

INTRODUCTION

Diode lasers are often indicated for the management of peri-implantitis of titanium implants, but there is no evidence on the safe use of laser therapy for ceramic implants.

OBJECTIVE

This study aims to evaluate the thermal changes that occur within the ceramic implant while using an 810nm diode laser at room temperature and in 37°C in vitro.

METHODS

A three-wall intrabony defect (4x4x5mm) was created in a bovine bone block adjacent to a ceramic (Zr) dental implant (Zeramex, 4.8x12mm). An 810nm-diode laser with a non-initiated 400µm fiber tip was used to irradiate the defect for 30 seconds in continuous wave (c.w.) and pulsed mode (duty cycle: 50%). The experiment was done at room temperature (21.0°C±1) and in a water bath (37.0°C±1) to mimic body temperature. The temperature changes were recorded in real-time using two thermocouple probes placed at the coronal and apical portions of the Zr-implant. A data acquisition tool was used for data collection, and a descriptive/comparative analysis was conducted at p< 0.05.

The highest temperature change occurred at the coronal level of the Zr-implant in room temperature compared to the water bath using c.w. (9.26°C, p<0.0001). Under the same conditions, the apex of the implant reached 2.67°C vs. 2.60°C (p >0.05). In pulsed mode the lowest ΔT values were recorded at room temperature and in the water bath (p<0.0001). Overall, the average temperature changes remained below critical threshold (10°C) at room temperature and in the water bath (Table 1, Fig. 1).

CONCLUSION

Within the limitations of this study, laser irradiation with an 810nm-diode laser seems to be safe on ceramic implants for the management of peri-implantitis in vitro.

RESULTS

Table 1	Continuous Mode		Pulsed Mode	
	Coronal ΔT (°C)	Apical ΔT (°C)	Coronal ΔT (°C)	Apical ΔT (°C)
Room Temp	9.26 (±0.72)	2.67 (±0.30)	6.24 (±0.48)	2.05 (±0.16)
Water Bath	6.76 (±0.39)	2.60 (±0.22)	2.68 (±0.14)	1.10 (±0.17)
P-values	<0.0001	>0.05	<0.0001	<0.0001

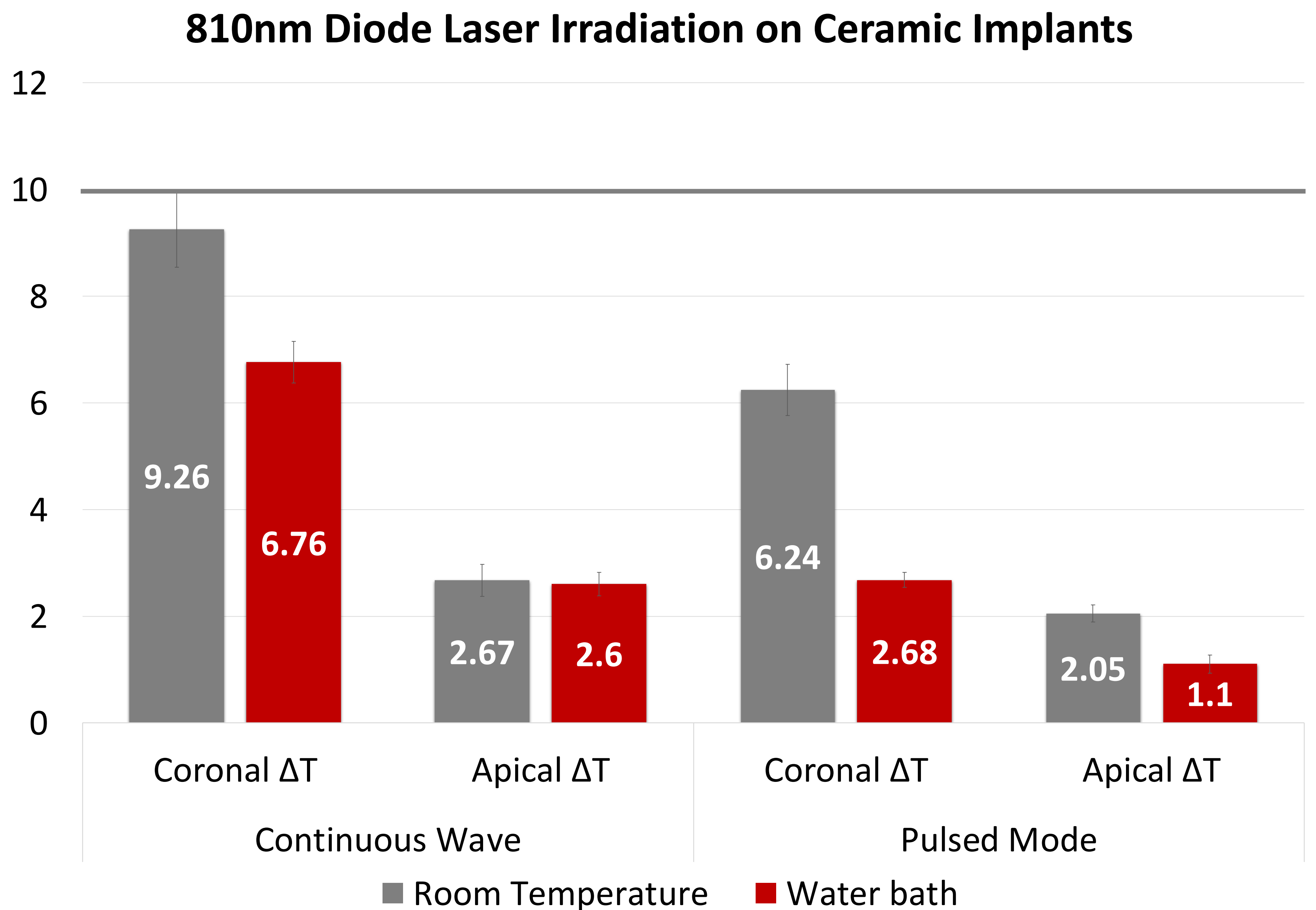


Figure 1. Average ΔT values after irradiation using 810nm diode laser in room temperature (21°C) and water bath (37°C).