Detection and quantification of iodine in biological fluids using photonic-based systems: UV-Vis and Transmission spectroscopy

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Iodine is a crucial trace element that occurs in minute amounts in nature and is necessary for the development of bones, thyroid function, and several metabolic processes. Iodine deficiency, also known as hypothyroidism, affects millions of individuals worldwide, and an overabundance of iodine in the body is known as hyperthyroidism. The early identification of iodine with high sensitivity and selectivity is crucial for physiological impact since the abnormalities caused by iodine disorder can increase the frequency of mortality and mental impairments. This work aims to detect iodine using UV-Vis and Transmission spectroscopy and utilizing selenium nanoparticles as a probe. Selenium nanoparticles (SeNPs) were synthesized by ND: YAG laser method and characterized by Dynamic light scattering (DLS), and High-resolution transmission electron microscopy (HRTEM), while the conjugation of iodine to SeNPs was confirmed by Ultraviolet-visible (UV-vis) spectroscopy. For iodine detection, UV-Vis and Transmission spectroscopy were used and compared and the synthesized colloidal and spherical selenium nanoparticles were utilized as a probe to detect iodine. The absorption peaks and a red shift for SeNPs changed upon the reaction with iodine and this shift may allow for the estimation of iodine concentration. The two methods will enable the detection and monitoring of iodine at different concentrations in the body thus preventing the onset of iodine-related diseases.