学 位 論 文 の 要 旨

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主論文の題名

Urinary MicroRNA-Based Diagnostic Model for Central Nervous System Tumors Using Nanowire Scaffolds

主論文の要旨

There are no accurate mass screening methods for early detection of central nervous system (CNS) tumors. Recently, liquid biopsy has received a lot of attention for less-invasive cancer screening. Here, we have developed a mass-producible and sterilizable nanowire-based device that can extract urinary micro ribonucleic acids (RNAs) efficiently. Urinary microRNAs from patients with CNS tumors (n=119) and noncancer individuals (n=100) were analyzed using a microarray to yield comprehensive microRNA expression profiles. To clarify the origin of urinary microRNAs of patients with CNS tumors, glioblastoma organoids were generated. Glioblastoma organoid-derived differentially expressed microRNAs (DEMs) included 73.4% of the DEMs in urine of patients with parental tumors but included only 3.9% of those in urine of noncancer individuals, which suggested that many CNS tumor-derived microRNAs could be identified in urine directly. We constructed the diagnostic model based on the expression of the selected microRNAs and found that it was able to differentiate patients and noncancer individuals at a sensitivity and specificity of 100 and 97%, respectively, in an independent dataset. Our findings demonstrate that urinary microRNAs extracted with the nanowire device offer a well-fitted strategy for mass screening of CNS tumors.