

# Optical biopsy of cancer: nanotechnological aspects

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## ABSTRACT

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Naturally occurring differences in the optical properties of normal and cancerous tissue have been exploited frequently in optical detection systems. However, optical biopsy of cancer can be improved by using targeted, optically active and bright contrast agents to enhance the optical signal from disease-specific molecular markers. Nanotechnology has advanced greatly in recent years and can be applied to variety of biomedical research areas, as well as optical biopsy in clinical settings. Quantum dots (QDs) are stable, bright fluorophores that, under ideal conditions, can have high quantum yields, narrow fluorescence emission bands, high absorbency, very large effective Stokes shifts, high resistance to photobleaching, and can provide excitation of several different emission colours using a single wavelength for excitation. Optically efficient, cancer specific QDs provide a new tool to enable non-invasive visualization of disease-specific molecular and tissue changes with subcellular spatial resolution. Nanotechnology is in a unique position to transform cancer diagnostics and to produce a new generation of fluorescent markers and medical imaging techniques with higher sensitivity and precision of recognition.

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**Key words:** optical biopsy of cancer, nanoparticles, nanotechnology, imaging.

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