# Low-Level Laser Therapy Accelerating Orthodontic Tooth Movement


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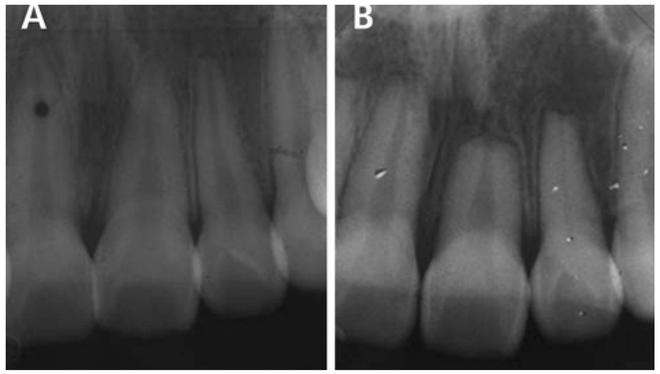
## QUESTION

**In a patient undergoing orthodontic treatment, would low-level laser therapy be effective in accelerating tooth movement?**

## INTRODUCTION

- **Low-level laser therapy (LLLT) uses light emitting diodes with low-level energy to stimulate and enhance cell function.**
- **Long duration of orthodontic appliances increase the risks of root resorption, gingival inflammation and dental caries.**
- **LLLT works by increasing cell proliferation and bone formation in the tension side and increases number of osteoclasts on compression side of tooth root.**




BEFORE ORTHODONTIC TREATMENT

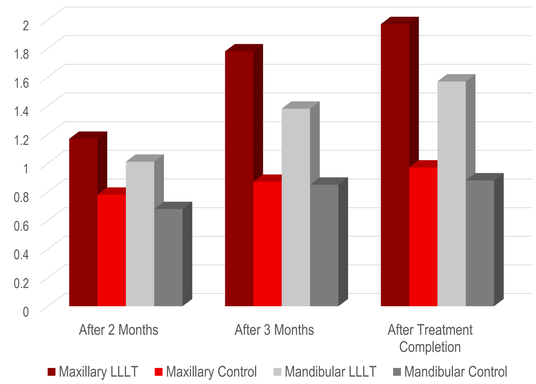
AFTER ORTHODONTIC TREATMENT WITHOUT LASER THERAPY

## ADVANTAGES OF LLLT

- **Shorter orthodontic treatment duration**
- **Reduced root resorption, gingivitis and caries.**
- **LLLT enhanced vitality actions of cell by upregulating the ATP production of mitochondria.**

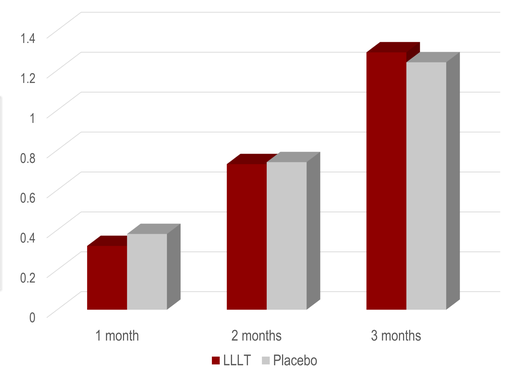
## RESULTS

RANDOMIZED CONTROLLED TRIALS



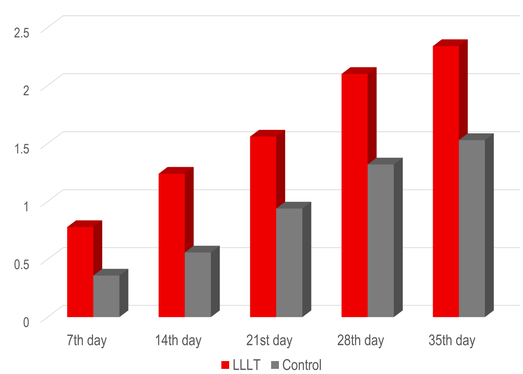

*RCT evaluation of LLLT on orthodontic tooth movement*

- Density: 810nm, 5 J/cm2
- Buccal and palatal aspect of tooth
- 80 sec weekly for 21 days
- Statistically significant increase in rate of canine retraction in LLLT group over the control group




*Effects of low-level laser therapy on the rate of orthodontic tooth movement*

- 860nm, 25 J/cm2
- Indicates no statistical difference of the means of canine distal movement between the two groups.




*Effect of low-level laser therapy (LLLT) on orthodontic tooth movement*

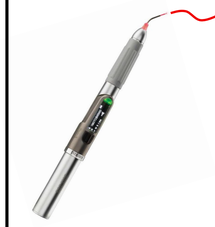
- 808nm, 0.71 J/cm2
- 10 sec exposure
- Applied on day 0, 3, 7, 14, 21 and 28.
- Statistical significance between LLLT and control group.

META ANALYSES

META ANAYSIS 1: Results showed statistical significance at 7 days and 2 months. No significance was shown at 1 month and only marginal significance at 3 months time (Ge, M. 2015).

META ANALYSIS 2: Results showed that the orthodontic movement of the canine was statistically increased as compared to the control group at 21 days (Imani, M. 2018).

## DISCUSSION



- **The types of laser used in each study was a gallium-aluminum-arsenide diode laser.**
- **Laser does not conduct heat and is only applied for about 80 seconds per sight**
- **The studies used various densities. A density of 5.25 J/cm² was found to increase speed while 35 J/cm² inhibited movement.**

## CONCLUSIONS

- **LLLT can speed movement up by 20-40% faster than a control group.**
- **Radiographic evidence shows no root resorption.**
- **LLLT is found to be effective in accelerating orthodontic tooth movement.**
- **Further research in human subjects is needed to define the optimal dose or density of LLLT in order to maximize the efficacy of treatment.**

## REFERENCES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