

S42-5 Differential molecular analysis by Live Single-cell Video-Mass Spectrometry

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Living organisms used in biomedical and pharmaceutical studies consist of cells with multiple phenotypes those give averaged results. We established “Live Single-cell Video-Mass Spectrometry” method which enables single cell-targeted mass spectrometric analysis by sucking up cytoplasm or certain cellular region with a nanospray needle under a microscope and direct injection into mass spectrometer to obtain a spectrum that reflect molecular content of the targeted cell or region. Nanospray which has quite higher sensitivity and very low ion suppression effect has great advantage for analyzing complicated biological samples compared to conventional electrospray. Using this method, we found marker molecules of neuron among heterogeneously differentiated murine embryonal carcinoma cells. In addition, we succeeded to clarify the molecular profile of cytoplasm and vacuole in drug treated liver cells: a drug and its metabolites showed different cellular distribution, and cytoplasm and granule in mast cells: molecules in histamine and serotonin synthesis pathway showed specific subcellular localization. Because this is the first technology that allows real-time mass spectrometric analysis of single living cell, we further apply it to single cell analyses in many fields of studies such as development and drug metabolism.