MEDICAL REVOLUTION OF FAR INFRARED

Innovative Attach-type Far Infrared Product
Joint Development Among
Taiwan-America-Japan Technology

www.harukifir.com
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What is Far Infrared?

Far infrared is one kind of electromagnetic wave. Generally, we call wavelength between 4~1000 µm are called far infrared ray. And wavelength between 6~14µm are called “light of birth”.

![Diagram showing electromagnetic waves and infrared categories](image-url)
Is Far Infrared Safe?

- About 42% of sunlight are far infrared. Far infrared will not damage your skin like ultraviolet. FIR can activate the function of our body to achieve a variety of health effects.

- However, FIR were easily absorbed by CO2 and moisture of the air and we can hardly receive any FIR after blocked by our clothes.

- Thus, we must seek for more direct, more convenient and more secure FIR sources.
Operation Principle of Far Infrared

The operation principle of FIR is closely related to our circulation, an important factor of FIR is to activate enzyme (eNOS) of inner wall of blood vessel, and expedite the generation of NO.

Clinical research found that Nitric mono-oxide(NO) is an important element to regulate blood circulation. It can repair our inner blood vessel, relax and lower down our blood pressure, increase blood flow rate, and clean clog of our blood vessel.

In 1998, Nobel Prize of Physiological Medication awarded to three American scientists for discovering the importance of NO to our body circulation.
There are thermal effect and non-thermal effect for the operation model of FIR.

Thermal effect is the phenomena when the cells of body surface receive energy from near infrared and generated heat that make us feel warm. It belongs to physical mechanism.

Non-thermal effect is the phenomena when the cells of deep layer of body absorb FIR and activate cell to accelerate circulation and improve their operation function. It belongs to psychological mechanism.

In thermodynamics, thermal effect belongs to conduction, and non-thermal effect belongs to radiation.
Applications of Far Infrared

Agriculture
- helping young plant to grow
- prevent harm from insects

Cultivation
- keep warm for youngling
- increase immunity

Garden
- prolong flower period
- prevent harm from insects

Industry
- heating, drying
- cementation

Living
- Warm, refresh
- Improve good smell of food

Pets
- Increase immunity
- Improve activity

Medical
- Medical beauty-care
- Fistula care

Health Care
- To relieve all kind of pain
- Promote metabolism
Raw Materials of Far Infrared

Natural
- Screen out FIR radiation material from natural mining
- Sources of mining, screening methods, formula proportion, process technology, etc. will affect the FIR emissivity
- Pure, long lasting emission effect and the wavelength can be adjusted by formula ratio.

Artificial
- Treating the organic material with high temperature, ex: bamboo charcoal
- The principle is to change the arrangement of molecules in order to increase the FIR emissivity
- Mix the material into fiber and make fabric cloth with 1~2% ratio only
- The FIR effect will decay over time, and contains lower level of far infrared (higher level of near infrared)
**Categories of FIR Products**

- **Ceramic Lamp**
  - Heated ceramic piece to high temperature (>200) to radiate FIR

- **Halogen Lamp**
  - Lamp with near-IR optical filtered halogen bulb

- **Sauna House**
  - Use industrial FIR heater in the sauna house

- **Textile**
  - Add far infrared material (carbon or Ge) to fiber or fabric clothing products

- **Therapy Gear**
  - Add few (<1%) far infrared material (carbon or Ge) to fabric protection gears

- **Natural Ore**
  - Salt crystal, crystal or titanium will radiate low power far infrared
The Function of FIR Has Been proved by Medical Research

- The far-infrared has been applied in medication for more than 30 years, and there were many studies proved its biological effects.

- Far infrared is related to a specific range wavelength of light, the mechanism it reacts on our body is physically, and its effect depends on its intensity and the wavelength.

- But for drugs, the composition and molecular structure may be different even bear same drug name, so independent clinical trials are required to verify its effectiveness and side effects.

- For example, microwave can heat food because the wavelength of the microwave can resonate with the water molecular contained in foods, consumers only have to check the radiation power while they want to buy microwave oven. It is not necessary to worry about if microwave can heat the food or not, because there are already lots of scientific proof to verify.
The Review of Multinational Clinical Medical Application Research on FIR

FIR have been applied in clinic for several decades. There are numbers of research in Japan, the United States, Germany and Taiwan evidenced that Far Infrared can contribute a significant effect on many symptoms. Although there are no clinical studies for symptoms besides below list, but far infrared treatment is still an options available to try.

