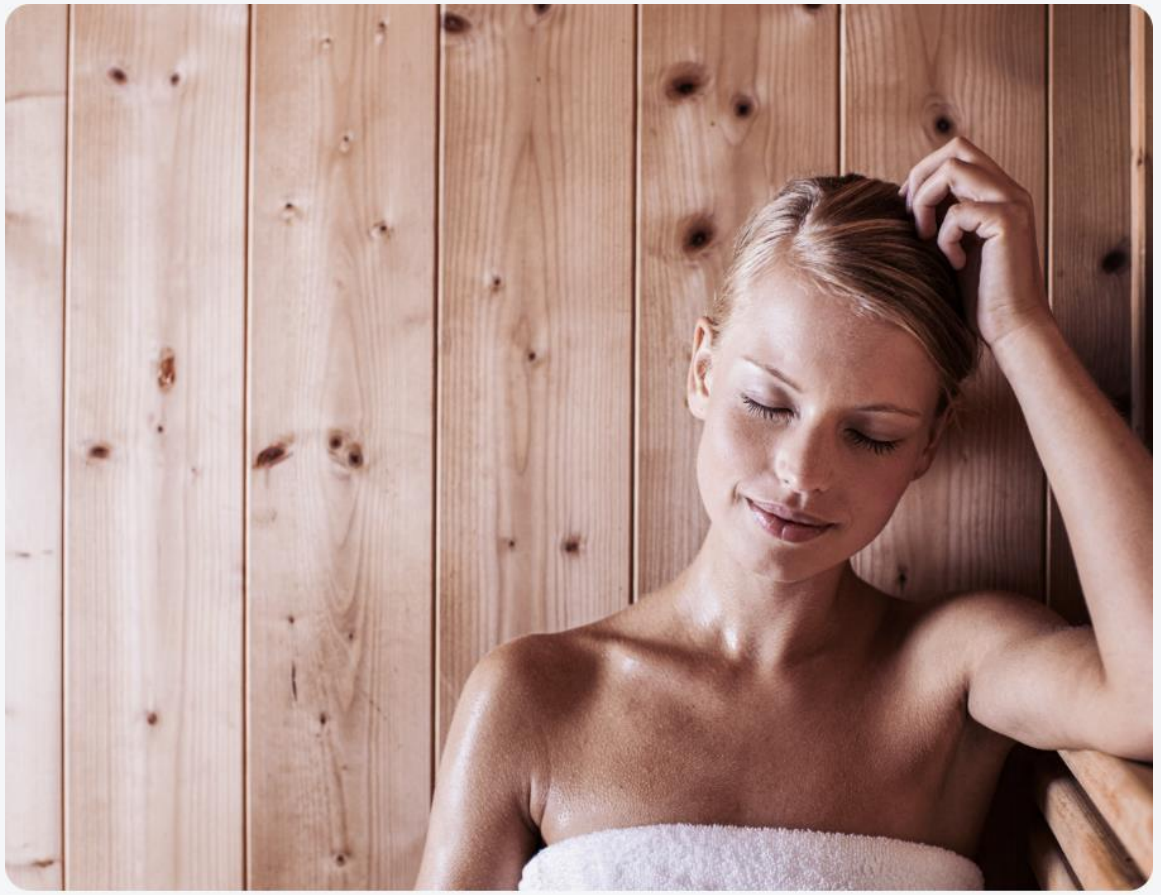
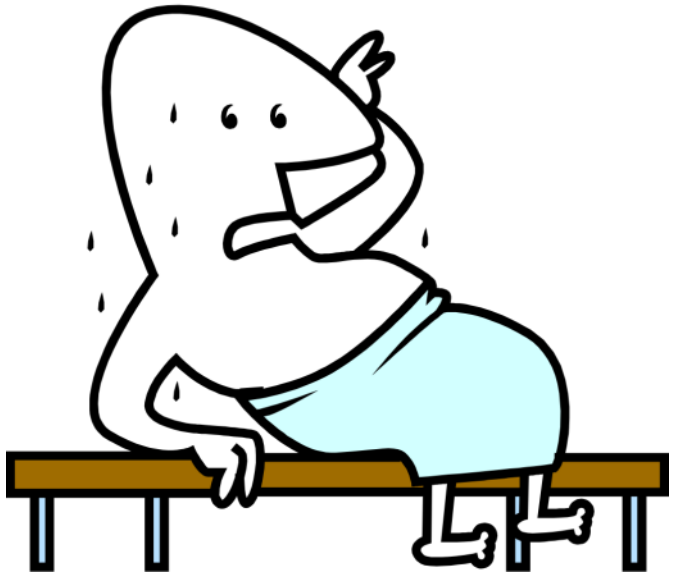
IR Webinar



