

THE FINNISH SAUNA, METHOD AND IMPACTS

The word "sauna" suffers from the same dilemma as a Kleenex. While sauna is a sweat bath and Kleenex is a facial tissue, all sweat baths are not saunas and no other tissues can claim to be Kleenex except the real thing. The same is true for the "sauna", the Finnish sweat bath and the only Finnish word to be absorbed into the English language.

History and Evolution of Heat Treatments

As early as 326 B.C. Oribasius worked as a sports physician, treating sports injuries with massage, heat, water and air baths. Asclepius used water, air, light, hot and cold baths for medical and physical therapy. Herodotus, the Greek physician used helio and hydro therapy. Even Jesus and Paul were familiar with the gymnasium and supporting bath houses (John 5-1-9-7).

Heat treatments come in a variety of forms which includes hot air, hot water, steam, sun or radiant energy, friction due to rubbing or massage and combination treatments. A sub-set of the heat treatments is a category of activities known as sweat baths. Common elements of all sweat baths include a period of heating and sweating followed by a period of cool down and relaxation.

Sweat Baths

In the classic book "Sweat" by Mikkel Aaland, a summary and history of the sweat bath is provided. The sweat bath has been part of the culture of many countries and has been used for cleansing the body, for religious purposes and disease treatment.

Throughout Europe, public baths were popular from the 13th to the 17th centuries. It was not until the trend to use a sauna to mask sexual activities that the use of the public sauna waned, it's image being tarnished. The sauna began to make a comeback in Europe after 1950 and has become popular, though increasingly less well understood, throughout the world.

Early public baths of the Greeks and Romans used hot springs to create thermae. The Russians and Turks created unique bathing procedures and cultures. The steam baths in Soviet towns are called "banvas" in which the average temperature is 52 degrees C with a high level of humidity. The washroom of a banya can often accommodate 30-70 bathers. Even the native Americans had a sweat lodge, with hot rock heat and direct fired variants.

The concept of sweat, heat and health is not new by any means. Despite common elements found in all sweat baths, the Finns developed the sauna bath, a sweat bath of unique character. Today, the word sauna is wrongly used to describe a variety of sweat baths which have little in common with an actual sauna. The Finnish sauna evolved to include unique design, conditions of temperature and humidity and use.

The concept of a sweat bath at first seems crude and even improper, yet makes total sense from a physical, chemical, mental and emotional perspective. Sweat is good and more sweat is better. In his book, "Sweat", Mikkal Aaland gives the history, variations and prevalence of the sweat bath in many cultures.

The need for a perspiration bath seems to have emerged first in countries and regions where people had to perform heavy physical labor as part of daily life. The sweat cleanses and relaxes, while the heat keeps the body supple for the next day of work. Work capacity, performance and recovery seem to be tied to how the body is treated after it is stressed.

The Finnish Sauna

The Finnish sauna has been popular for at least 2,000 years. While it was not the original hot air or sweat bath, it has evolved into a unique activity which should have widespread application in wellness, recreation, relaxation and sports. The modern Finnish sauna generally includes hot room, wash room and dressing room.

note: In Finland, the sauna has been used as a place to warm up, restore the body and soul, perform household chores, do exercise or health related activities and as a maternity clinic. The outdoor chalet style of sauna often had large enough dressing and cooling off rooms to be used for guest housing.

Finland is a rugged country with an abundance of forests, lakes and varied terrain. Early life was hard and the work was intensely physical. The Finnish sauna likely evolved as a means to recover, prevent injury and insure that workers were ready for the physical challenges of the next day. While sweat baths are not unique to Finland, the sauna is a unique adaptation of the sweat bath. Sauna is a Finnish term which represents a Finnish invention. The word sauna is the only Finnish word in the English language.

The first known saunas in the U.S. were built by Finnish and Swedish immigrants in the Delaware River Valley 1638. The spot where the first sauna was located is marked in the center of the Philadelphia Navy Yard. Bath houses were also common in the early settlements.

The largest wave of Finnish immigrants occurred from 1850 to 1920, when over 400,000 Finns relocated to America. The first saunas were savu saunas because they were easily built from materials which were readily available (logs, stone, mortar and nails). Due to the fact that Finns had no words in common with the English language, they tended to congregate in settlements. Many Finns did not speak English and were often held suspect due to the frequent episodes of dancing about naked. Gradually, the sauna and naked bathers were accepted.

