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Impact of Laser Therapy on Periodontal and Peri-Implant Diseases

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Abstract

Objective: In the last few decades, lasers in dentistry have encompassed all branches in dentistry, with more focus in periodontology. In recent years, the use of lasers against periodontitis and peri-implantitis has undergone a decisive development that has involved various operational areas. The broadest applications were probably found in the clinical approach to soft tissues.
Methods: Laser therapy is a novel technique that may provide further beneficial effects to conventional periodontal and peri-implant therapies. However, clinical evidence for the improvement of periodontal wound healing and tissue regeneration through laser treatment is still limited.
Results: This review is aimed at assessing the advantages and disadvantages of the use of lasers in dental procedures and pathologies, focusing more on protocols for the management of periodontal and peri-implant diseases.
Conclusions: The adjuvant action of laser therapy, in addition to conventional therapies for the management of periodontal and peri-implant disease, could induce benefits, but further investigation would be necessary to standardize better the protocols applied and to understand the actual tissue response to laser therapy.

Keywords: periodontitis, peri-implantitis, laser therapy, healing, regeneration

Introduction

The acronym laser stands for ''Light Amplification by the Stimulated Emission of Radiation.'' In 1917, Albert Einstein first theorized the process that made the development of laser possible, ''Stimulated Emission.''[1,2] This theory is based on the ability of light to be absorbed when it passes through a material, inducing the energy transition of the atoms it encounters. In fact, the atom's absorption of a quantum of energy induces its transition from a low energy state to an excited/activated state. However, the lowest energy state is the most stable, so the excited atom tends to return to normal by spontaneously emitting a quantum of energy called ''spontaneous emission.'' When the conversion to the low energy state is achieved by stimulating a medium with a quantum of light at the same transition frequency, it is called ''stimulated emission.''

During this process, a photon of the same size as the released atom is released, which strikes against the adjacent activated atom, triggering a chain reaction of photon release.[2] This is the principle on which all lasers work. However, stimulated emission can only occur if the incoming radiation causes the emission of outgoing radiation with the same properties such as wavelength, direction, polarization, and phase (coherent radiation).[2,3] In the 1960s, Theodore Miaman built the first working laser at Hughes Research I laboratories in Malibu, California, using a mixture of helium and neon.[4] Today, laser devices have countless applications and have influenced many fields, including medicine and dentistry, affecting patient care and well-being.

Lasers used in dentistry are classified according to the active medium that is stimulated, which can be a gas (argon or carbon dioxide), a liquid (dyes), or a crystal in the solid

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