Study on mammalian peroxisome biogenesis : Peroxisomal membrane proteins are assembled via the direct Pex19p-Pex3p pathway

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（哺乳類ペルオキシソームの形成機構に関する研究：ペルオキシソーム膜タンパク質は Pex19p-Pex3p 経路を介して直接膜へ輸送され組み込まれる）

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Abstract

Correct targeting of peroxisomal membrane proteins (PMPs) is essential for the formation and maintenance of functional peroxisomes. Activities of Pex19p to interact with PMPs on one hand and Pex3p on the other, including formation of ternary complexes between Pex19p, PMP, and Pex3p, strongly support post-translational translocation of PMPs via the Pex19p- and Pex3p-dependent direct pathway, termed the class I pathway. However, it remains elusive whether Pex19p-PMP complexes are indeed capable of being imported into peroxisomal membranes through the interaction between Pex19p and Pex3p. We resolve this issue by investigating the targeting process of several topologically distinct PMPs, including multi-membrane-spanning PMPs. We show here that Pex19p forms cytosolic complexes with PMPs and directly translocates them to peroxisomes. Using a semi-intact mammalian cell-based import assay system, we prove that PMPs in the cytosolic complexes are imported into peroxisomes via the interaction between cargo-loaded Pex19p and Pex3p. Furthermore, we demonstrate for the first time that peroxisomal targeting of ATAD1, an N-terminally signal-anchored protein that resides on both mitochondria and peroxisomes, is also achieved through the Pex19p- and Pex3p-dependent class I pathway. Together, our results suggest that translocation of PMPs via the class I pathway is a common event in mammalian cells.