In the 1920's and 1930's Finnish athletes participating in the Olympics publicly advocated the use of sauna as an important part of training. Journalists reporting on the successes of Finnish athletes during the Olympic Games in Paris in 1924, linked the performances to the sauna. Saunas were further popularized when they were installed at the Berlin Olympics in 1936.

Paavo Nurmi, "The Flying Finn" won 9 gold medals in 3 Olympic competitions, breaking 25 track and field records. The sauna was cited as an important supporting factor. Despite positive press and some interest, it really was not until the 1960's that America began to take note of the sauna and consider it's value. In 1960, saunas were constructed in Squaw Valley, California as part of the athletic infrastructure for the Olympics. That year, Finnish saunas were taken by athletes from many countries.

Once noticed, the sauna became more widely used. President Kennedy had a sauna installed in the White House. The advent of the electric sauna heater made it easier to adapt the sauna to the growing urban centers of the U.S.. In 1962 the Wall Street Journal printed an article titled "Relaxing Sauna Baths Growing Popularity Lifts Equipment Sales".

Viking Sauna on the West Coast was the first U.S. sauna company and the most successful. In 1961, Viking sold 50 saunas and by 1978 the company was selling thousands annually. Today, saunas are a well accepted part of the American culture and "sauna" is the only Finnish word which has been well accepted.

While fairly popular in America, and most can identify the word sauna, few can describe how to use a sauna and why. Even fewer can identify quality sauna design and know why. Like so many things which come to America, once assimilated, the new version may be watered down to the point where it does not even seem related to the original. This has been the case for the Finnish sauna.

note: There is no such thing as an American sauna. The concept of sauna refers to a Finnish bath. While there may be other sweat baths, steam baths, hot rooms and perspiration chambers, they are not saunas.

Sauna Method

Sauna is a Finnish word for bath. While methods can vary slightly, the sauna method is specific and required in order for the experience to be called a sauna. The sauna is an affordable luxury because if it is used 1-3 times per week, it may only cost \$4-\$6 per month. The actual cost depends on the length of time required to heat up the sauna.

The method of the Finnish sauna bath generally uses a high temperature (80-100 degrees C, 176-212 degrees F) and low humidity (30-40 g of water per kg of air, 7% to 12% relative humidity). While some can tolerate heat greater than 100 C, this is not recommended due to excessive heat stress. Sauna air temperature is read at the level of the upper body, chest height.

Common Air Problems

Air Too Dry - If the air is too dry, it can lead to excess sweating and retard the increase in body temperature.

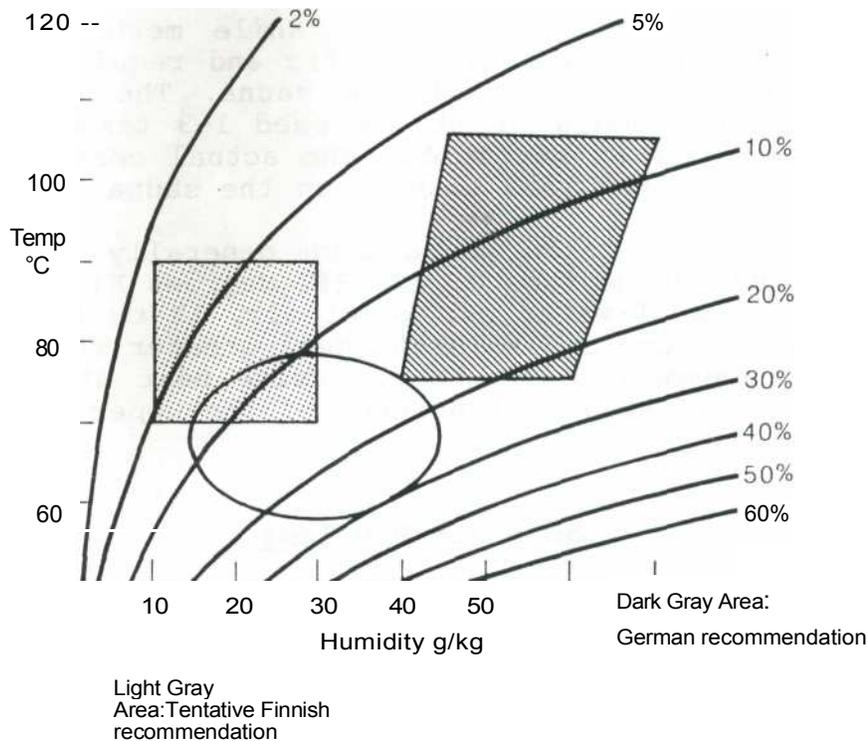
Air Too Wet - If the air is too humid, moisture can condense in respiratory passages which can cause the tissues to experience heat stress.

