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Development of a Detection System for Expressed Genes in Isolated Single Jurkat Cells

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A novel detection system for an expressed gene in single cells based on hot cell-direct reverse transcription polymerase chain reaction (RT-PCR) using a device for cell isolation was developed. The system comprised a microscope to observe single cells and a thermal cycler to perform RT-PCR. We detected the mRNA of the glyceraldehyde-3-phosphate dehydrogenase (GAPDH) gene in isolated Jurkat cells. In addition to the observation of single cells in microchambers after cell isolation, a marked fluorescence increase of the RT-PCR product from a single cell was observed with this new detection system. Relative fluorescence intensity (RFI), which was attributed to the level of GAPDH gene expression in each cell, was 2.30 ± 0.41 (ranging from 1.7 to 3.1) of the chambers with a single cell after RT-PCR, while that with no cells was 1.01 ± 0.01. The RFI of expressed β-actin was 2.63 ± 0.70 (ranging from 1.2 to 3.3) and similar to that of GAPDH. These results indicate that the gene expression level is different in each single cell, even when the expressed gene is a housekeeping gene, such as GAPDH and β-actin.

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