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Presence and Features of Fatty Acyl-CoA Binding Activity of Rat Hepatic Peroxisomes

Fumie Hashimoto（橋本フミ恵）and Hidenori Hayashi（林　秀徳）

Department of Pathological Biochemistry, Faculty of Pharmaceutical Sciences, Josai University, Keyakidai, Sakado, Saitama 350-0295, JAPAN

We studied the fatty acyl-CoA binding activity of the peroxisomes in rat liver. After subcellular fractionation of rat liver treated or not treated with clofibrate, a peroxisome proliferator, the binding activity with [1-^{14}C]palmitoyl-CoA was detected in the light mitochondrial fraction in addition to the mitochondrial and cytosol fractions. After Nycodenz centrifugation of the light mitochondrial fraction, the binding activity was detected in the peroxisomes. The activity depended on the 2-mercaptoethanol concentration, and the plateau of activity was unexpectedly found at concentrations of 2-mercaptoethanol from 20 to 40 mM. Clofibrate increased the total and specific activity of the fatty acyl-CoA binding of peroxisomes to 7.9 and 2.5 times the control, respectively. In the presence of 20% glycerol at 0°C, approximately 90% of the binding activity was maintained up to at least 3 wk. After successive treatment by ultramembrane Amicon YM series, about 70% of the binding activity was detected in a fraction of M.W. 30,000 - 100,000. When the M.W. 30,000 - 100,000 fraction was added to the incubation mixture of the fatty acyl-CoA ß-oxidation system of peroxisomes, a slight increase in the ß-oxidation activity was found. 2-Mercaptoethanol (20 mM) significantly activated the fatty acyl-CoA ß-oxidation system to 1.4 times the control. After gelfiltration of the fraction of M.W. 30,000 - 100,000, the peaks of fatty acyl-CoA binding protein showed broad elution profiles from 45,000 to 75,000. These results suggest that the fatty acyl-CoA binding activity can be directly detected in peroxisomes and increased by peroxisome proliferators. The high binding activity in the presence of higher concentrations of 2-mercaptoethanol indicates the importance of the SH group for the binding. The apparent molecular weight of the binding protein may be from 45,000 to 75,000.