note; Sauna temperatures less than 80 degrees C can favor rotting of the wood used for sauna walls. Radiant sauna energy warms the walls, ceilings and benches. Many modern saunas use temperatures below 80 degrees C and the wood can deteriorate as a result.

The temperature of the Finnish sauna is higher than many other sweat baths. The reason is that the Finnish sauna uses a relatively dry heat and the body can withstand dry heat better than moist heat. Following the Finnish sauna method, the air stays fairly dry even when steam is produced by pouring water on the hot rocks. The excess moisture is quickly absorbed by the hot wood walls.

The usual combinations of temperature and humidity are depicted in the chart below. Factors which affect the impact of the sauna bath include air temperature, humidity, air flow and the total time of exposure.

Heat loss by evaporation in a dry sauna is much greater than in a wet sauna. This is a point of distinction for the Finnish sauna which is hot and dry. The Finnish sauna uses heat which exceeds the ability of the body to compensate and dissipate the heat. This leads to "hyperthermia" which is a form of heat stress.



○ Probable temperature of small saunas built in connection with residential apartments

note: Due to the high thermal load of the Finnish sauna bath, user must be careful to monitor exposure time.

source: Helamaa E;, et al *The Secret of Good Loily*

The Finnish sauna bath usually consists of 5-20 minute sessions, with 12-15 minutes on the sweating platform and cool down breaks at room temperature, with a swim or shower. During the time in the sauna, skin temperature may reach 40 degrees C, although a 30 minute stay in the sauna will only affect rectal temperature 0.9 degrees C. The rise in core temperature is greater in children than adults. Increased air flow velocity will affect heat transfer.

note: Intensive and lengthy heat exposure can lead to fainting due to insufficient cerebral blood flow.

By design, the rate of air flow should provide 3 to 8 changes of air per hour. The sauna steam room should have an opening at floor level, a shutter vent where the wall meets the ceiling and a vent just below body height. If there is a window, it should be the type which can be opened briefly or to air the sauna when finished.

Loyly and Vasta

Loyly and Vasta are used to create thermal and tactile sensations which may be at first painful, become pleasant and enjoyable after initial exposure.

Loyly is created when water is tossed on hot stones and the resulting steam condenses on the skin. The word loyly often is used to refer to the steam. The steam produces heat sensations on the skin and increases the heat load to the body. The heat load is what causes the circulatory and hormonal changes which produce the pleasing effects of the Finnish sauna bath.

While Vasta initially may appear as a simple ritual of self flagellation, there is an actual technical basis for the procedure. The Vasta is also called Vihta which refers to the birch or other broadleaf specie twigs used to beat the skin to increase the heat load capacity of the body. The gentle beating of one's body with a whisk of birch twigs functions to increase local circulation and increases the velocity of air on the skin which helps dissipate excess heat.

Cool Down

The cool down is accomplished by sitting, lying or lounging at room temperature, a cool water shower, a swim in cool water or the traditional rolling in snow. The cool down will allow the body to recover from the heat stress, prepare for the next session of sweating and in the final cool down, it functions to close the pores.

note: The extreme cardiac stress associated with ice water dips and rolling in the snow should be avoided by any persons having any degree of heart disease, hypertension or irregular heart rhythm.

Simple Guide to Effective Sauna

Heat the sauna to the right temperature and humidity and soak the whisk.

- Perspiration on the platform
 lying with the feet raised on foot rest
- Water tossed on stones/Whisk with birch twigs
- Cool off in water/air
- Sit on bench/sweat
- Wash self with soap, water, brush/rinse in warm water
- Cool off in water/air
- Sit on platform/sweat
- Cool off in water/air
- Rest

Sauna Design and Construction

In Finland, the vast majority of homes have a sauna which holds 6 people and which is heated at least once per week. While the traditional sauna was built lakeside and of wood, saunas are now built anywhere and some even of concrete with a wood interior. The gradual reduction in the size of saunas has saved money, yet has caused many problems. These include excess radiant heat reaching the body and a lack of adequate ventilation. In small saunas the steam hits hard, while in larger saunas, the steam hits gently.

