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Codetermination of sphingomyelin and cholesterol in cellular plasma membrane in sphingomyelin-depletion-induced cholesterol efflux

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Quantification of multiple lipids with different contents in plasma membrane in single cells is significant, but challenging for investigating lipid interactions and the role of dominant protein transporters. In this paper, co-monitoring the alteration of low-content sphingomyelin (SM) and high content cholesterol in plasma membrane of one living cell is realized by use of luminol electrochemiluminescence (ECL) for the first time. Concentrations of SM as low as 0.5 μM are detected, which permits the measurement of low-content membrane SM in single cells. More membrane cholesterol is observed in individual cells after depletion of membrane SM, providing direct evidence about SM depletion induced cholesterol efflux. The up-regulation of ATP-binding cassette transporters A1 (ABCA1) and G1 (ABCG1) in SM depleted cells induces a further increase in membrane cholesterol. These results imply that higher expression of ABCA1/G1 promotes cholesterol trafficking, which offers additional information to solve the debate about ABC transporters in cholesterol efflux. Moreover, the established approach offers a special strategy to investigate the correlation of membrane lipids and the role of transporters in cholesterol trafficking.

Biography

Danjun Fang, Zhejiang University of Technology, BE, Analytical Chemistry (1997/9 - 2001/6). 2001/9 - 2004/6 □ Zhejiang University, Master, Chemistry. 2004/8 - 2010/1, Case western reserve university, PhD, Chemistry. 2010/5 - 2010/10, Case western reserve university, Post Doc, Chemistry. 2011/11 - present, Nanjing Medical University, Associate professor of Analytical Chemistry. Research Interests: Electro-analytical Chemistry, single cell analysis, pharmaceutical analysis.

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