

Hyperspectral Stokes polarization imaging for detection of biotissues abnormalities (HyperStokes)

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RADESS The project is devoted to the development of a hyperspectral polarization-sensitive detection method as a basis for new disruptive imaging technology for non-invasive, rapid and accurate assessment of biotissues with particular emphasis on cancer detection. The proposed work is novel and unique in its intent to quantify structural and functional changes in turbid biological tissues by using the circular/elliptical polarization and spectral selectivity of light scattered in the biotissue. Specifically, we aim to determine whether our technology accurately and sensitively detects the pathological conditions of a tissue in real-time, which could potentially obviate the need for time-consuming and laborious histopathological processing or the need for manual visualization of tissues by microscopy. With cancer treatment costing EU 124 bn (Finland – 0.7 bn) per year, not including the costs of reduced lifespan and ability to work, the potential for significant spillover benefits to the population from our new technology is extremely huge. The research to be performed ranges from the basic studies of propagation and scattering of circularly polarized light in disordered inhomogeneous tissue-like media, interpretation of the detected signals, to the technological developments of the experimental system and devices with the long-term objective of in vivo biomedical deployment. A device-driven approach applied in the project will create additional possibilities for further commercialization of emerging imaging technology. In addition, the developed detection approach used as a platform can have a significant impact in various relevant strategically important areas, including non-invasive assessment of quality of fresh agricultural products, food quality control, label-free biosensing, pharmacy and health care product industries.