



Double-stranded DNA in Exosomes as a Biomarker for Cancer Diagnosis and Prognosis

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Technology description

This invention discloses methods of using double-stranded DNA (dsDNA) in exosomes as a diagnostic and prognostic biomarker for monitoring cancer progression and developing personalized therapeutic regimes.

Exosomes are cell-derived vesicles that are present in many biological fluids and contain functional biomolecules. Cornell inventors demonstrate that tumor-derived exosomes carry dsDNA. They also show that some metastatic cell lines are able to release high level of DNA in their exosomes.

The inventors further examined whether exosomal DNA (exoDNA) could be utilized as a surrogate for tumor tissues or cells to detect tumor-specific genetic mutations. They tested exoDNA isolated from various cancer cell lines for known driver mutations, such as several human melanomas cell lines for the BRAF(V600E) mutation, several non-small cell lung cancer for EGFR mutations, human colon cancer cells for KRAS mutation and chronic myeloid leukemia cells for BCR-ABL gene fusion. Their studies demonstrate that exoDNA represents the entire genome and reflects the mutational status of parental tumor cells.

These studies suggest that exoDNA can be used to track specific mutations related to malignant behavior. These mutations in exoDNA could be used as prognostic and diagnostic markers for cancers. A simple blood test could be used as an alternative to tumor biopsies in order to identify changes in the genotype of the cancer.

Application area

Measuring the total levels of dsDNA and specific DNA mutations in circulating exosomes derived from patient plasma, urine or lymphatic fluid as prognostic and diagnostic factors in cancers

Detecting specific DNA mutations in circulating exosomes derived from patient plasma, urine or lymphatic fluid to analyze changes in genomic content before and after chemotherapy as an alternative to tumor biopsies

Advantages

A simple blood test to detect cancer specific mutations could be used as an alternative to tumor biopsies

These findings can be applied to other cancer types, such as breast, brain, pancreatic, liver, gastric, skin, thyroid, prostate, ovarian cancers, soft tissue tumors, osteosarcoma, hematopoietic malignancies and lymphatic neoplasias.

Institution

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