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Clinical application of photoplethsmography for pulp vitality test

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I. Objectives

The purpose of this study was to apply the photoplethsmography(PPG) as a non-invasive tool to evaluate the blood flow of the anterior tooth in clinic.

II. Materials and Methods

The system consist of two light-emitting diodes (LED) powered by 5V as the light source. The LED was designed to two wave lengths, 940(infrared) and 660(red)nm simultaneously with a 36nm bandwidth at half the peak intensity.

The 54 anterior vital tooth were examined and the measured data was analysed in frequency domain (power spectrum).

III. Results

1. Oxygen saturation

This was calculated using the following equation

$R = (AC_{660}/DC_{660})/(AC_{940}/DC_{940})$

AC : the composition of pulsating arterial blood flow

DC : total composition of venous flow, capillary flow and non-pulsatile blood flow

Average oxygen saturation in vital tooth was 87%.

2. Frequency analysis

Any dominant frequencies for tooth and finger of each individual between 0.83 and 2 HZ bands were identified and the ratio of the peak power of tooth /finger was calculated.

All 54 readings showed within the range of the normal parameter.

IV. Conclusions

1. Among 54 teeth diagnosed as vital, 49 teeth(91%) showed positive readings at 80% oxygen saturation margin.
2. When frequency analysis methods was used, all 54 readings showed within the range of the normal parameter.