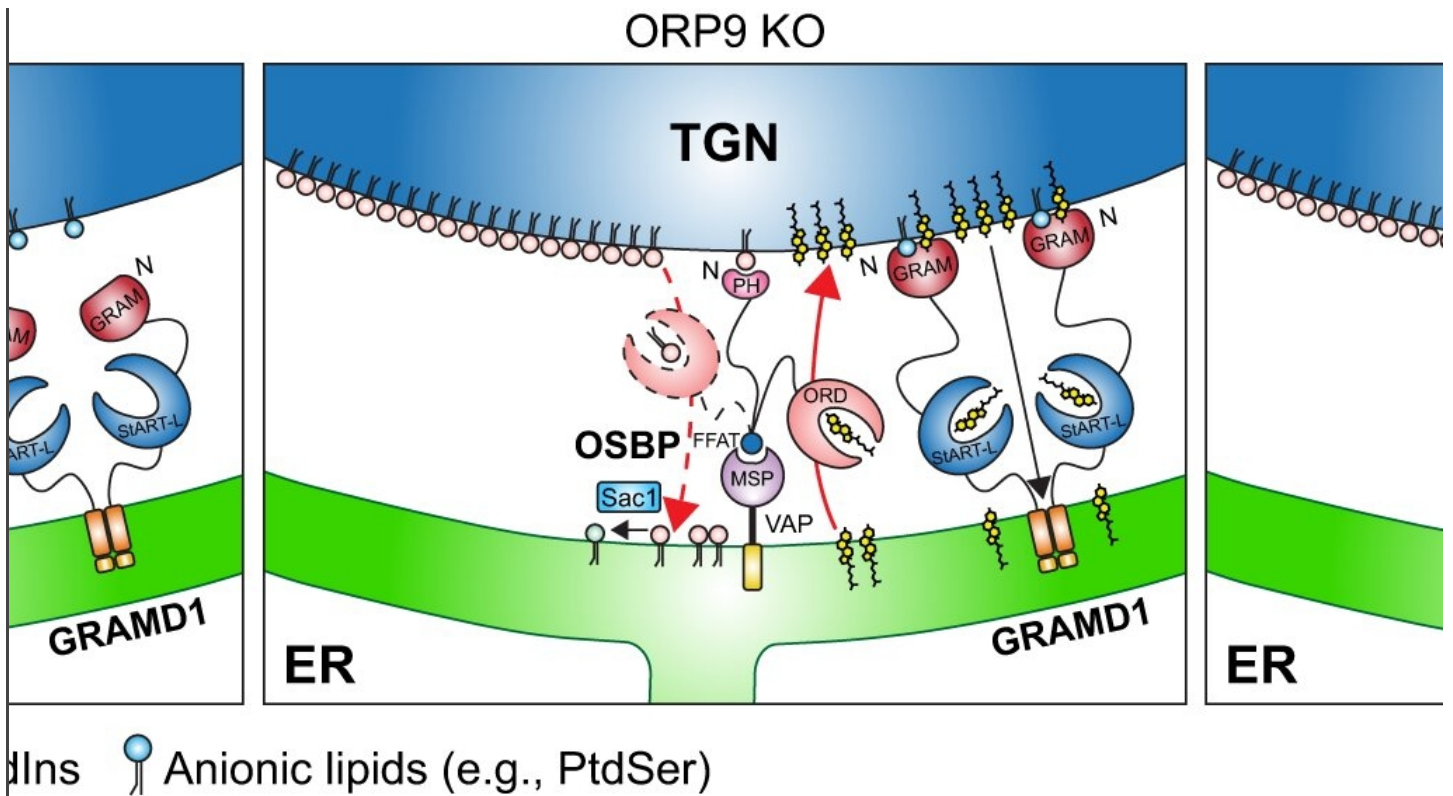


● HEALTH

Exploring the Intricate Processes of Cholesterol Distribution in Human Cells



By **Sheras Fernandes** • 2 days ago



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Unraveling the Mysteries of Cholesterol Distribution

Scientists at Nanyang Technological University, Singapore, have made significant strides in understanding how human cells distribute and maintain cholesterol levels, a process critical to the normal functioning of the body. Cholesterol, a waxy, fat-like substance, is vital for various body functions such as cell production, hormone creation, and defense against pathogens. This discovery is particularly relevant because irregularities in

Key Proteins in Cholesterol Regulation Identified

The researchers identified key proteins, OSBP1, ORP92, and GRAMD1s, that regulate and transport cholesterol within cells. Furthermore, the scientists found that when the ORP9 protein is deactivated, OSBP becomes hyperactive, causing excessive cholesterol distribution. GRAMD1 protein plays a role in maintaining cholesterol distribution, and without it, cells show abnormal cholesterol distribution.

The Impact of Cholesterol on Human Health

Cholesterol is the principal sterol of all higher animals distributed in body tissues especially the brain and spinal cord and in animal fats and oils. It is an essential structural component of animal cell membranes. In vertebrates, hepatic cells typically produce the greatest amounts. It is absent among prokaryotes (bacteria and archaea), although there are some exceptions, such as Mycoplasma, which require cholesterol for growth.

The Potential of New Therapeutic Approaches

This research marks a significant milestone in cell biology and could potentially contribute to developing new therapeutic approaches for diseases resulting from cholesterol dysregulation. Elevated levels of cholesterol in the blood, especially when bound to low-density lipoprotein (LDL), often referred to as 'bad cholesterol', may increase the risk of cardiovascular disease.

Understanding Cholesterol's Role in Cellular Functions

Cholesterol is essential for all animal life, with each cell capable of synthesizing it by way of a complex 37-step process. This process begins with the mevalonate or HMG-CoA reductase pathway, the target of statin drugs, which encompasses the first 18 steps. This is followed by 19 additional steps to convert the resulting lanosterol into cholesterol. A human male weighing 68 kg (150 lb) normally synthesizes about 1 gram (1,000 mg) of cholesterol per day, and his body contains about 35 g, mostly contained within the cell membranes.

Cholesterol and Disease: Unveiling the Connection

Using new genetic tools to study statins in human cells and mice, researchers and collaborators have uncovered how the cholesterol-lowering drugs protect the cells that line blood vessels. The findings provide new insight into statins' curiously wide-ranging benefits for conditions ranging from arteriosclerosis to diabetes. Statins are the most prescribed medications in the country, with more than 40 million Americans taking them. Yet, these underlying mechanisms are poorly understood.

A New Way to Visualize Cholesterol

Researchers from UCLA and the University of Western Australia have developed a new way of visualizing the distribution of cholesterol in cells and tissues. Their research provides insights into the movement of cholesterol into and out of cells and could eventually identify mechanisms linking cholesterol to coronary artery disease. Using a new high-resolution imaging mass spectrometry approach called NanoSIMS imaging, the team was able to visualize and quantify a pool of cholesterol, called accessible cholesterol, on the surface of cells.



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