Synopsis of Original Research Paper

Liver disease risk of xenobiotics due to percutaneous absorption revealed by Nano-PALDI imaging mass spectrometry

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This research should be of interest to a broad readership, particularly those whose research involves the mass spectrometric analysis of localization of xenobiotics. Because the present study describes emerging evidence suggested environmental factors as causative agent such as methyl 2-octynoate (2-OAm). Not only does 2-OAm have potential to cause visceral disease but importantly is used in environment such as lipsticks, hair dye, perfumes and food flavorings.

However, its disposition after percutaneous application is not revealed. We report the disposition and effect, visually, by nano-PALDI-based imaging mass spectrometry. Generally, small molecule like 2-OAm cannot be detected by LDI-based mass spectrometry (MS) due to the interference of organic matrix signal. Previously, we have reported nano-PALDI MS realize detection of small and high molecules (Anal. Chem. 2008, 2011. Analyst 2012, 2015).

The ionization ability of the nano-PALDI for 2-OAm was confirmed. 2-OAm was applied to mice skin and it permeated through the skin and accumulated in the liver. In livers of single dose mice, 2-OAm was delivered to the liver for 6 hours and excreted from the liver for 24 hours. On the other hand, in livers of long apply mice, 2-OAm was retained in the liver. Furthermore, we could be revealed that 2-OAm was accumulated in bile ducts by analyzing at a high resolution. In addition, CD8 staining indicated that an inflamed bile duct was observed. 2-OAm triggered the inflammation due to a coincident localization of 2-OAm and bile duct. This imaging approach is a promising technique for rapid quality evaluation of xenobiotics.