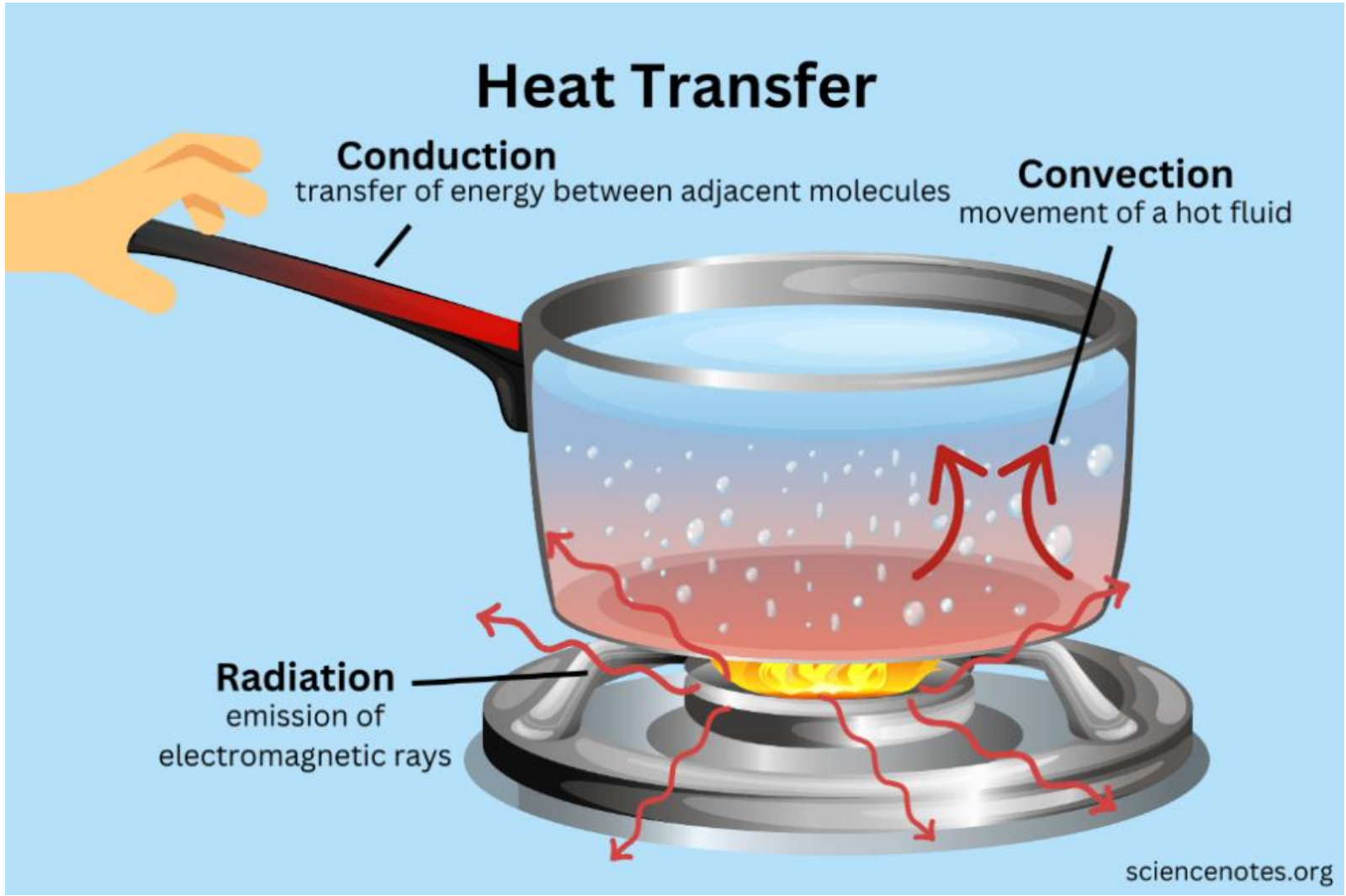
Infrared and Traditional sauna

First things first

1. Both will cause the user to sweat profusely
2. **All** profuse sweating is good for the body
3. Which type of sauna to use, and how they want to feel as they sweat, is up to the **user**