While many wood types are used in the interior of the sauna, several species excel. Nordic white spruce is a tight grained wood which resists staining, does not discolor easily and will not absorb odors. Abeche is a light wood which works well for contact with the body because it remains comfortable to the touch at high sauna temperatures.

Of the north American woods, western red cedar is preferred over eastern white cedar. The western cedar is 30% less dense and will not twist or shrink. Eastern white cedar is more dense and hotter to the touch. It also splits easily when fastened or nailed near the end of a board. Aspen is readily available in many areas and is also used. Wood to be used for a sauna should be inexpensive and readily available. For contact with skin, spruce and aspen are widely used.

note: Poorly designed, constructed and maintained saunas have an unpleasing odor and some can even be unsanitary, depending on how they are used and maintained. After each use, the sauna platform and bench should be washed.

Many saunas built and installed in the U.S. appear to be of low quality design, have poor or improper material selection and few if any provide any instructions for proper use. While there are saunas in many apartments, condos, motels, hotels, and resorts, they are not so much saunas as they are heated closets. And, without an established sauna method, the results are poor and benefits diminished. And, in some cases, the health risks and sanitation are not controlled or even considered. This is not a sauna experience, but is rather a sauna nightmare.

note: Small saunas without exhaust fans can pose danger due to a low amount of air flow. The recommended air change should be 3 to 8 times per hour. As the size of saunas gradually decreased, problems with air flow have increased.

For proper ventilation the vent should be placed slightly below bench height. This will help insure uniform heat, a shutter vent near the ceiling offers control and a space under the door will help insure the floor stays cool.

Sauna Spaces and Layout

The total sauna space consists of the sauna room, wash room, dressing/cooling room and sometimes an outdoor deck/porch. While outside saunas have averaged 15-20 sq meters (some were 40 sq m or more), there has been a gradual reduction in size. New apartment models may only be 1.5-2.5 sq m. Some of the small sauna designs cause claustrophobia and often have excess radiant heat, overly harsh loyly and defective air flow. Care must be taken when reducing the size of a sauna to insure that an acceptable level of function will result.

note; While the word sauna cannot be trademarked or patented, a specific sauna design may be protected by a trade name, brand and possibly a site use license.

The classic chalet style outdoor sauna has great potential for new custom home construction, seasonal homes, cottage homes and free standing condo vacation homes. The location of the chalet should be close to the home so that power and water are readily accessible. The walk to the sauna can be open or enclosed.

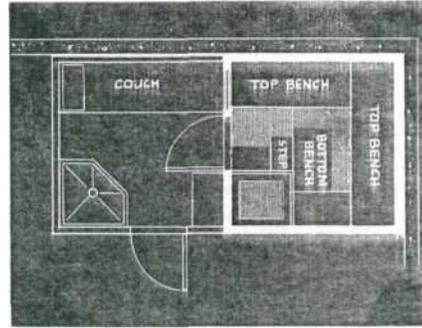
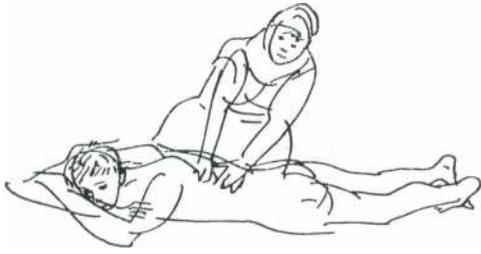
The sauna room minimum is recommended at 6.5'x 6.5' and from 6.25' to 7.0' in height. If the sauna room is also used for washing, the height should be 7.75' to 8.2' so that the temperature at the height of the person washing is 30 degrees C. Wood sauna stoves require the most space and electric sauna stoves the least.

The washroom usually has a bench and wooden stool with buckets of water. If there is running water, there can be a shower stall which allows great space savings. There can also be a sink if there is a shower stall and water.