- Heart Disease
- Anti Oxidation
- Anti Inflammatory
- Protection Against Oxidative Stress
- Anorexia Nervosa
- Hypertension
- Blocked arteries
- Woman Health
- Weight Loss

- Pain Reliefs
- Kidney Disease
- Wound Healing
- Cerebral Palsy
- Allergic Rhinitis
- Chronic Heart Failure
- COPD
- Chronic Fatigue Syndrome
- Chronic Pain

- chronic Disease
- Depression
- Skin Wrinkles and Photo Aging
- Diabetes
- Cancer
- Arthritis
- Fibromyalgia
- Others
The Future Prospect of Clinical Medical Application Research on FIR

• The attach-type far infrared is a revolutionary innovation, because the far infrared therapy device in former clinical researches were mostly irradiation type products, and its treatment effect has already come across to bottleneck.

• Our attach-type far infrared products did not change the biological mechanism of the far-infrared, we only subvert the traditional method of operation. And it greatly improved the radiation power of 6 to 14 microns far infrared, which has been medically proved its benefit to human body.

• It is our hope that all experts and scholars who want to do clinical research of far infrared can take the advantage of the attach-type far infrared products. It is our most pleasure to provide further assistance, if any. Please feel free to contact us by e-mail.
**Far Infrared in Medical Care**

**(A) Rehabilitation**

- Far Infrared radiation expedite generation of NO of inner cell wall of blood vessel, its anti-inflammatory effect can rehabilitate the inflammation and pain of muscle and joints.
- FIR can promote muscle relaxation and lower spasm effect.
- FIR can relief our nerve to reach calm down and pain-relief effect.
- Strengthen muscle, increase the flexibility of the joints.
- Improve circulation, accelerate tissue repairmen.
- Relieve pain, inflammation, swelling
- Relieve muscle spasm.

(B) Kidney Disease

- Far infrared can expedite generation of NO of inner cell wall of blood vessel, which improve blood flow of fistula and prevent hardening of fistula, thus reduce re-surgery caused by fistula occlusion.

- Far infrared treatment need to be applied for long period, short-term treatment only bring limited effects. The best way is to use every day at home or carry with.

- The energy of far infrared is low, it is easy to be obscured by clothes or water vapor, so it is better to attach to your body while treating.

- FIR can also reduce the itch of dry skin among kidney disease patients.

Far Infrared in Medical Care

(C) Prostate care

- Many males suffer from prostate hypertrophy or prostate inflammation. It is because the prostate is surrounding the urethra, when it become bigger or inflamed, it will generate pressure to the urethra and result in frequent urinary, nocturia, urgency, and difficulty urinating.
- Far infrared can expedite generation of NO of inner cell wall of blood vessel, which can suppress the inflammation and smooth muscle around the prostate. This will greatly reduce the pressure on the urethra, and increase urination rate and urine output, relief the related symptoms.
(D) Pain and after-surgery care

- According to clinical research, FIR can promote the regeneration of tissue cell of injured skin and accelerate its recovery. It can be applied after surgery or wounded to help partial recovery and preventing infection.

- FIR can expedite generation of NO of inner cell wall of blood vessel, which will reduce the feeling of pain from wounded parts and related discomfort.

Far Infrared in Medical Care

(E) Eliminate Disease Cells

- Due to messy vascular congestion in tumor tissues, heat is easily to be accumulated. This cause the cancer cells very sensitive to higher temperature. While temperature reach to 40~43 degrees most of the cancer cells gradually killed.
- Normal heat therapy can only make the surface warm, unable to penetrate into tumor tissue. But far infrared can penetrate deep layer of human body and generate deep warm effect. It can inhibit the cancer cells (those bear) poor temperature resistant capability.

Journal of Medical and Biological Engineering, Vol 29, No 1 (2009)
Far Infrared in Medical Care

(F) Medical Beauty

- Far infrared can bring unique physiological effects on human body, which can promote blood circulation, accelerate metabolism, improve cell activity. For medical beauty care, FIR can improve skin quality, reduce wrinkles, fade dark spots, and suitable for all skin type.
- Far infrared can promote wound healing, can be applied to accelerate wound healing and cosmetic surgery to prevent infection.

Far Infrared in Health Care

(A) Relieve Soreness or Pain

- In fact, the pain feeling result from our brain rather than nerve. Our nerve is only responsible for message transition, while the pain feeling is finally judged by the brain. However, our brain often misjudge pain, the best example is our headache while eating ice.

- Long-term pain or soreness are usually caused by disorder of autonomic nervous, which make brain misjudge and feel pain.

- Far infrared can deep warm and accelerate circulation, improve the disorder of autonomic nerve. It can reduce the pain after exercise or long-term pain caused by damage of muscle or ligament.