Thermodynamics

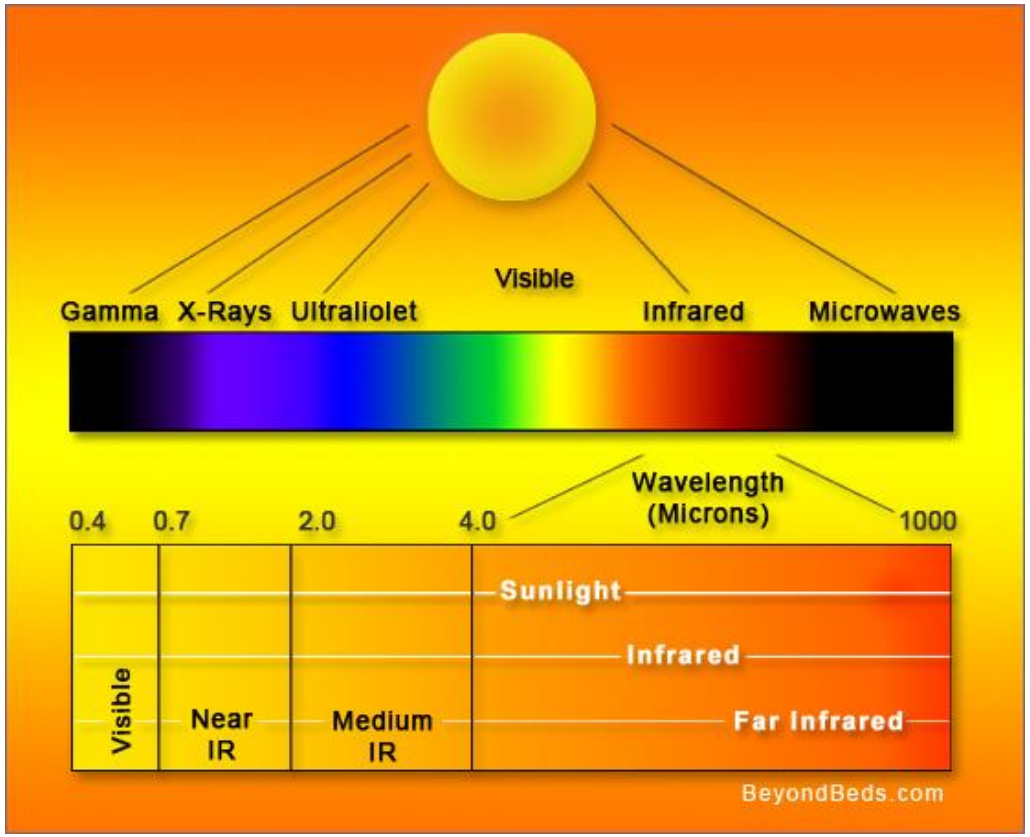


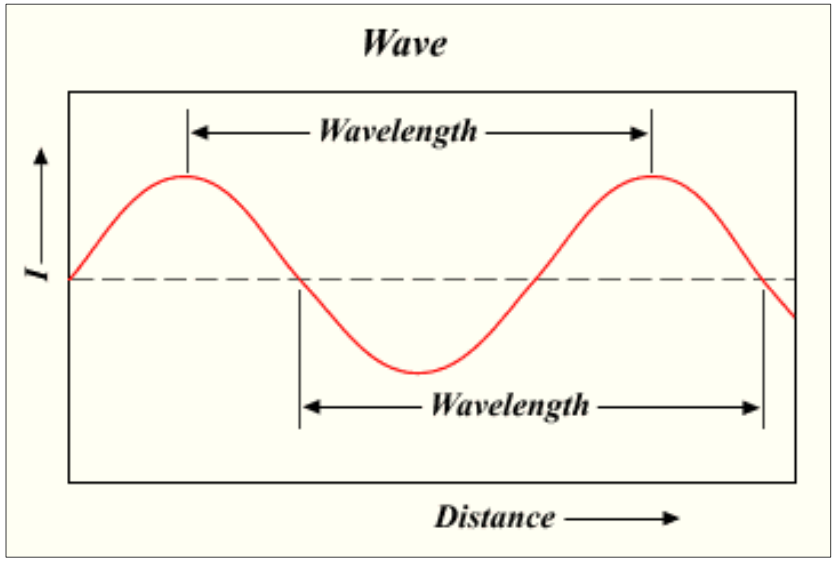
$$Q = [K \cdot A \cdot (T_{hot} - T_{cold})] / d$$

$$Q = h_c \cdot A \cdot (T_s - T_f)$$

$$P = e \cdot \sigma \cdot A \cdot (Tr - Tc)^4$$

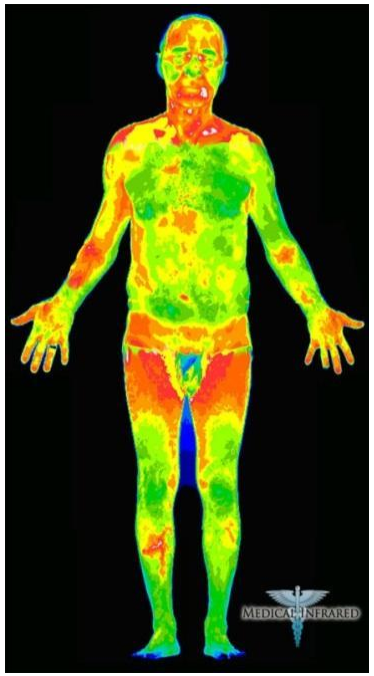
What is IR?

