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Cell Membrane Cholesterol and Diseases Associated with Its Deficiency

ABSTRACT

This review considers the significance of cell membrane cholesterol for health from the perspective of cell biology. The cell of an animal organism is a unique system in which the functioning of its constituent molecules is interdependent and coordinated, and any disruption of this coordination is fatal to the cell. One example of such coordination and mutual regulation is the functioning of membrane proteins, whose activity depends on their interaction with membrane lipids. With a given genome and corresponding set of proteins, this lipid component provides a wide range of regulation of cellular functions. Cholesterol is one of the most important lipids in cell membranes, and many membrane proteins are cholesterol dependent. For effective cell function, optimal cholesterol concentration is required, and deviations from this optimal level in either direction reduce the efficiency of cell processes. We examine the role of cholesterol in microbial infections and certain other conditions in which the pathogenesis is associated with a loss of cholesterol by cells. Considering the role of cholesterol in the pathogenesis of diseases and understanding the mechanisms of interactions between cholesterol and proteins are important resources for the development of drugs that target interactions between proteins and cholesterol and normalise cholesterol-dependent cell functions.

Keywords: cell membrane, cholesterol, cholesterol-dependent proteins, diseases

BIOGRAPHY

Born in Moscow in 1952, graduated from the Biology Department of the Moscow Lomonosov State University in 1975; worked at the Belozersky Research Institute, Moscow Lomonosov State University from 1975 to 2022. Collaboration with University College London, Amsterdam University, Stuttgart University, NIH. Areas of interest: intercellular communications; gap junctions; cell membranes, cholesterol-dependent proteins and processes; Five grandchildren