

Volatile oxidized lipids as noninvasive biomarkers for monitoring ferroptosis in cells, animal models, and human breath



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Abstract

This study demonstrates that volatile organic compounds (VOCs) can serve as biomarkers for ferroptosis, a lipid peroxidation-dependent cell death. Volatile oxidized lipids (VOLs) derived from ω -6 polyunsaturated fatty acids, such as 1-octen-3-ol and 2-pentylfuran, were identified and validated as ferroptosis markers. These VOLs were detected in cells, animal models, and human breath, particularly in metabolic dysfunction-associated steatohepatitis (MASH) cases, indicating their potential for noninvasive ferroptosis monitoring.

Biography

Yuki Sugiura studies the fundamentals of mass spectrometry, especially metabolomics and imaging mass spectrometry, and its application to clinical research. His research began in 2005 when he participated in the "Development of Mass Spectrometry" instrument development program of the Japan Science and Technology Agency. At that time, imaging mass spectrometry was developed as a technique to visualize the distribution of high molecular weight proteins. He and his colleagues developed this technique as an imaging method for low molecular weight metabolites. Recently, the imaging technique has also enabled visualization of the distribution of steroid hormones, and a specific type of cell that secretes abnormal amounts of aldosterone in the adrenal glands of hypertensive patients has been discovered by that imaging technique.