidelberg
1977 – 1979	Pharmacy at the University of Heidelberg
1979	Pharmaceutical State Exam ("Pharmazeutisches Staatsexamen"), University of Heidelberg
1979 - 1983	Ph.D. (University of Heidelberg) at the German Cancer Research Center, Division of Cell and Tumor Biology; Supervisor: Prof. Werner W. Franke
1983	Ph.D. (Dr. rer. nat.) in Cell Biology, University of Heidelberg
1979 - 1980	Visiting Ph.D. student at the Research Department of Animal Science, University of Purdue, West Lafayette, IND, USA; Head: Prof. Thomas W. Keenan
1983 - 1986	Postdoctoral Position at the Division of Cell and Tumor Biology, German CancerResearch Center, Heidelberg; Head: Prof. Werner W. Franke
1986	Staff Scientist at the Division of Cell Biology, German Cancer Research Center, Heidelberg; Head: Prof. Werner W. Franke

Publications

1981

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