Far Infrared in Health Care

(B) Relieve the Menstrual pain
During menstrual period, uterine will be contracted to expel the endometrium. Excessive uterine contract will result in muscle ischemia and cause menstrual pain. Far infrared can expedite generation of NO of inner cell wall of blood vessel, which soothe the uterine muscle to reduce discomfort caused by menstrual pain.
Far Infrared in Health Care

(C) Increase Oxygen Content of Our Body
Our body cell rely on blood circulation to transport oxygen and nutrient. Far infrared can expedite generation of NO of inner cell wall of blood vessel and expansion of the blood vessels. This bring good effects to increase the blood oxygen, strength and endurance of muscle. Which also make you feel energetic, and protect you from disease and aging.

**Far Infrared in Health Care**

(D) Improve Circulation

- Many people suffer from cold hands and feet in winter, this is mainly caused by poor blood circulation. The functions of our microvascular are to supply the oxygen and nutrient and to excrete the waste generated in body cells.
- Far Infrared can raise the skin temperature under deep layer, and expedite generation of NO of inner cell wall of blood vessel. It can speed-up the blood circulation, to help you feel better in winter time.

**Far Infrared in Health Care**

(E) Increase Metabolism

Far infrared can expedite generation of NO of inner cell wall of blood vessel, which make arteries more elastic. It is very helpful for arterial endothelial tissue, which can protect blood vessels from atherosclerosis, or improve circulation problems caused by metabolic syndrome.

Canadian Journal of Diabetes Volume 34, Issue 2, Pages 113-118, 2010
Volume 34, Issue 2, Pages 113-118, 2010 Canadian Journal of Diabetes
(F) Balance the PH of our body
Far infrared can expand blood vessel and promote the metabolism to prevent pain in joint or gout which caused by high blood uric acid or other acidic compounds.

### New knowledge of Far Infrared

Difference between FIR therapy and normal warm therapy

<table>
<thead>
<tr>
<th>Item</th>
<th>Warm therapy</th>
<th>FIR therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category</td>
<td>Attach-type warming</td>
<td>FIR radiation or attachment type</td>
</tr>
<tr>
<td>Transmission</td>
<td>Conduction</td>
<td>Conduction and radiation</td>
</tr>
<tr>
<td>Depth</td>
<td>Only within 1cm from body surface</td>
<td>Can penetrate into more than 5cm depth from body surface</td>
</tr>
<tr>
<td>Principle</td>
<td>Warm effect</td>
<td>Non-warm effect</td>
</tr>
<tr>
<td>Period</td>
<td>Max 30~40 min each time</td>
<td>Max 30 min(radiation) / No limit(attach-type)</td>
</tr>
<tr>
<td>Risk</td>
<td>Burned or dry skin</td>
<td>Dry skin(radiation) / None(attach-type)</td>
</tr>
<tr>
<td>Effect</td>
<td>Only relieve symptoms, such as pain relief and increase motion of joints</td>
<td>Deep layer improvement, such as: improve circulation, promote wound healing</td>
</tr>
</tbody>
</table>

Warm therapy can only temporarily reduce symptoms of discomfort, while FIR can basically improve circulation to reduce the frequency of all kind of uncomfortable symptoms.
New knowledge of Far Infrared

The relation of therapy intensity and distance of Far Infrared

- FIR is one kind of light wave whose radiation intensity is inverse proportional to the distance.
- FIR can get better treatment effect while closer to our body.
- Owing high temperature and outside shape, radiation type products can not applied attached to our body.
- Radiation type products require distance of 20~30 cm, attachment type product can be contact to our body directly.

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Distance (cm)</th>
<th>Intensity (MW/cm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attachment</td>
<td>0.3</td>
<td>45</td>
</tr>
<tr>
<td>Radiation</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Radiation</td>
<td>30</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Treatment effect of FIR vs. Distance
* **New knowledge of Far Infrared**

**Breakthrough power of FIR**

- FIR carries longer wavelength, thus contains lower energy.
- FIR is very easily blocked or absorbed by all kind of clothes.
- Cotton clothes create the most significant absorption among all, only 1mm thickness can completely block the FIR.
- It is required to expose the treatment position while apply the radiation type FIR product. But the attachment type can attach directly to our body, not necessarily take off clothes, and much more convenient, private, effective.
New knowledge of Far Infrared

The difference of far infrared and near infrared

- The beneficial wave length of infrared is 6~14 μm, it can activate our cells and improve our circulation
- Wave length shorter than 3μm is near infrared, it will only heat up the surface of our body and can not penetrate deeply
- There are high ratio of near infrared (<3μm) contained in some retail products, beware while you choosing products

Radiation spectrum

Product contained near infrared with wavelength<3μm

Medical FIR radiation wave length.
Why FIR is not popular in medical care?
- Fake: No remarkable effect or not follow scientific principles.
- Poor Effect: Low emission rate or decay rapidly, no feel by user.
- Not Convenient: Location and methods are limited, can not use for long period.
- High Price: Not acceptable by users.