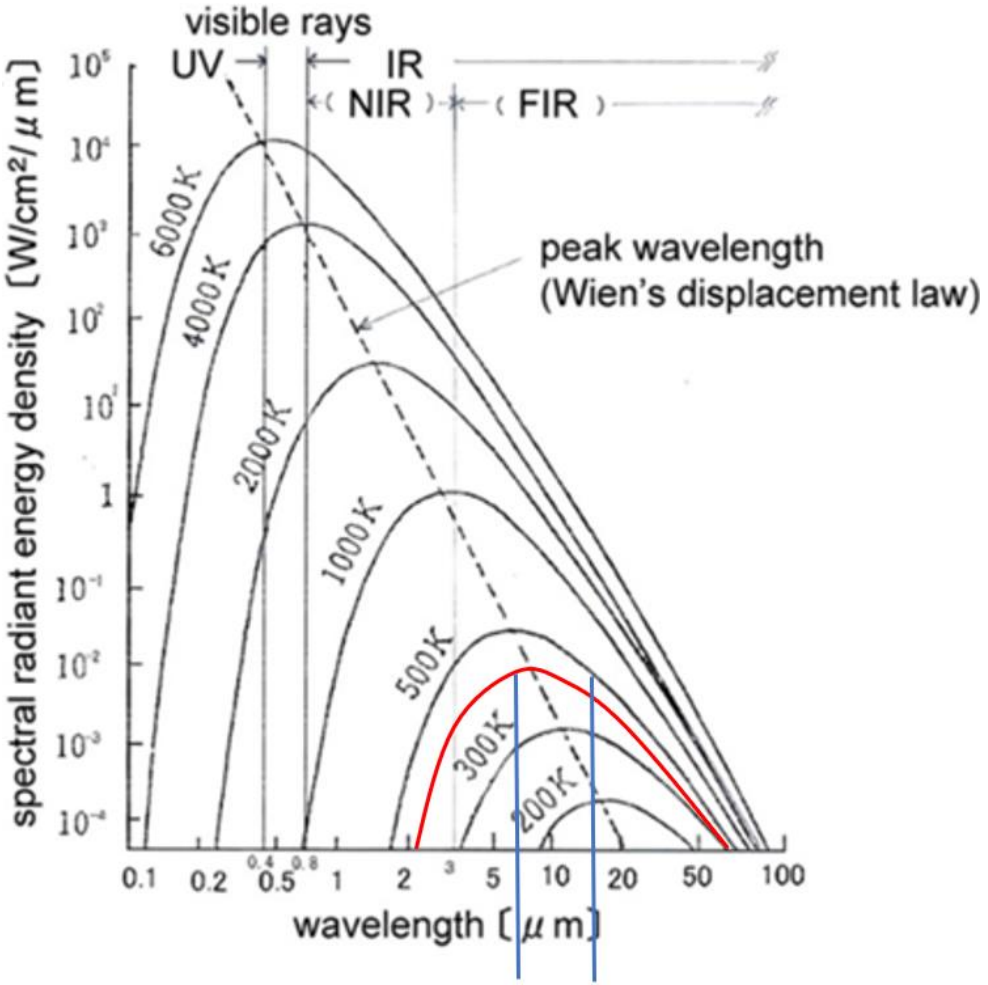

Visible
Gamma
X-Rays
Ultraliolet
Infrared
Microwaves
Wavelength
(Microns)
0.4
0.7
2.0
4.0
1000
Sunlight
Infrared
Far Infrared
Visible
Near
IR
Medium
IR
BeyondBeds.com

