Tricarboxylic Acid Cycle Enzymes of the Ectomycorrhizal Basidiomycete, *Suillus bovinus*

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Z. Naturforsch. 56c, 334–342 (2001); received December 13, 2000/January 26, 2001

*Suillus bovinus*, Carbohydrate Metabolism, Tricarboxylic Acid Cycle Enzymes

In crude cell extracts of the ectomycorrhizal fungus, *Suillus bovinus*, activities of citrate synthase, aconitase, isocitrate dehydrogenase, succinate dehydrogenase, fumarase, and malate dehydrogenase have been proved and analyzed. Citrate synthase exhibited high affinities for both its substrates: oxaloacetate \((K_m = 0.018 \text{ mm})\) and acetyl-CoA \((K_m = 0.014 \text{ mm})\). Aconitase showed better affinity for isocitrate \((K_m = 0.62 \text{ mm})\) than for citrate \((K_m = 3.20 \text{ mm})\). Analysis of isocitrate dehydrogenase revealed only small maximum activity \((60 \text{ nmol} \times \text{mg protein}^{-1} \times \text{min}^{-1})\), the enzyme being exclusively NADP\(^+\)-dependent. Using the artificial electron acceptor dichlorophenol indophenol, activity and substrate affinity of succinate dehydrogenase were rather poor. Fumarase proved Fe\(^2+\)-independent. Its affinity for malate was found higher \((K_m = 1.19 \text{ mm})\) than that for fumarate \((K_m = 2.09 \text{ mm})\). High total activity of malate dehydrogenase could be separated by native PAGE into a slowly running species of (mainly) cytosolic (about 80%) and a faster running species of (mainly) mitochondrial origin. Affinities for oxaloacetate of the two enzyme species were found identical within limits of significance \((K_m = 0.24 \text{ mm and } 0.22 \text{ mm})\). The assumed cytosolic enzyme exhibited affinity for malate \((K_m = 5.77 \text{ mm})\) more than one order of magnitude lower than that for oxaloacetate. FPLC on superose 12 revealed only one activity band at a molecular mass of 100 ± 15 kDa. Activities of 2-oxoglutarate dehydrogenase and of succinyl-CoA synthetase could not be found. Technical problems in their detection, but also existence of an incomplete tricarboxylic acid cycle are considered. Metabolite affinities, maximum activities and pH-dependences of fumarase and of malate dehydrogenase allow the assumption of a reductive instead of oxidative function of these enzymes in vivo.