How to choose good FIR product?
- Material: Natural is better, which must be allowed to feel and touch.
- Effect: Must bear certification for emission rate, and can feel the effect in short period.
- Technology: Should be safe, convenient, durable, stable, etc.
- Price: Reasonable price for users.

* New knowledge of Far Infrared
**Characteristics of Attach-type FIR**

**Raw Material**
- Select high FIR emission material from natural mining
- High-tech grinding process into nano-grade power
- Repeated test and adjustment to find the best formula
- Laboratory proofs whose emission rate is about 85% at 34°C
- When heated to 60°C, emission rate is over 90%
- Non-toxic material, no harmful radiation
Coating Technology
Composite the FIR ceramic nano-powder and high temperature tolerable non-toxic soft gel into brand new FIR film materials. It is soft and flexible, and can be coated on various surface or attach to our body.
**Characteristics of Attach-type FIR**

**Innovative Heating Technology**

- Heating can improve FIR emission rate
- Innovate soft nano-carbon heating film
- Rapid heating and evenly, low power consumption
- Combine with our flexible FIR film can fabricate attach-type therapy pad
**Characteristics of Attach-type FIR**

- **High Emission Rate**
  - Taiwan TRI
    - Temperature: 34 °C
    - Emission: 85%
  - Taiwan ITRI
    - Temperature: 60 °C
    - Emission: 92%
  - Korean KCL
    - Temperature: 60 °C
    - Power: 45 mW/cm²

- **Emission Power**
* Characteristics of Attach-type FIR

Comprehensive and easy to use

- Driving
- Working
- Walking
- Leisure
- Sleeping
- Sporting
### Attach-type FIR Product

<table>
<thead>
<tr>
<th>Model</th>
<th>Home-use Personal Nurse</th>
<th>Profession-use Hospital &amp; Clinic</th>
<th>Special for Hemodialysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy Wear (S)</td>
<td>Easy Wear (L)</td>
<td>Easy Pad (S)</td>
<td>Easy Pad (L)</td>
</tr>
<tr>
<td>Picture</td>
<td>Picture 1</td>
<td>Picture 2</td>
<td>Picture 3</td>
</tr>
<tr>
<td>FIR Pad</td>
<td>130x75x3 mm</td>
<td>200x100x3 mm</td>
<td>250x360x5 mm</td>
</tr>
<tr>
<td>Size</td>
<td>9x35 cm 9x55 cm</td>
<td>12x120 cm</td>
<td>26x37x1 cm</td>
</tr>
<tr>
<td>Power</td>
<td>DC 5V / 3W</td>
<td>DC 5V / 5W</td>
<td>DC 24V / 45W</td>
</tr>
<tr>
<td>Suit For</td>
<td>Head, neck, limbs</td>
<td>Shoulder, back, waist, butt</td>
<td>Head, neck, limbs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
* **Attach-type FIR Product**

**Home-use Personal Nurse**

- Stiff neck
- Tennis Elbow
- Carpal tunnel syndrome
- Knee osteoarthritis
- Gout
- Rheumatoid Arthritis
- Plantar fasciitis
- Varicose veins
- Cold hands and feet
- Strains, sprains

**Easy Wear (S)**

- Neck
- Elbow
- Wrist
- Knee
- Ankle

**Contain**

- Therapy Pad (7.5 x 13 cm)
- Easy Wear (Hand)
- Easy Wear (Leg)
- Power Line
- Charger

Optional exclusive protective gears
*Attach-type FIR Product*

**Home-use / Personal Nurse**

- Frozen shoulder
- Scoliosis
- Degenerative cervical syndrome
- Lower back pain
- Spur
- Sciatica
- Menstrual pain
- Prostate inflammation
- Prostatism
- Strains, sprains

**Easy Wear (L)**

Contains:
- Therapy Pad (10x20cm)
- Easy Wear (L)
- Power Line
- Charger
*Attach-type FIR Product*

**Profession-use / Hospital & Clinic**

**Competent Application**
- Soft and comfortable, fit to every part of body
- Directly attached to body, significant effect of the treatment position.