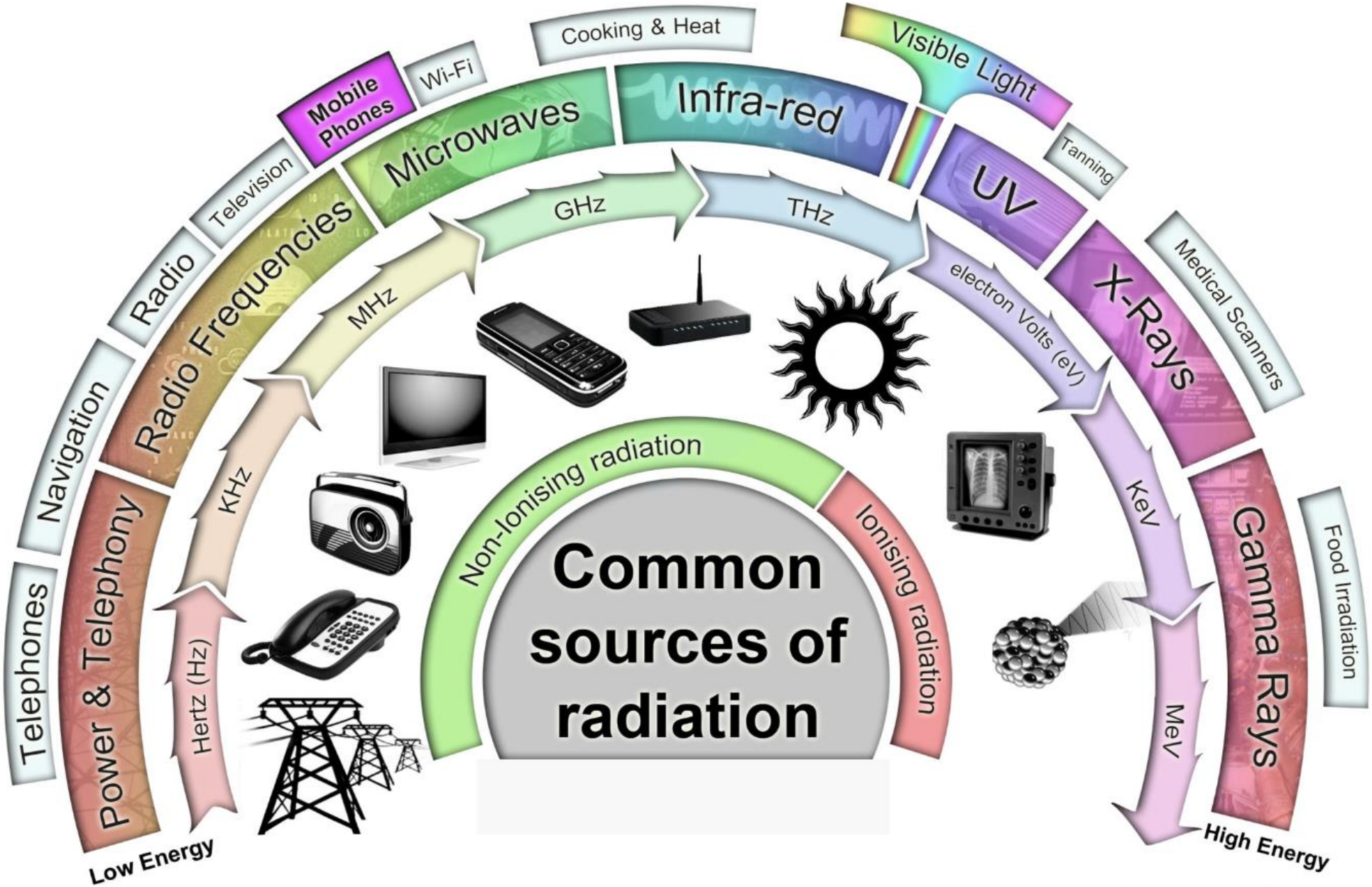

Wave
Wavelength
I
Wavelength
Distance

IR theory

- Correlation between black body radiation and temperature
- Human body receives and emits IR
- Vital range = 7-14 micrometer
- With the “optimal range” being between 8.4 to 9.4 microns







Source: Science Media Centre

EMF

- An Electromagnetic Field (EMF) consists of two force components.
  The first being Electromagnetic Radiation (EMR) which is caused by alternating current flow and the second being Electric Field (EF) which is caused by system voltage

EMR + EF = EMF

What is safe?

- There is no safety standard applicable
- Toughest existing standard is the Swedish Computer Monitor Standards

The Swedish Computer Monitor Standards

Sweden offers two measurement and emission guidelines for computers monitors:The first, known as **MPR II**, prescribes limits on electric and magnetic field emissions in the ELF and VLF ranges, as well as the static field.

A more recent and more restrictive standard, promoted by the Swedish Confederation of Professional Employees (TCO), addresses the entire computer. In addition to field emissions, **TCO '95** includes guidelines for energy consumption, screen flicker, luminance and keyboard use.

Frequency Range	MPR II	TCO '95
Electric Fields:		