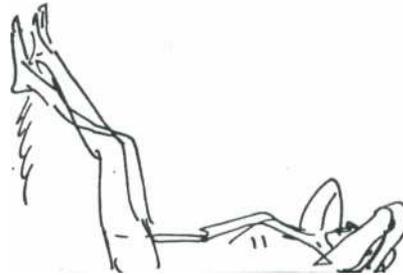
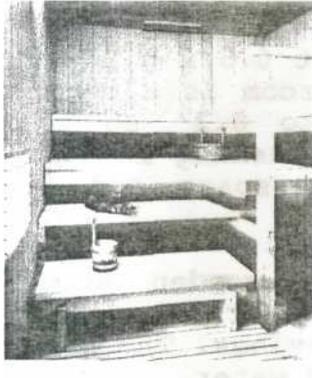
The dressing/cooling off room is used for cooling off during the winter, although an outside deck works best in summer. The dressing room will often have benches (at least 6 foot recommended) to sit on and lay down on. A larger dressing room may even have a fireplace and serve as guest quarters. The guests can use the washroom and have easy access to the sauna.

The Deck or Porch is the natural place for bathers to cool off and relax during the summer. Because of the habit of taking saunas in the evening, the porch should face west towards the setting sun. The porch should have a bench or chairs and be protected from the neighbor's view.

The Chalet Building can be a 8' x 14' (112 sq ft) building with a 6' x 14' covered deck. The recommended roof pitch is a 6/12 with option storage loft. The standard roof should be metal. Logs should be dried to 15% or less moisture and the standard log should have flat surfaces.



The picture below shows the sweating platform with footrest, bench and stool. Note the vent is located above the floor yet below the position of the body.



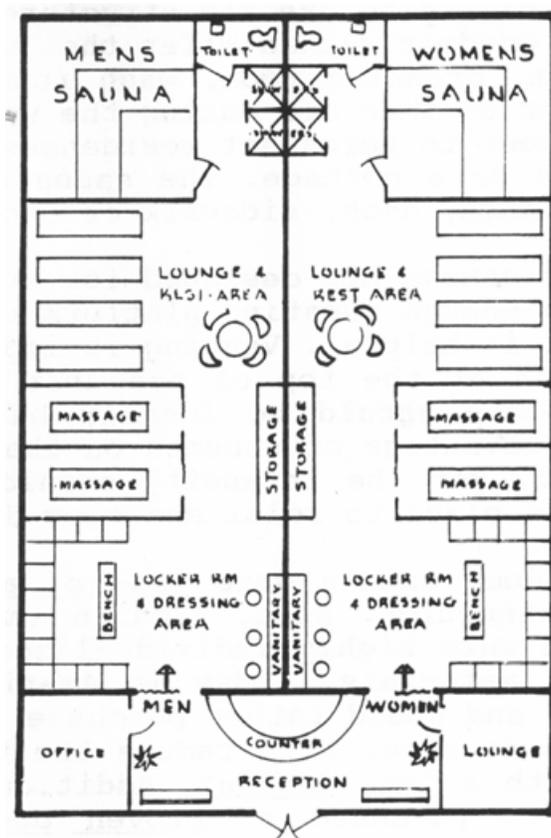
Giselle Roeder

Real Estate Saunas

While real estate saunas remain popular in Finland, Germany and Japan, in America the sauna has been allowed to fall into a position of disrepute. Possibly, the sauna in the U.S. will be re-born through spas and fitness studios. Saunas have become integrated with wellness and fitness centers. In several European locations, the concept of a bathing resort has emerged. In Japan, saunas often have a large screen tv in the cooling off room.

In Finland and Germany, real estate saunas use sauna meisters or sauna attendants to wash customers. In Finland, the sauna attendant is usually a specially trained woman who washes the naked men as they lay on wooden benches. The women have seen thousands of naked men and treat them no different than they treat fully clothed men.

Many of the real estate saunas are morphing into a blend of a day spa or fitness studio. Finnish sauna, massage, hot tubs, hydro-therapy tubs, small pools, steam baths and physical therapy can be combined to create a complete experience using compatible elements.



Full Service Sauna Facility in the Netherlands

Sauna
Steam Bath Hydro-therapy
tubs
Pools Solaria
Lounge Area
Reception Area
Locker rooms
Massage Gym
Equipment Physical
Therapy
Restaurant/Cafe

While the real estate sauna name has been tarnished in the U.S. by those selling sexual massage, sexual favors, illicit sex, the concept can be revived through careful design, marketing and professional operation. In many cases, the facility will need to be called a spa or exercise studio. The fitness studio chain 24 Hour Fitness has saunas in most facilities, including airport locations.

