

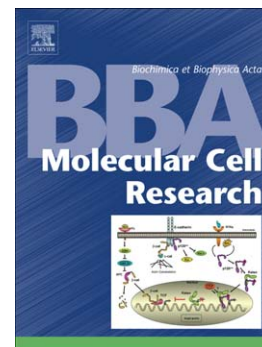
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Assembly, Maintenance and Dynamics of Peroxisomes

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Preface

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Peroxisomes are ubiquitous organelles of eukaryotic cells, and it is becoming increasingly clear that the biogenesis of these multi-purpose organelles is more complex than initially anticipated. Along this line, peroxisomes exhibit features, which clearly distinguishes them from other cellular organelles, like their ability to import folded proteins or their capability to form *de novo*. However, further insight into the cellular life of peroxisomes also revealed features that they share with other organelles, such as organelle fission or regulated degradation by autophagy, that are similar for peroxisomes, mitochondria and chloroplasts.

This special issue highlights recent progress in the understanding of the biogenesis of peroxisomes with emphasis on the **assembly, maintenance** and **dynamics** of the organelles. In particular, it focuses on the following areas: (i) Topogenesis of peroxisomal matrix proteins as well as the structure and function of peroxisomal protein import machineries. (ii) Peroxisomal targeting of membrane proteins and *de novo* formation of peroxisomes. (iii) Maintenance of peroxisomes in health and disease. (iv) Proliferation and regulated degradation of peroxisomes. (v) Motility and inheritance of peroxisomes. (vi) Role of peroxisomes in the cellular context.

Topogenesis of Peroxisomal Matrix Proteins

A special feature of the peroxisomal protein import is the concept of **cycling receptors**, which can be conceptually divided into four steps: **(1) Recognition** of the peroxisomal targeting signal (PTS) by import receptors in the cytosol and assembly of the receptor–cargo complex. **(2) Docking** of the receptor–cargo complex at the peroxisomal membrane. **(3) Import** and release of cargo. **(4) Export** of the free receptor to the cytosol. Nearly three decades have passed since the discovery of the two peroxisomal targeting signals (PTS1 and PTS2), which direct proteins from the cytosol to the peroxisomal matrix and the first peroxins, proteins required for the biogenesis of peroxisomes. The first review in this special issue deals with the evolution of peroxisomal targeting signals, especially with the question how proteins evolved different types of peroxisomal targeting signals and in which order the two import pathways

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