DC: Static Field	+/-500 V	+/-500 V
ELF: 5 Hz – 2 KHz (Band I)	up to 25 V/m	up to 10 V/m
VLF: 2 KHz – 400 KHz (Band II)	up to 2.5 V/m	up to 1 V/m
Magnetic Fields:		
ELF: 5 Hz – 2 KHz (Band I)	up to 2.5 mG	up to 2.0 mG
VLF: 2 KHz – 400 KHz (Band II)	up to .25 mG	up to .25 mG

MPR II measurements are taken at a distance of 50 cm (approximately 20 inches) at 16 points around the monitor, at 3 different levels.
TCO measurements are taken at a distance of 30 cm (approximately 12 inches) in front of and 50 cm around the sides of the monitor (except for Band II magnetic fields and the static field, which are measured at 50 cm in front of the screen).

Confirmed measurements

Electromagne

Based on Tylö's pro

2. Method

2.1 Overview

All tests consisted of observing readings at regular intervals using a tri-field meter. The tri-field meter used in the experiment outputs a live feed of data and a max value from the last three seconds. The max value was the one used in all the data points. The tri-field meter has been factory calibrated.

When taking readings on infrared panels, the tri-field meter was placed on the wooden part where the user's body leans. The reason for this is based on that the user cannot get any closer to the panels, therefore users will not be exposed to higher levels of radiation.

