Medicon Dental Sciences
Volume 2 Issue 3 December 2022
Editorial Note

Lasers-Past, Present & Future

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Received: November 29, 2022; **Published:** December 12, 2022

DOI: 10.55162/MCDS.02.046

Light is a form of electromagnetic energy that occurs as a particle, and progresses in waves, at a sustained velocity. The basic unit of this radiant energy is called a photon; the wave of photons travels at the speed of light and it can be defined by two basic properties- amplitude and wavelength. Amplitude is defined as the vertical height of the wave oscillation from the zero axis to its peak and it corresponds with the amount of energy in the wave. The latter that is wavelength is the horizontal distance between any two corresponding points on the wave [1].

A laser is a device that transforms the light of various frequencies into a chromatic radiation in the visible, infrared, and ultraviolet regions, with all the waves in the phase being capable of mobilizing immense heat and power when they are focused at a close range. Amplification is a part of a process that occurs inside the laser. Stimulated emission is the process which takes place within the active medium due to the pumping mechanism, and it was postulated by Albert Einstein in 1916 [2].

A number of lasers are used in dentistry named based on their active media such as carbon dioxide (CO_2) laser, neodymium yttrium-aluminum- garnet laser (Nd:YAG), Erbium laser and Diode laser [3]. Each of these lasers represents some features which make them applicable for specific dental goals. They can be applied for many dental branches like diagnosis, prevention, restorative procedures and endodontics [4]. The high intensity lasers treatment are intended for ablation, vaporization cutting and coagulating of the tissue because they work with increasing temperature, while the low intensity lasers are used in the processes of tissue repair, inflammation and in cases in which analgesia is required and are often referred to as photo biomodulation [5].

The light energy produced by a laser can have four different interactions with a target tissue: reflection, transmission, scattering, and absorption [6]. When a laser is absorbed, it elevates the temperature and produces photochemical effects depending on the water content of the tissues. When a temperature of 100°C is reached, vaporization of the water within the tissue occurs, a process called ablation. At temperatures below 100°C, but above approximately 60°C, proteins begin to denature, without vaporization of the underlying tissue [7].

In restorative dentistry, there are many indications for high power lasers; for example, in dental erosions, in reconstitution of the canine guides, final removal of carious tissue, in dentin hypersensitivity, in microbial reduction, the conditioning of enamel and dentin for adhesive systems, internal conditioning of prosthetic ceramic pieces, prior to permanent luting and caries prevention in pits and fissures [8]. The low power laser can be used after cavity preparation in order to reduce post-operative sensitivity and microbial reduction after cavity preparation, combining a photosensitizing agent to low power laser (photodynamic therapy); also, in aesthetic procedures and in maintaining periodontal health [9].

There is always an evolution regarding the techniques and procedures of conventional dentistry. The most important thing is to associate the technological innovations of dentistry to traditional procedures. The key to success for the future is to associate both clinical procedures and innovations, based on evidence and research published in journals with high impact factors, which have strict

protocols and can be used in clinical practice [10].

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