

**Immunohistochemical Evaluation of Vascular Endothelial  
Growth Factor and Transforming Growth Factor-beta On  
Osseointegration of CpTi Implant Radiated By Low Level Laser  
Therapy (Experimental Study In Rabbits)**

**A Thesis**

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## **Abstract**

**Background:** Dental implants provide a unique treatment modality for the replacement of lost dentition .This is accomplished by the insertion of relatively inert material (a biomaterial) into the soft and hard tissue of the jaws, thereby providing support and retention for dental prostheses. Various cell types, growth factors and cytokines are involved and interact throughout the stages of osseointegration, including inflammation, vascularization and bone formation and ultimately bone remodeling. Low level laser therapy( LLLT) is an effective tool used to prompt bone repair and modeling post surgery , this has referred to the biostimulation effect of LLLT.

### **Aims of study:**

**-1**To study the effect of low level laser on osseointegration of CpTi implant radiographically with mechanical test and histologically. **2-** To evaluate the immunohistochemical expression of vascular endothelial growth factor (VEGF) and transforming growth factor -beta (TGF- $\beta$ ) in experimental and control groups. **3-** To compare the result of immunohistochemical evaluation and low level laser therapy on osseointegration between experimental and control groups.

**Materials and Methods:** Thirty-two adult New Zealand white rabbits used, screw titanium implants inserted in the tibia. The

right side is considered as experimental groups and the left side considered as control groups. Low power diode laser (GaAlAs) with wave length (904nm) and (5mW) power applied with the right screw implants. The sample divided into four groups, eight rabbits are sacrificed at four intervals: 4 days, 1 week, 2 weeks, and 6 weeks respectively. Histological, immunohistochemical (VEGF & TGF- $\beta$ ), and radiographical evaluation were done for each interval with mechanical test in 2 and 6 weeks.

**Results:** Radiographical examinations showed that the process of osseointegration started after 2 weeks and complete radioopacity around the titanium implant after 6 weeks. Removal torque test showed dramatic increase with the presence of laser irradiation especially with advancing time. Histological examination showed that the acceleration of bone formation and more rapid healing process in the screw implant with laser irradiation than in the control implant. Immunohistochemical findings revealed high positive expression for VEGF and TGF- $\beta$  in experimental implant in comparison to control one.

**Conclusion:** This study was illustrated that the LLLT application enhance bone formation and increase osseointegration.