Figure 2.1 – Tri-field meter

2.2 Readings on Tylösand

Readings were observed on Tylö's infrared cabin, Tylösand T-870. The data points were taken in 22 different places inside the cabin (see figure 2.2 – 2.4) with intervals of 5 minutes over the course of an hour. That sums up to 286 data points. It takes about 1.5 minutes to take readings of every marked place in the cabin. There are always approximately 1.5 minutes between the reading on "A1" and "E". This time difference is consistent and does not affect the result.

Figure 2.2 – Panel A

Figure 2.3 – Panel B

Figure 2.4 – C, D, and E

The places starting with the same letter originate from the same panel. (see figure 2.2 – 2.4). The place labeled "E" is in the center of the cabin. (see figure 2.4).

As shown in figure 2.2 – 2.4, the readings were taken, evenly spread, on the panels. Every panel has a spot where the readings are highest which are not included in the first test. These

5. Conclusions

5.1 Analyzing the data

The confidence interval, created from data points "A1" - "E", can be used to conclude that the average radiation the user gets exposed to is between 0.559468 and 0.59298 mG with 95% confidence.

By calculating the standard derivation and the mean value of the data from point "G", "H", and "K", the empirical rule can be used. The empirical rule states that the user will be exposed to less than 2 mG of radiation while using Tylö's far infrared emitters with near certainty (99.7%). This is true because 1.99583, and 1.816452 are less than 2.

The same reasoning can be used when analyzing the data from the phone. When using a phone similar to the one used during testing, the user should expect to get exposed to more than 43.67 mG of radiation, with near certainty (99.7%).

All calculations can be obtained from chapter 4. Equations.

5.2 Perspective

The user does not get exposed to a large quantity of electromagnetic radiation when using an infrared sauna from Tylö. Looking at the readings from inside the cabin, it is hardly more than the electromagnetic radiation that always exists in a room. There will always be some radiation in a room created by household lights, speakers, and electronics. The following table (see figure 5.1) contains other references collected from the Wikipedia article: *Orders of Magnitude (magnetic field)* (2021). This further proves how low the radiation measured in the test is.

Value (mG)	Item
0.001 to 0.1	Magnetic field strength in the heliosphere
0.6 to 7	Magnetic field produced by a toaster, in use, at a distance of 30 cm.
1 to 5	Magnetic field produced by residential electric distribution lines (34.5 kV) at a distance of 15 m,
13 to 27	Magnetic field produced by high power (500 kV) transmission lines at a distance of 30 m.
40 to 80	Magnetic field produced by a microwave oven, in use, at a distance of 30 m.
50 000	The strength of a typical refrigerator magnet

Figure 5.1 – List of orders of magnitude for magnetic fields

Seen from the worst angle, the user still only gets exposed to less than 2 mG of electromagnetic radiation. That is a trivial amount of radiation. Comparing the results from the infrared cabin with the results from the phone, phones emit a lot more radiation than Tylö's far infrared emitters. According to the tests, the phone emitted, on average, over 40 times the amount of radiation compared to the far infrared emitters. An argument can be

Our product range – infrared rooms

One-person room

Two-person room

Three-person room

Three-person room

Our product range – infrared panels

Three different kinds of loose infrared panels

With our infrared panels, you can set up your infrared room so that you receive warmth on your back, calves, and/or sides. You can for example swap the backrest to an infrared panel.

Combine them in your sauna or use them to build a custom fitted infrared room.

Let’s talk some unique selling points!

The effect is immidiate

When you press the ON-button, the effect from infrared starts immidietly even though you don’t feel warm yet.

Deeper warmth

The infrared vawes penetrate the skin more deeply than traditional saunas

The energy efficient choice

A smaller sauna room usually consumes about 4 - 5 kW/h, (depending on size, construction and desired temperature).
Tylö’s infrared room needs approx. 1.5 - 2 kW/h for 1 hour of use in comparison.

Easy installation

It required no assembly and can be set up in around 30 minutes

Built-in control panel

- **Adjustable timer**: You can set the duration of the session yourself, but it will automatically turn off after 60 minutes
- **Temperature control**: You can adjust the heat setting to your comfort level. The benefits with infrared sauna are equally good either temperature you choose
- **Bluetooth speaker**: Connect your phone to the Bluetooth speaker to listen to your favorite music och sound book

How to-videos

@Tylö Global