**Peroxisome**, membrane-bound organelle occurring in the cytoplasm of eukaryotic cells. Peroxisomes play a key role in the oxidation of specific biomolecules. They also contribute to the biosynthesis of membrane lipids known as plasmalogens. In plant cells, peroxisomes carry out additional functions, including the recycling of carbon from phosphospholycolate during photorespiration. Specialized types of peroxisomes have been identified in plants, among them the glyoxysome, which functions in the conversion of fatty acids to carbohydrates.

Peroxisomes contain enzymes that oxidize certain molecules normally found in the cell, notably fatty acid and amino acids. Those oxidation reactions produce hydrogen peroxide, which is the basis of the name *peroxisome*. However, hydrogen peroxide is potentially toxic to the cell, because it has the ability to react with many other molecules. Therefore, peroxisomes also contain enzymes such as catalase that convert hydrogen peroxide to water and oxygen, thereby neutralizing the toxicity. In that way peroxisomes provide a safe location for the oxidative metabolism of certain molecules.

Plasmalogens are the primary ether lipids in humans (ether lipids contain one or more ether linkages, distinguishing them from other lipids, which typically contain ester linkages). Specialized enzymes in peroxisomes catalyze the synthesis of an ether phospholipid precursor. The precursor molecule undergoes further synthesis in the endoplasmic reticulum, resulting in the production of plasmalogen. Although the physiological role of plasmalogens is unclear, defects in their biosynthesis, which occur as a result of peroxisomal disorders, are associated with severe developmental conditions, including rhizomelic chondrodysplasia punctata (RCDP) and Zellweger syndrome. In the brain reduced levels of plasmalogens have been observed in patients with Alzheimer disease and linked to deficits in cognitive function.

Peroxisomal disorders are caused by mutation in genes that are involved in peroxisome biogenesis or that encode the enzymes and transporter proteins (which take up the enzymes from the cytoplasm) of the peroxisome. Peroxisomal disorders are congenital disorders, and they range from relatively moderate to severe in nature. The Zellweger spectrum, for example, includes Zellweger syndrome, neonatal adrenoleukodystrophy (NALD), and infantile Refsum disease. Zellweger syndrome is characterized by complete absence or reduction in the number of peroxisomes. It is the most severe condition within the Zellweger syndrome. Mutations giving rise to Zellweger syndrome cause copper, iron, and substances called very long chain fatty acids to accumulate in the blood and in tissues, such as the liver, brain, and kidneys. Infants with Zellweger syndrome are often born with facial deformity and intellectual disability; some may have impaired vision and hearing and may experience severe gastrointestinal bleeding or liver failure. Prognosis is poor: most infants with Zellweger syndrome do not live beyond one year. Symptoms of NALD and infantile Refsum disease, by contrast, appear in late infancy or in childhood, and patients may survive to early adulthood. Likewise, patients with RCDP may survive into childhood or, in mild cases, early adulthood.

Peroxisomes were described in 1960 as part of the pioneering work of [Christian René de Duve](https://www.britannica.com/biography/Christian-de-Duve), who developed cell fractionation techniques. De Duve’s method separated organelles on the basis of their sedimentation and density properties, and peroxisomes are denser than other organelles. He later coined the term *peroxisome*. De Duve shared the 1974 Nobel prize for Physiology or Medicine with Albert Claude and George Palade for that work.