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## Derivation of appropriate parameters for photothermal therapy, mediated by iron oxide nanoparticles

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Generally, the photothermal therapy involves radiation in the near-infrared region coupled with a photo-absorbing agent to convert laser energy into heat, inducing thermal damage. This type of therapy can lead to a tumor specific treatment with minimal damage to surrounding healthy tissues. Assuming the potential effects of various parameters such as laser wavelength, power density, duration of laser irradiation, penetration depth and concentration of the photo-absorbing agent, is essential to determine the right dose of energy that is necessary to produce hyperthermia.

In our study, we aimed at measuring the light penetration of 810 nm diode laser in tissues and evaluate the efficiency of iron oxide nanoparticles as near-infrared light absorbents. Iron oxide nanoparticles were prepared by co-precipitation technique. Different nanoparticle concentrations and porcine muscle tissues of varied thickness were used to derive the optimum parameters for further photothermal therapy. It was found that at a power density of 0.33 W/cm$^2$, which is the skin threshold limit for 810 nm laser irradiation, the effective depth of beam penetration, at which hyperthermia would be achieved, is 3 mm.