

Health Benefits of Infrared Therapy and its Potential Applications in Health and Wellness Products

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Abstract (to be completed)

What is Infrared (IFR) Energy?

The electromagnetic spectrum is the transfer of energy via electromagnetic radiation. The electromagnetic spectrum can be subdivided into regions according to its wavelength; these subsets include ultraviolet, infrared, microwave and radio frequency. Infrared (IFR) radiation wavelength falls between that of visible light and microwaves, and ranges from approximately 0.72 to 1,000 micron. The IFR region is itself divided into three subsets:

- Short-wave (near): 0.72 to 2 micron
- Medium-wave (middle): 2 to 4 micron
- Long-wave (far): 4 to 1000 micron

All bodies above absolute zero emit electromagnetic energy in some form. The sun produces 80% of its rays in the infrared spectrum [ref??]. Our atmosphere allows infrared rays in the 7 to 14 micron ranges to reach the earth's surface, with peak output at 10 microns. Our bodies radiate infrared energy through the skin at 3 to 50 microns, with most output at 9.4 microns. Palms emit infrared energy from 8 to 14 microns and palm healing is an ancient Chinese tradition that has been using the healing properties of infrared rays for 3,000 years. The useful infrared region for therapeutic purposes is between 2 microns and 25 microns [ref??] (see *Figure 1*).

What effect do IFR rays have on the human body?

Unlike ordinary heat, which is mostly absorbed at skin level and raises the skin temperature, IFR rays easily penetrate the skin. The natural resonant frequencies of water and organic substances are within the IFR range, which means that close to 93 percent of IFR rays that reach the skin are absorbed up to a depth of 4 centimetres [ref xx]. The electromagnetic energy travels in straight lines from the source, and it can be directed into specific patterns with the use of properly designed reflectors. It decreases in intensity as it travels outward from its source [refxx].

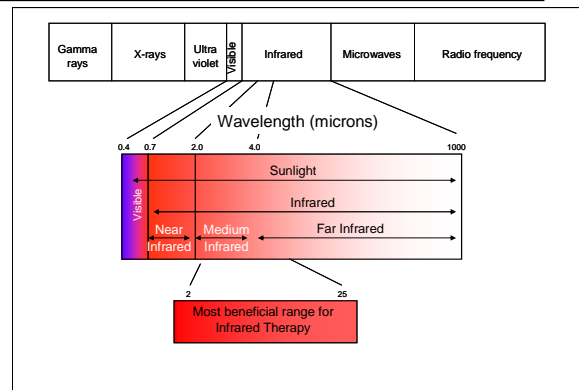


Figure 1 - The wavelength spectrum and its subsets

IFR has a range of effects on the human body:-

- When infrared energy strikes an object (including tissue), it causes the surface electrons to excite and oscillate, which creates heat. This increased heat leads to vasodilation (**expansion of blood vessels and capillaries**), improved blood circulation, increased metabolism between blood and tissue, which promotes faster tissue regeneration. Heating muscles improves blood flow.
- The oscillation also reduces the ion bonds of the atoms that are holding together the molecules of water, resulting in a **release of toxins** [ref xx].
- Some studies have shown that there is improved angiogenesis (**growth of new blood vessels**) following repeated application of IFR;
- Studies have also shown that IFR **improves endothelial function** of capillaries, arteries and veins by inhibiting neointimal hyperplasia (the uncontrolled proliferation of smooth muscle cells, which reduces the lumen of the blood vessels and compromises patency) [ref patency study xx];

Unlike short wavelengths (such as X-Rays and gamma rays), which have a damaging effect on tissues, the effects of IFR rays are either biologically benign or beneficial.

What are the health benefits of IFR?

IFR has been shown to have wide-ranging health benefits:-

- **Increases extensibility of collagen tissues** Applying IFR to tissues before stretching is particularly beneficial for ligaments, joint capsules, tendons and scar tissue. Not only does it reduce the risk of injury, but it also allows for greater extension than would otherwise be achieved.
- **Accelerates healing in soft tissue injury** IFR is being increasingly used for treatment of soft tissue injuries. Improving the blood flow to the site of injury can speed up the rate of recovery.
- **Reduces inflammation and oedema** IFR is a safe and effective treatment for inflammation. Increased peripheral circulation helps to reduce oedema, which helps reduce inflammation and associated pain.
- **Provides effective pain relief** The application of heat has long been recognised as being effective for the relief of pain [ref xx] In addition IFR may bring about an improvement through by increasing blood flow and relieving spasms.
- **Reduces muscle spasms** Heat has long been used to treat muscle spasms, and IFR has additional advantages in that it can reduce inflammation and reduce pain.
- **Increased blood flow** Application of IFR can result in increased vasodilation even when there is no rise in core body temperature.
- **Decreases joint stiffness** Subjective and active observation of joint stiffness has been shown to improve with application of IFR. Speculation is that both the joint and connective tissues benefit.
- **Enhances white blood cell function** This in turn increases the immune response and the elimination of foreign pathogens and cellular waste products.
- **Improves the lymph circulation** This removes accumulated toxins which are often at the core of many health problems.
- **Stimulates the hypothalamus** The hypothalamus controls the production of neurochemicals involved in processes such as sleep, mood, pain sensations, and blood pressure.

