



Luigi Cristiano: *Infrared rays (IRs) and IRs-based devices: uses in physiotherapy, sports medicine, and physical rehabilitation*

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Abstract: Infrared rays (IRs), classified into NIR, MIR and FIR rays, are increasingly used both in medicine, especially in non-invasive aesthetic medicine, and beauty salons, slimming centers and gyms. They are also used in physiotherapy, physio-aesthetic, physical rehabilitation, and sports medicine for enhancing athletic performance and muscle recovery after both the sports activity and as a result of pathologies, traumas, or accidents of various types. IRs are well absorbed by living organisms and are perceived as heat and, although their mechanisms of action are still not well clear, they develop endogenous heat (i.e. it originates within living tissues) and show many interesting heat-related effects and non-heat-related effects on the human tissues included skeletal muscles, tendons, and ligaments. IRs have shown a positive effect on general disorders of the locomotor system and concur to the improvement of skeletal muscle performance, decrease exercise-induced oxidative stress, delay of muscle fatigue, reduce pain (also chronic pain) and inflammatory responses of muscles, protect against muscle injuries and stimulate general psychophysical well-being. Infrared-based devices are frequently used as a non-invasive complementary tool and passive modality of enhancing performance or recovery both in sports pre-exercise and after athletic post-workout sessions but also for the neuromuscular recovery in physiotherapy and physical rehabilitation. These devices can be used for whole-body treatments or on single area applications and they include infrared thermal blankets, infrared lipo laser paddles (soft-laser), infrared heat lamps, infrared bands, infrared saunas, infrared pens, far infrared-emitting ceramic or stone beads and far infrared-emitting apparel (technical sportswear).



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Publications:

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3. Au–Ag–Cu nanoparticles alloys showed antifungal activity against the antibiotics-resistant *Candida albicans*
4. Induce mutations for Bavistin resistance in *Trichoderma harzianum* by UV-irradiation
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