

Developing Optical Sensors with Application of Cancer Detection by Elastic Light Scattering Spectroscopy

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Abstract : Context: Cancer is a serious health concern that affects millions of people worldwide. Early detection and treatment are essential for improving patient outcomes. However, current methods for cancer detection have limitations, such as low sensitivity and specificity. Research Aim: The aim of this study was to develop an optical sensor for cancer detection using elastic light scattering spectroscopy (ELSS). ELSS is a noninvasive optical technique that can be used to characterize the size and concentration of particles in a solution. Methodology: An optical probe was fabricated with a 100- μm -diameter core and a 132- μm centre-to-centre separation. The probe was used to measure the ELSS spectra of polystyrene spheres with diameters of 2, 0.8, and 0.413 μm . The spectra were then analysed to determine the size and concentration of the spheres. Findings: The results showed that the optical probe was able to differentiate between the three different sizes of polystyrene spheres. The probe was also able to detect the presence of polystyrene spheres in suspension concentrations as low as 0.01%. Theoretical Importance: The results of this study demonstrate the potential of ELSS for cancer detection. ELSS is a noninvasive technique that can be used to characterize the size and concentration of cells in a tissue sample. This information can be used to identify cancer cells and assess the stage of the disease. Data Collection: The data for this study were collected by measuring the ELSS spectra of polystyrene spheres with different diameters. The spectra were collected using a spectrometer and a computer. Analysis Procedures: The ELSS spectra were analysed using a software program to determine the size and concentration of the spheres. The software program used a mathematical algorithm to fit the spectra to a theoretical model. Question Addressed: The question addressed by this study was whether ELSS could be used to detect cancer cells. The results of the study showed that ELSS could be used to differentiate between different sizes of cells, suggesting that it could be used to detect cancer cells. Conclusion: The findings of this research show the utility of ELSS in the early identification of cancer. ELSS is a noninvasive method for characterizing the number and size of cells in a tissue sample. To determine cancer cells and determine the disease's stage, this information can be employed. Further research is needed to evaluate the clinical performance of ELSS for cancer detection.

Keywords : elastic light scattering spectroscopy, polystyrene spheres in suspension, optical probe, fibre optics

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