Editor's Letter. Malocclusion treatment tools evolution – electromagnetic synergism. What is the current status of knowledge? Part I

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Looking back and seeing the path taken by jaw functional orthopedics (JFO) since its beginning the evolution is notorious even more if we consider that there were two world wars in the way and most of the precursors of JFO are European, the soil where the wars took place.

Since Cellier's chin cap used before 1802 [1] made with leather stripes and a leather cap until the functional orthopedic appliances (FOA) nowadays that promote the same kind with stimulus to modulate mandibular growth without any part of the appliance outside the mouth much have been learned and much more must be learned yet.

Much of this evolution is due to Kawamura the creator of Applied oral neurophysiology back in 1970/1980's this gave rise to a book series edited by Karger – Frontiers of Oral Physiology [2]. His studies lead to more precise touch of the parts of the FOA in the stomatognathic structures resulting in the need of less material in the appliance diminishing its volume inside the mouth bringing more comfort to use it and less pressure applied to the teeth to obtain not the same but better clinical results. The need for less pressure is very welcome by the periodontal structures and diminishes considerably the risk of detachment of the periodontal fibers and the risk of bone loss and the risk of root resorption, summarizing, a more biological stimulus.

But the road is far from ending. There lots of questions to be studied and answered, many regarding materials engineering investigating, for instance, non-metallic ductile materials with more intelligent and biological memory than rubber that may follow the biological maxillary answer to transversal growth stimulation without a screw, for instance; digital stream researching printers that can prototype FOA appliances with polymers that have the properties described above. It is a long, hard and extremely interesting way.

The main point to be addressed is about electromagnetic and/or mechanical waves stimulation. Mechanical stimulation will be discussed in the editorial letter of the next issue. Following the same pattern there is knowledge which already impacts clinical results.

There are two types of laser devices, the high-level laser that are surgical and the low-level laser devices that are used to stimulate body biology and to antimicrobial purposes. The benefits of low-level laser therapy (LLLT) in soft tissue healing, anti-inflammatory effects is already pacified by the literature. the hard tissue benefits in bones and articulations healing and anti-inflammatory is already proved but there is one aspect about bone response that is not pacified – its synergist effects in the condyle/mandibular response with the user of orthopedic devices that stimulate mandibular growth used to treat micrognathia. Oksayan et al. demonstrated that the use of intra oral appliance associated with LLLT in rats stimulate condylar growth and increase mandibular advancement they used in one study group 8 J/cm^2 (0,25W, 25 sec) and 10 J/cm^2 (0,25W, 25 sec) in another group with both showing better mandibular advancement response than the non LLLT group with mandibular advancement and the control group. Franco et al. [4] found no difference in the clastic cell index in rats in the group of mandibular advancement and LLLT using 10 J/cm^2, 40 mW, 1 W/cm^2, 10 sec/point, 0.4 J/point. According to the authors they are not able to demonstrate a synergistic effect of LLLT in the biological response of the mandibular condyle during mandibular advancement with intraoral appliances.

There are more remaining questions than answers in the field. For instance, Aghili et al. 2023

used a different wavelength LLLT in humans with distinct dose (100 mw) and found synergistic effect of LLLT and mandibular advancement. What happened to distinct results of Franco et al [4] and Aghili et al [5]? Is this the dose? The interval between the dose application? The Modus Operandi of the used appliance to advance the mandible? So many important questions need an answer. And that is not all, if results of Aghili [5] are correct, there are many more. With LLLT application in the patient results are just faster, which is the quality of the newly formed bone? One of the greatest complaints about FOA is speech difficulty. With LLLT is it possible to use the appliance less time, let's say 10 hours a day instead of the 18/20?

Jaw Functional Orthopedics and Craniofacial Growth journal will be honored to receive manuscripts that may bring some light to such important subjects.

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