Microbodies

Peroxysomes and Glyoxysomes

Since the first conference 1969, entitled «The nature and function of Peroxysomes (Microbodies and Glyoxysomes)» has been a tremendous progress in this field, summarized on the second conference 1981 by H. KINDL and P-B. LAZAROW (1982).

The *microbodies* seems to be nothaway a unit. In Trichomonads discovered D. LINDMARK a. M. MÜLLER (1973) microbodies and identified them as «hydrogenosomes» . An other type found in Triponosomatids by F. OPPERDOES a. P. BORST (1977) were recognized as «glycosomes» . There seems to be no overlap with peroxysomes or glyoxysomes; each of these microbodies has an originally functional system:

Anaerobic transfer of electrons between pyruvate and protons, supporting a substrate-level phosphorylation step for the hydrogenosomes; anaerobic glycolysis from glucose to 3-phosphoglycerate and glycerol, in a manner that is mysteriously selfsupporting ATP, for the glycosomes (DE DUVE 1982). These microbodies are restricted to single groups of protozoa, whereas the peroxy-glyoxysomes are widely distributed throughout the plant and animal kingdom and the microorganisms.

The *evolutionary origin* of the microbodies is not exactly known, since the former hypothesis as derivates of the endoplasmatic reticulum is not generally accepted. DE DUVE proposed, that all different forms of peroxysomes and glyoxysomes in eukaryotic microorganisms, plant an animals are decendants of a common evolutionary ancestor in the role as a primitive respiratory organelle –lacking oxydative Phosphorilation, but capable of oxidizing all major foodstuffs with formation of hydrogen peroxide (H_2O_2). In the superior anaerobic bacteria with the establishment with mitochondria like the eukaryotic cells the function of peroxysomes got lost with the exception of certain functions, especially in gluconeogenesis.

Considerable *biochemical differences* between peroxysomal membranes and the endoplasmatic reticulum were detected by Y. FUJIKI a. o. (1982). It seems, that the peroxysomes are –independent of the endoplasmatic reticulum and the associated membransystem– an enterily isolated population of cell-organelles, similar to the mitochondria.

Following the suggestions of DE DUVE (1982) each type of microbody has some sort of counterpart among the ancient bacteria. Peroxysomes resemble some primitive aerobe, lacking an organized respiratory chain. Hydrogenosomes includes key properties of anaerobic hydrogen-producing bacteria, such as clostridia. The glycosomes could originate from some very primitive anaerobe, because they contain one of the oldest, if not the oldest enzyme system of the biosphere, the glycolysis.

Not unlike this hypothesis the most research-workers believe, that the mitochondria originate from symbionts, loosing with the nucleus the major part of their genetic autonomy.

The *function* is summarized as peroxysmal-β-oxidation. As triglycerols stored fatty acids are the main fuel reserves of animals and readily used by the most tissues with exceptions of a few specialized

cells such as nerve cells and erythrocytes (T. HASHIMOTO 1982). The fatty acid degradation goes over the successive oxidation removal of acetyl groups from the carboxyl end of the long chain fatty acids.