

## INTRODUCTION

- Peri-implantitis is the most common complication around dental implants.
- Diode lasers have been shown to be effective at treating peri-implantitis.
- There is no clear consensus on which wavelength is safest for clinical application

## OBJECTIVE

The aim of this study was to determine the thermal effects of infrared laser irradiation on titanium implants in vitro.

| Table 1    |                      |                      |                      |                      |
|------------|----------------------|----------------------|----------------------|----------------------|
| Wavelength | 810 nm               | 940 nm               | 970 nm               | 980 nm               |
| ΔT(°C)     | Coronal<br>Apical    | Coronal<br>Apical    | Coronal<br>Apical    | Coronal<br>Apical    |
| Cont. Wave | 28.1±1.2<br>6.20±0.8 | 21.8±1.6<br>8.10±0.6 | 26.0±1.8<br>6.10±0.2 | 25.4±1.5<br>5.60±0.2 |
| Pulsed     | 14.3±1.6<br>3.40±0.5 | 10.1±0.6<br>3.0±0.3  | 13.0±1.4<br>2.9±0.2  | 22.5±2.1<br>5.40±0.6 |

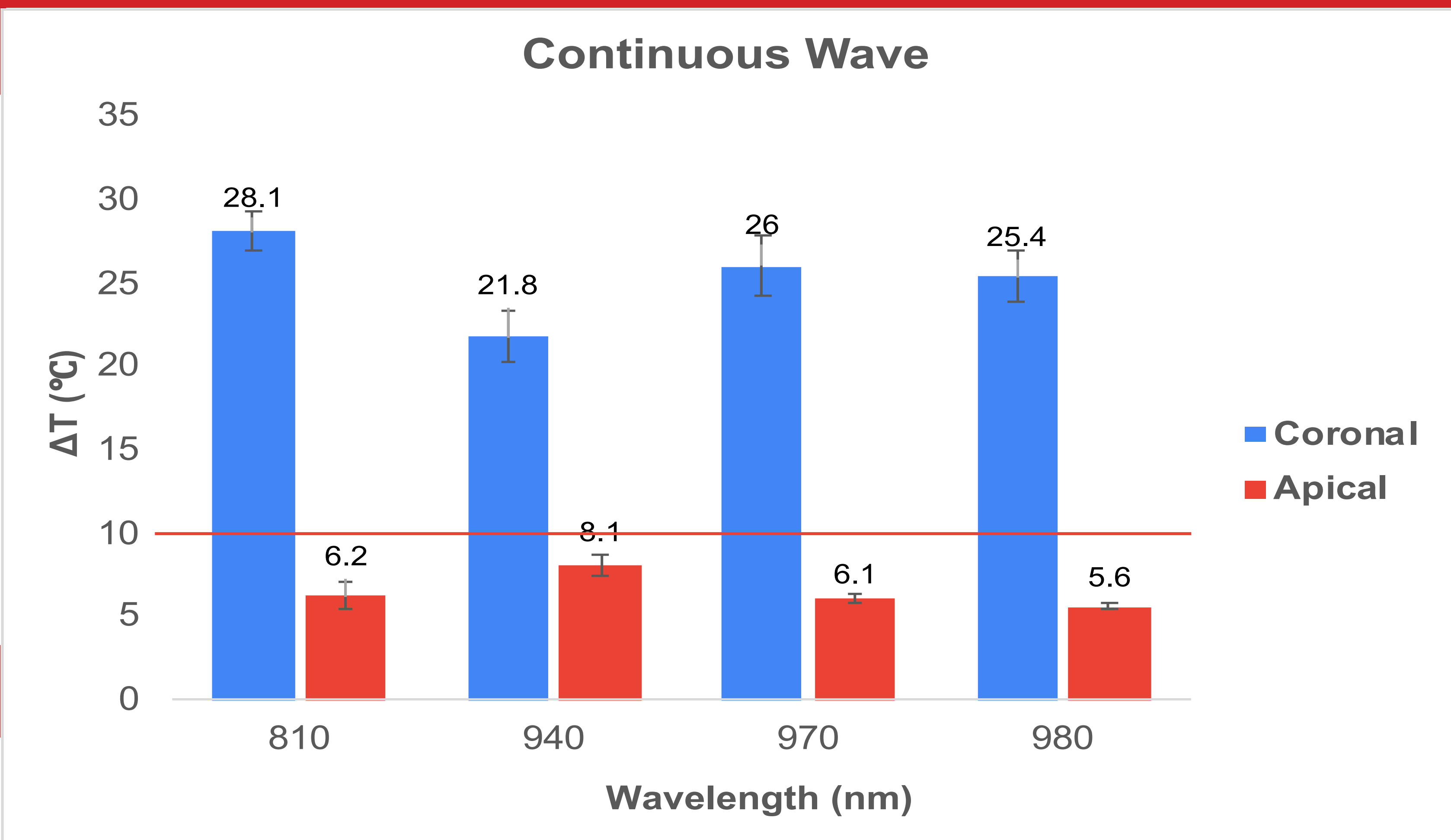


Fig. 1 Average temperature change at the coronal and apical thermocouples for 810, 940, 970, and 980nm lasers in c.w. mode