**High-grade Safety**
- DC power, safety and no EM waves
- Over-heat and overload protection, smart temperature control

**Easy & Convenient**
- Easy to operate, no professional training required
- Can be accommodated to save the space of treatment room

**Infection Free**
- Jacket can be removed to wash or use disposable film to prevent the interactive infection, suitable for all medical units

**Contain**
- Easy Pad (S): Therapy Pad (25x36cm), Jacket (S), Charger
- Easy Pad (L): Therapy Pad (25x60cm), Jacket (L), Charger
**Attach-type FIR Product**

Special-use / Hemodialysis

- Open-end design
- Adjustable angle

- 9 step of heating control
- Timer or continuous

- Maximum 15W
- Power saving

- Deposable film for hospital and clinic use
- Small dimension
  - Easy to install

- Separable therapy pad
  - Can be treated other parts
- 5 times greater FIR power than radiation product
- Can use with protection gear
  - No naked for treatment

**Contain:** Therapy Pad(10x20cm), AVF Treatment Unit, Charger
The Effect Differences Between Attach-type and Commercial FIR Products

• Generally, commercial far infrared products can only claim its "emissivity", but almost never mention "radiation power". It is because those available current market products only carry very low radiation power, and hardly bring any therapeutic effect. "Emissivity" and "radiation power" are not the same concept, while “emissivity” is a ratio value and “radiation power” is an absolute value.

• "Emissivity" is a ratio value compared to the theoretical value only, it does not take account the size factor and the total amount of radiation. For example, a small vehicle is not capable of over-drive a super sports car even with its full power speed.

• Thus, the "radiation power" is the most important factor affect the amount of far infrared we received. Our attach-type far infrared has been laboratory proved that the radiation power is 5 times greater than available current market products, and its biological effect is very different accordingly.
**Comparison with Commercial Products**

- **Ceramic Lamp**
  
  **Principle:** By heating ceramic piece to radiate FIR
  **Pros:** Market longer, more users
  **Cons:** Should be 30cm away while using, due to the high temperature.
  Can not use more than 60 min.
  Some contain near infrared.

  **Advantage of attach-type FIR**
  (1) Medical grade heating technology can directly attach to our body
  (2) Can use anytime, available to carry
  (3) Certified high FIR emissivity
  (4) Safe, no near infrared

- **Halogen Lamp (Not FIR)**
  
  **Principle:** Add filter on halogen lamp (Filtering the non-FIR lights)
  **Pros:** Low price
  **Cons:** Lifetime of lamp is limited
  Contain high potion of Near IR
  Low FIR radiation rate
  High temperature lamp

  **Advantage of attach-type FIR**
  (1) Long lasting emissivity effect
  (2) Safe, low temperature, no near IR
  (3) Certified high FIR emissivity
  (4) Low energy consumption, no EM waves
**Comparison with Commercial Products**

**Sauna House**

**Principle:** FIR heating plates or tubes

**Pros:**
- Easy production, good looking

**Cons:**
- High price, big volume and space required
- Non-safety industrial heater
- Operation period and method restricted

**Advantage of attach-type FIR**

1. Acceptable price by consumer
2. Can use anytime, available to carry
3. Medical grade nano carbon film heating technology, can attach to our body
4. Soft and can be closely attach to our body

**Textile**

**Principle:** Add charcoal or germanium (1-2%) into textile fabric

**Pros:**
- Mass production, low price

**Cons:**
- Low emission rate (<10%)
- FIR emissivity decayed
- Low warming effect

**Advantage of attach-type FIR**

1. Certified high FIR emissivity
2. Long lasting effect, and will not decay
3. Medical grade heating technology, can expedite treatment effects
4. High quality natural raw material with high FIR emissivity
• **Therapy Gears**

**Principle:** Mix carbon or mining powder and use conventional heaters  
**Pros:** Convenient, low price  
**Cons:** Low FIR emission rate (almost none)  
Need controller, easily cause burnt  
Conventional heater, not evenly heated

**Advantage of attach-type FIR**
1. Certification of high FIR emissivity  
2. Medical grade nano-carbon film heating  
3. Evenly heating and attach directly to body  
4. Low energy consumption, no EM waves

• **Natural Ore (Crystal, Salt crystal, Titanium)**

**Principle:** Ore which carry FIR emissivity  
**Pros:** Beautiful, can be jewelry or ornaments  
**Cons:** High price, big size, heavy  
Poor emission rate (<50%)  
Contain harmful radiation elements

**Advantage of attach-type FIR**
1. Reasonable price, can carry along with  
2. Certified of high FIR emissivity  
3. Safety raw material, no harmful radiation  
4. High quality natural raw FIR material with high FIR emissivity

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**Comparison with Commercial Products**

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MEDICAL REVOLUTION OF FAR INFRARED

Your Personal FIR Nurse

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