

## ABSTRACT

Enhancing the results of picosecond and nanosecond laser by safely amplifying the photoacoustic effect: Physical analysis with clinical validation

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### Introduction:

Due to their photoacoustic properties, picosecond and nanosecond lasers effectively treat skin problems like pigmentary skin disorders. This study aims to provide tips for safely amplifying the photoacoustic response of these lasers to enhance therapeutic outcomes.

### Materials and Methods:

Thermodynamics and the Beer-Lambert law demonstrate that the amplitude of the photoacoustic effect is linearly related to temperature. Therefore, before laser treatment, we can treat the skin lesions with a photothermal laser, such as a long-pulsed alexandrite laser. Combining therapy with a pulsed dye laser can also improve the efficacy of diseases such as melasma with telangiectasia. Additionally, an attenuator can safely lower the output laser fluence with a stacking technique to reduce the risk of laser-induced post-inflammatory hyperpigmentation.

### Results:

After being treated with the above techniques, we can observe good therapeutic responses in patients with cutaneous pigmentary disorders, including lentigines, freckles, melasma, and post-acne erythema/pigmentation.

### Conclusion:

The safe amplification of the photoacoustic response of picosecond and nanosecond lasers with photothermal lasers can improve therapeutic results for patients with pigmentary skin disorders.