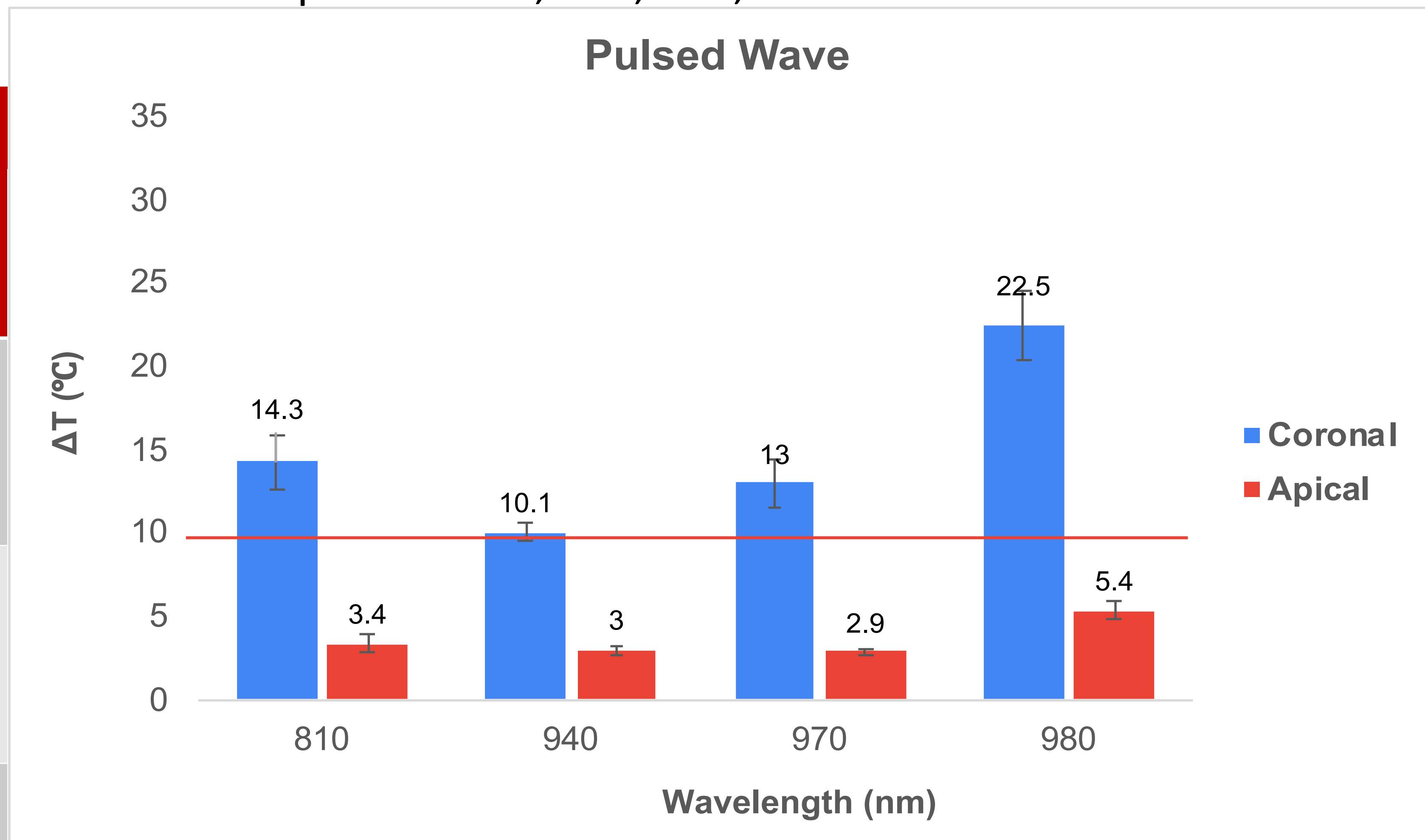


Fig. 2 Average temperature change at the coronal and apical thermocouples for 810, 940, 970, and 980nm lasers in pulsed mode

## METHODS

A titanium implant (3.5x11mm) was placed into a bovine bone block, and a 3-wall intra-bony defect was created. Two thermocouples were secured to the apical and coronal surfaces to measure temperature change during irradiation. The laser tips were positioned parallel to the implant, and the defect was irradiated for 30 seconds at 2W in continuous (c.w.) and pulsed mode (320μm fiber). The temperature changes (ΔT) were recorded, and a statistical comparison with a linear mixed model was conducted.

## RESULTS

The temperature change in both thermocouples is shown in Table 1. The 940nm laser resulted in the lowest ΔT at the coronal level in comparison to the other lasers (p<0.0001). The implant surpassed the critical threshold of 10°C in the coronal thermocouple when each of the lasers was used.

## CONCLUSION

The 940nm diode laser appears to be the safest in terms of overheating risk during implant irradiation.