Methods to Differentiate Healthy from Cancerous Cells

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Technology description

Obtaining a cancer diagnosis can be difficult, particularly for bladder cancer. Current bladder diagnostic strategies include either invasive cystoscopy or labor intensive urine cytology; neither of which is ideal. Different types of cells, including cancer cells, have distinct biophysical properties. Cancer cells tend to spread out and have greater focal adhesions; subsequently they exert a stronger force on a surface than normal cells. While there have been many techniques explored in an effort to quantify the biophysical properties of cells, none have been utilized in diagnostic applications to differentiate between cancerous and non-cancerous cells.

Researchers at Arizona State University in collaboration with a researcher at Stanford University School of Medicine have developed a novel visualization platform to differentiate cancerous cells from healthy cells. Cells collected from urine, sputum, cervical swabs, peritoneal and pleural fluid, etc. are cultured on a thin silicone based membrane and allowed to grow. Because cancerous cells strongly adhere to and spread on the membrane, wrinkling or deformation occurs. This deformation is not seen with healthy cells. Quantitative measurement of membrane wrinkling represents a powerful, non-invasive diagnostic tool for early detection of common cancers, which may possibly enable less invasive therapies and enhanced human health.

This technology represents a foundation for the development of a small, powerful and non-invasive device to identify the presence of cancerous cells in clinical samples.

Application area

Non-invasive cancer diagnoses:
Bladder cancer (using urine)
Cervical cancer (using cervical swabs)
Lung cancer (using sputum)
Cancer in the abdominal and chest cavities (using peritoneal and pleural fluids)
Fundamental studies of biophysical properties of cells
Monitoring cell traction force change upon various stimuli

Advantages

Qualitative - looks at number and length of wrinkles

Non-invasive - can use a simple urine or other fluid sample
Sensitive, rapid and accurate differentiation
Minimal sample preparation
Results interpretation does not require significant expertise
Can be utilized with complex, heterogeneous bodily fluids without affecting wrinkle formation

Institution

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