Early Stage Cancer Detection Using Laser-Induced Breakdown and Machine Learning

Published date: July 31, 2018

Technology description

Background

Early diagnosis of cancer is the most important aspect of treating the disease. In some types of cancer (asymptomatic), there are no symptoms exhibited on the patient until metastasis begins. By this time, illnesses such as Epithelial Ovarian Cancer (EOC) and Melanoma have spread to the point where treatment is much less effective and survival rates are low. With timely diagnosis, 5-year survival rates for EOC (30%) and Melanoma (17%) can increase to upwards of 90%, saving countless lives. Today's researchers have discovered that Laser-induced Breakdown Spectroscopy (LIBS) can be used as a tool for detecting cancerous tissues throughout the body. This promising technology can be used to increase survival rates through a minimally invasive, large scale screening.

Technology

Professor Melikechi and his team have shown that the LIBS method of cancer detection can be used to screen fluid cells in the same way it is used for tissue samples. They have shown that LIBS alone is not sufficient enough to accurately detect cancer, but when combined with machine learning it can be a viable procedure. They have also optimized the choice of substrate for LIBS for various diseases. With different machine learning methods, the team measured accuracy of up to 96% when discriminating between cancerous and healthy fluid cells in mice. Little to no preparation was needed for the tested samples; only few times needing a solid substrate dried onto the sample. Accuracy fluctuated based on the age of the mice, the elemental substrate used in LIBS process, and the sample (blood, spleen tissue, lymph nodes, lung tissue) used in each case. The inventors hypothesize that this same screening process can be used to detect a number of different diseases and infections.

Market Potential

The global Cancer Diagnostics Market is projected to grow at a CAGR of 7.2%, reaching an estimated $232.7 Billion by the year 2025. Emerging technologies and increased screening awareness are the main causes for such growth.

Application area

· Urinalysis to detect UTI's and other infections

· Spinal fluid tests for the detection of Alzheimer's disease · Saliva analysis for lung and oral cancers

· Blood sample testing for cardiovascular diseases

· Detection of cancerous blood cells such as: - Epithelial Ovarian Cancer - Melanoma - Other asymptomatic cancers

Advantages

· Early diagnosis technique

· Minimally invasive procedure

· Little to no sample preparation needed

· High accuracy of detection

Institution

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