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Review on the Significant Interactions between Ultrafine Gas Bubbles and Biological Systems

Nguyen Le Hanh Tran, Thien Quang Lam, Phuong Vu Quynh Duong, Linh Hai Doan, Mai Phuong Vu, Khang Huy Phuc Nguyen, and Khoi Tan Nguyen*

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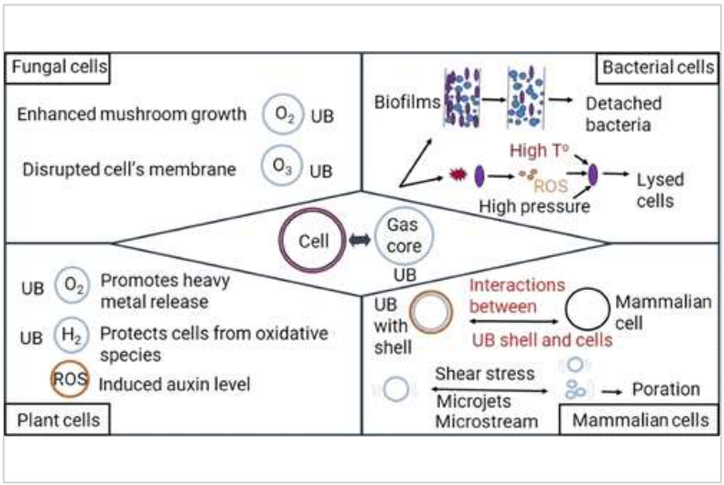
Abstract



Having sizes comparable with living cells and high abundance, ultrafine bubbles (UBs) are prone to inevitable interactions with different types of cells and facilitate alterations in physiological properties The interactions of four typical cell types (e.g., bacterial, fungal, plant, and mammalian cells) with UBs

an important role in the development of fungal cells. By the proposed mechanism of attachment of UB on hydrophobin proteins in the fungal cell wall, oxygen and ozone gas-filled ultrafine bubbles can eithe promote or hinder the cell growth rate. On the other hand, reactive oxygen species (ROS) formation an mass transfer facilitation are two means of indirect interactions between UBs and plant cells. Likewis the use of different gas cores in generating bubbles can produce different physical effects on these cells, for example, hydrogen gas for antioxidation against infections and oxygen for oxidation of toxic metal ions. For mammalian cells, the importance of investigating their interactions with UBs lies in the bubbles' action on cell viability as membrane poration for drug delivery can greatly affect cells' surviva UBs have been utilized and tested in forming the pores by different methods, ranging from bubble oscillation and microstream generation through acoustic cavitation to bubble implosion.

Subjects

Bacteria | Bubbles | Cells | Oxygen | Plasma Membrane

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