

CUTTING-EDGE LASER TECHNOLOGIES FOR QUICK MEDICAL DIAGNOSIS AND TREATMENT

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Abstract: Thanks to creative software solutions for Raman and fluorescence analysis, modern laser technology is becoming more important in medicine and dentistry for the quick diagnosis and treatment of medical disorders. Broadband, high-energy laser radiation serves two purposes: first, as a therapeutic tool [1, 2, 3, 4]; and second, as a way to enhance a biological specimen's Raman luminous diagnostic potential [5] (particularly in the context of biophotometry).

In order to diagnose diseases and processes of microbial, metabolic, neoplastic, or other origins, the methodology uses recorded spectral characteristics from Raman and/or luminescence fluorescence diagnostics (RLFD) of the subjects under investigation (microbial metabolites, cells, tissues, and biological fluids in both healthy and pathological conditions) [6].

Our goal is to provide empirical evidence that the use of laser hardware-software systems and Raman-fluorescence medical technologies may benefit dental practice.

Limitations of Traditional Dental Diagnostics Maintaining internal homeostasis between internal and external influences requires good oral health. Precise detection of pathological changes, such as oral infections, problems with enamel mineralisation, and other common dental illnesses, is made possible by the analysis of dental health indicators. Despite the significance of these qualities, dentistry is now unable to accurately measure them [1, 2, 3, 4]. difficulties with traditional diagnosis. Conventional diagnostic techniques

are hindered by many obstacles. Visual inspection is crucial for diagnosis, but because of its inherent subjectivity and possibility for several interpretations, it must be done carefully. The accuracy of a diagnosis may be impacted by a number of things. These include: Workplace lighting; Medical specialists' descriptions of colour perception; the healthcare provider's state of health.

Conventional assessment methods that ignore these elements lead to significant errors, often as high as 30–40% [1, 2, 3, 4, 5, 6, 7, 8]. Using Raman fluorescence for impartial assessment Overcoming the current limitations in dental diagnostic techniques is crucial. A promising development that offers previously unheard-of possibilities for assessing oral health is Raman fluorescence technology. Its use enables: Perform a quantitative assessment of the condition of oral tissues. reduce the influence of subjectivity in diagnosis;

Current operating results [4, 5, 6, 7, 8].

This technology might help in a number of ways, such as: determining when demineralisation begins;

evaluation of the degree of microbiological contamination; assessment of the ongoing therapy's effectiveness.

The three main advantages of this approach are that it is non-invasive, ideal for continuous condition monitoring, and helps standardise the diagnostic procedure. This method may reduce the length of the examination, increase diagnostic accuracy by 25–30%, and help identify diseases before symptoms appear.

Potential routes for growth The following factors will determine the direction of future study in this field: Creating automated criteria for assessing oral health; developing multi-tiered diagnostic approaches; and using technology to help doctors make decisions.

In conclusion, these innovative approaches provide a basis for integrating evidence-based practice into routine clinical procedures and customised dentistry. In the end, this improves the quality of dental care.

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