

METHOD FOR DETECTION OF CANCER BASED ON SPATIAL GENOME ORGANIZATION IN THE CELL NUCLEUS

SUMMARY

Technology developed in the National Cancer Institute provides methods of detecting abnormal cells in a sample using the spatial position of one or more genes within the nucleus of a cell.

REFERENCE NUMBER

E-283-2008

PRODUCT TYPE

- Diagnostics

COLLABORATION OPPORTUNITY

This invention is available for licensing and co-development.

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DESCRIPTION OF TECHNOLOGY

The [National Cancer Institute's Cell Biology of Genomes Group](#) seeks parties interested in licensing or collaborative research to co-develop diagnostic methods for detection of cancer based on spatial genome organization.

Early detection of cancerous cells is critical to the successful treatment of the disease. Conventional cancer diagnosis is largely based on qualitative morphological criteria, but more accurate quantitative tests could greatly increase early detection of malignant cells. It has been observed that the spatial arrangement of DNA in the nucleus is altered in cancer cells in comparison to normal cells. Therefore, it is possible to distinguish malignant cells by mapping the position of labeled marker genes in the nucleus.

This invention provides methods of optical detection of abnormal cells in a sample using the spatial position of one or more genes within the nucleus of a cell. Also described is a kit for detecting abnormal cells using these methods. The technology provides sensitive and versatile methods for detecting the disease that are applicable to both solid tumors and blood cancers. Because only small samples (100-200 cells) are required, the need for invasive procedures is reduced. The invention also provides methods of identifying gene markers for abnormal cells using the spatial position of one or more genes within the nucleus of a cell. Procedures to automate the technology are currently being developed.

The inventors have identified several promising markers based on a relatively small set of breast cancer samples. Validation and characterization of these markers on a larger set of tumor samples is now required. The inventors are interested in a collaborator with access to both healthy breast tissue samples, as well as breast cancer tissue samples. Other types of tissues would also be considered.

POTENTIAL COMMERCIAL APPLICATIONS

- Diagnostic for cancer from tumor biopsies after non-invasive techniques such as a mammogram or PSA assay have suggested cancer.

COMPETITIVE ADVANTAGES

- Highly sensitive, quantitative, and versatile method for the detection of cancer based on spatial genome organization
- Ability to diagnose cancer from tumor biopsies after non-invasive techniques such as a mammogram or PSA assay have suggested cancer
- The method uses extremely small sample size, has potential to detect early tumors and to distinguish tumor types
- The method can be applied to archived tissue samples and can be combined with existing cytogenetic methods
- The method is relatively inexpensive and utilizes conventional fluorescence microscopy techniques

INVENTOR(S)

Thomas Misteli and Karen Meaburn (NCI)

DEVELOPMENT STAGE

- Prototype

PUBLICATIONS

KJ Meaburn and T Misteli. J Cell Biol. 2008 Jan 14;180(1):39-50. [PMCID: [2213600](#)]

PATENT STATUS

- **U.S. Filed:** U.S. Application No. 13/062,247 filed 28 March 2011
- **Foreign Issued:** EP 2321428 (DE, FR, GB) (13 March 2013)

THERAPEUTIC AREA

- Cancer/Neoplasm