What conditions can IFR help treat?

IFR is being heralded as an exciting new treatment for a variety conditions:-

Conditions affected by circulation e.g. Clogged capillary vessels hypertension arteriosclerosis (Increases blood flow

by promoting dilation of capillaries); High blood pressure, Low blood pressure, Stress (it is thought that the improvement in blood circulation and the reduction in muscle spasms plays a role in this [refxx]), Haemorrhoids , Varicose veins , Raynaud's disease (IFR assists with relief of pain and improved circulation of blood to the affected limb), Chilblains (again, pain relief and improved blood circulation), Peripheral vascular disease.

Collagen tissues e.g. Ligaments joint capsules tendons, Fascia synovium increases range of motion, Scarred, thickened or contracted tissues, Increases extensibility of collagen tissues.

Joints e.g. Rheumatoid arthritis (assists in reduction of swelling and inflammation by improving lymph flow.

Pain relief e.g. Neuralgia headache (may lead to increased endorphin production, which reduces pain), Menstrual cramps and pain (pain relief, improved flow of blood and reduction in cramps).

Cardiovascular e.g. Arteriosclerosis (thickening of artery walls due to fatty deposits).

Inflammatory and oedema e.g. Joint inflammation, Gout.

Soft tissue IFR speeds up new and chronic soft tissue injuries.

Cancer e.g. Cancer therapy, Radiation sickness (relieves signs & symptoms), Cancer pain (relieved in later stages of cancer).

Immune system e.g. Fights infection in toe-and-finger-nail fungus (due to improved white blood cell function)

Conditions associated with ageing e.g. Menopause , Sequelae of strokes, Leg ulcers , Benign prostatic hypertrophy, Osteoporosis (some scientists think that reducing excess acidity in the body through toxin elimination will improve bone density, Alzheimers (The writer Terry Pratchett is currently undergoing a course of IFR treatment.)

Diseases of organs e.g. Duodenal ulcers, Hepatitis , Gastritis, Cirrhosis of liver , Bronchitis , Crohn's disease , Cystitis.

Ear, nose, throat, conditions e.g. Sore throats , Nosebleeds, Chronic middle-ear inflammation and infection, Tinnitus .

Respiratory e.g. Chest colds , Bronchitis , Pneumonia

Skin conditions e.g. Eczema, Acne, Psoriasis , Chilblains , Leg and decubitus, Burns, Keloids.

Brain e.g. Short-term memory improved, Accelerated repair in brain contusions, Cerebral haemorrhages; healing both speeds up and is significantly enhanced, Migraines (as a result of improved blood flow to the brain).

Body acidity e.g Reduces acidity in the body (FIR causes fruit to ripen faster by reducing acidity)

Nerves e.g. Peripheral neuropathy (IFR increases local microcirculation, helping to deliver oxygen and nutrients as well as reducing overstimulation of sensory nerves, pain, stiffness, and muscle spasm), Bell's palsy (again IFR assists with microcirculation).

Musculoskeletal e.g. Lumbago , Cramping , Post-exercise muscle pain,.

Weight Management Improved circulation, elimination of toxins and improvement in metabolism is thought to contribute to weight loss as part of weight management programmes.

Exercise and conditioning effect An infrared system can play a pivotal role in both weight control and cardiovascular conditioning, especially for those who are limited in their ability to carry out a full exercise programme, e.g. elderly or disabled; Cardiovascular conditioning (NASA used IFR stimulation of cardiovascular function during long space flights);IFR is great for warming up before stretching or starting any vigorous activity.

The opportunity for IFR

Although the benefits of IFR have been recognised in the East for many centuries, its application is relatively new in the West. The IFR therapy market is growing rapidly as a result of an increase in conditions such as arthritis, cancer and musculoskeletal problems, due to an ageing population and increasingly unhealthy lifestyles. Individuals are looking for more natural treatment therapies such as IFR. As a result, there has been an increase in the range of IFR products being launched for home and professional use. These include Infrared saunas, lamps, tents, bedding (pillows, blankets), body wraps (compresses, belts, full wraps, etc.), clothing (socks, gloves, body warmers, etc.), massage products (foot, back, etc.) and various miscellaneous products such as mats and heat pads.

The expectation is that the acceptance of these products will continue to grow as their use spreads into mainstream. This will provide exciting opportunities for new products in new segments.