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## Lasers in dental traumatology

### ABSTRACT

**Aim** Dental traumas are frequent in children. They can be complex events and sometimes real emergencies. Since very little attention is devoted to this topic in the international literature and there are no well-coded laser guidelines for these specific clinical events, our aim is to consider and present those situations in which laser-assisted therapy can offer new treatment possibilities. The authors' aim is to stimulate more extensive scientific research in this area, which might not only increase the use of these technologies, but also improve outcomes and reduce complications connected to dental trauma, particularly in children. Furthermore, laser-assisted therapies drastically reduce the need for analgesics and anti-inflammatory medications compared with conventional procedures.

**Conclusion** Using laser equipment to obtain anaesthesia is another challenge, while the use of low power setting for desensitising tissue and to obtain anaesthesia is also an open field.

**Keywords:** dental trauma, paediatric dentistry, erbium laser.

## Introduction

Dental traumas are frequent in children (around 20% of children suffer a traumatic injury to their primary teeth and over 15% to their permanent teeth) [Andreasen et al., 2007; Glendor, 2008] and they can be complex events, sometimes real emergencies.

The management of a dental trauma in children can be complicated by their young age (in particular their emotional status and inability to cooperate), the severity of the event or a late intervention. An effective operative protocol, including a correct diagnosis, an effective control of pain, a rapid and correct intervention, may strongly influence the clinical course, reducing the risk of sequelae and/or complications to the permanent teeth and providing a proper development of the dental arches

[Caprioglio and Caprioglio, 2010].

The psychological approach towards the child and his/her parents is therefore of fundamental importance, as essential as the in-depth knowledge and the use of new technologies, that can simplify and/or improve both therapy and prognosis.

Since there is very little literature devoted to laser-assisted traumatology and there are no well-coded laser guidelines for these specific clinical events, it is the authors' intention to propose, based on their own case studies and clinical research, the use of several laser wavelengths for multiple applications in dental traumatology.

Laser therapy may improve the psychological approach and the compliance of the patient, positively influencing both the objective and the subjective factors of pain, by raising the threshold of pain (inducing laser analgesia) and reducing discomfort [Genovese and Olivi, 2008].

For these reasons the use of laser in paediatric patients proved to be a valid method of intervention with a good level of patient acceptance during both hard and soft tissue therapy, as reported by several authors [Keller et al., 1998; Parkins, 2000; Takamori et al., 2003; Liu et al., 2006; Boj et al., 2005; Haytac and Ozcelik, 2006; Genovese and Olivi, 2008; Kara, 2008]. Even though this new technology is ideal for trauma-related problems, the existing dental trauma guidelines and protocols should nevertheless be widely consulted [Andreasen et al., 2007; Andreasen and Andreasen, 1990].

### Laser-tissue interaction

Dental lasers, using different active mediums, emit light energy beams of different wavelengths: most of them belong to the invisible infrared range and some to the visible region of the electromagnetic spectrum (Fig. 1).

The different wavelengths interact differently on the target tissue, depending on optical affinity, coefficient of absorption, level of hydration and vascularisation of the different target tissues (gingiva, mucosa, pulp, enamel, dentin, carious tissue, bone).

Lasers with wavelengths in the visible zone and the first portion of the infrared electromagnetic spectrum (laser KTP, Diode, Nd:YAG e Nd:YAP), are well absorbed by the

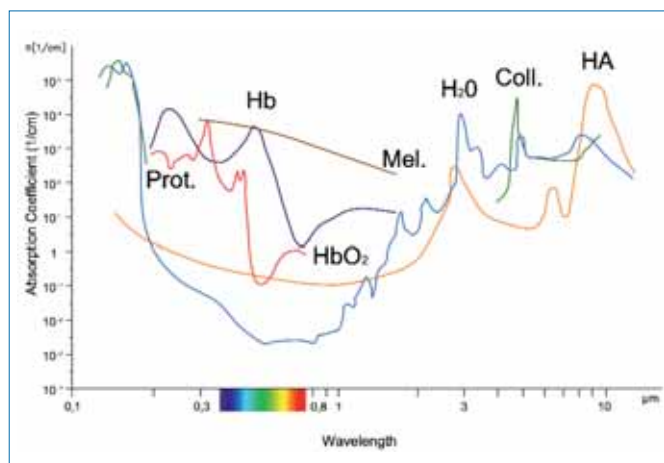


FIG. 1 - The graph shows the laser wavelengths commonly used in dentistry and the different target chromophores.