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The liver sinusoidal endothelial cell: a new player in homeostasis and immunity

Prof. Bård Smedsrød
Department of Medical Biology
University of Tromsø, Norway

Every second the animal body is challenged with waste material, both self-made and foreign. Most macromolecules in the body are highly dynamic structures, with natural turnover rates spanning from minutes to months. This natural turnover includes some limited extracellular degradation, but in fact, complete degradation to single building blocks (amino acids, monosaccharides, fatty acids, and nucleotides) will primarily take place after uptake and intralysosomal processing in specialized scavenger cells. In addition to natural turnover mechanisms, chemical and mechanical wear-and-tear processes constantly turn macromolecules into harmful waste substances, such as advanced glycation end products and oxidized lipoproteins that are recognized and eliminated by the same scavenger cells. Moreover, foreign material (primarily microbes and microbial products) that constantly invade the body are removed by these scavenger cells. Cells responsible for the removal of waste macromolecules have long been the subject of research in immunology, metabolism, and physiology. The role of the macrophage in uptake and degradation of waste substances was extensively studied over several decades, leading to a major focus on the role of macrophages in this process. The past three decades has led to a significant development in our understanding of the waste generating and disposal processes in the body, and we now know that extracellular macromolecules as well as entire cells are turned over by uptake and lysosomal degradation in specialized scavenger cells, namely, macrophages and scavenger endothelial cells, in particular the *liver sinusoidal endothelial cell*. Clearly, a deeper knowledge of the scavenger endothelial cell, which is much less studied than the macrophage, will provide insight into disease formation, and blood clearance functions, i.e., the beneficial elimination of blood-borne virus and other pathogens, as well as unwanted uptake of biopharmaceuticals.

Curriculum Vitae

Employment:

2011 - : Founder and CSO, D'Liver (www.dliver.com), a service and development providing company specializing on the biodistribution of biopharmaceuticals.

1993 - : Professor in Cell Biology; Head of Vascular Biology Research Group, Department of Medical Biology, University of Tromsø (uit.no/research/vbrg).

Education:

1984: Ph.D. in Biochemistry/Cell biology at University of Uppsala, Department of Medical Chemistry. Thesis title: "*Endocytosis of connective tissue macromolecules in liver endothelial cells*".

Supervision:

17 PhD; 6 postdocs; 9 masters

Publication:

155 scientific papers; h-index (web of science, May 2014): 33

Current Research:

centers around the biology and physiology/pathophysiology of the vertebrate scavenger endothelial cell (SEC) (= the liver sinusoidal cell, LSEC), and includes national and international collaboration, both with colleagues within our own field, with groups representing translational research, and with groups representing quite different fields (interdisciplinary research) such as nano materials physics and optical physics.

For many years we have performed pioneering work developing methods to isolate and cultivate LSECs, enabling basic studies of these cells. We have established methods for isolation and culture of LSECs from mouse, rat and pig, and as partner of the EU FP7 project HeMiBio we prepare early primary cultures of human LSECs. Moreover we study the phylogeny of SEC.

Another line of our research includes interaction of nanoparticles, or colloids, with LSECs, which are remarkably active in the clearance of blood borne colloids.