Outdoor Saunas

Outdoor chalet style saunas can provide a full function sauna plus provide the ability to use the structure as a multipurpose building. Outdoor saunas offer the luxury of space for the sauna room, dressing room, wash room or shower plus an outside deck for cooling off during the warm months. They can be built adjacent to permanent residences, vacation homes or seasonal cabins or a cottage. The sauna can be connected to the house by a path, deck, sidewalk or enclosed walkway.

Typically, outdoor saunas are designed for at least 6 persons and are roomy with enough sweating platform room to lay down. A raised foot rest is helpful. Venting is important and there should be an outlet at the top of the unit and an inlet at the bottom. The sauna should be ideally built to face the southwest to take advantage of sunsets on the deck. At night, lights may be used, yet the intensity should be kept fairly low. The sauna is a place to relax and slow down.

Traditionally, outdoor saunas were "one of a kind" in terms of design and construction. Also, Finnish immigrants usually built saunas which were highly individualized and which used inexpensive, local materials. Today in America, most people are "time starved" and would rather purchase a pre-built kit which is assembled on site. Kits reduce the time, effort and risk associated with a "one design". Additionally, a kit can allow a consumer to purchase a "proven design" which has known operating characteristics.

Savu Saunas (smoke sauna)

To many, the smoke sauna is still the standard by which all saunas are judged. In Finland, it is considered the best and is still the most common type of sauna in the country. In the original savu sauna, the smoke and steam was not let out, but in modern versions, there is a vent to allow the smoke to exit the sauna. The air temperature in the savu sauna was typically 160-170 degrees F.

Pre-Built Sauna Kits

The traditional outdoor sauna was a one of a kind building made of logs, wood panels and possibly stone and mortar. Very attractive lakeside saunas were often built "chalet style" and many even had a deck in front.

The advent of the pre-built sauna allowed consumers to easily construct an outdoor model, access and use a design which is time proven and where air flow, moisture control, radiant heat and other factors have been carefully considered. For a well designed kit sauna, the operating characteristics are known and documented.

Pre-built sauna kits create value for the "do it yourself" type by taking risk out of the designing, material selection and building process. By definition, a pre-built sauna will include all parts pre-cut, and all components required for operation. The kit is delivered ready to assemble, complete with instructions, drawings and possibly a video. For the purchaser of a kit, there is a cost savings associated with the owner providing all of the labor for assembly.

Pre-built saunas can be fully assembled by the manufacturer and delivered to a site, ready to set on a post or block foundation or concrete pad. These saunas will likely cost 30-50% more than the kits due to the cost of labor and increased cost of shipping a completed chalet style sauna.

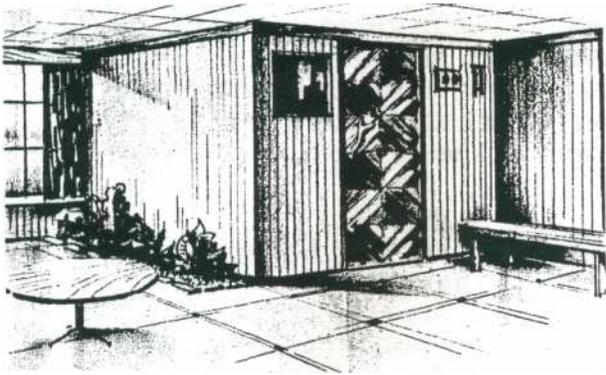
Advantages of Pre-Built Saunas

build it and use it the same day
no cutting wood (pre-cut)
no framing to build
no construction mess
easily moved to another site
known completed cost
pre-determined operating characteristics
includes all components, fittings and hardware

Modular Indoor Saunas

The pre-built sauna for indoor use is the modular sauna which consists of pre-engineered panels which are assembled or simply fastened together. Modular saunas can be placed in bathrooms, basements, cellars, apartments or in multi-unit condo buildings. Typically, these are the saunas used for motels, hotels, resorts and even office complexes.

Indoor saunas have an advantage of being able to use an existing bathroom in place of a washroom with shower. These saunas can also be relocated if the panels use temporary fasteners. The largest indoor installations may have all of the functional spaces of an outdoor sauna.



Business and Saunas

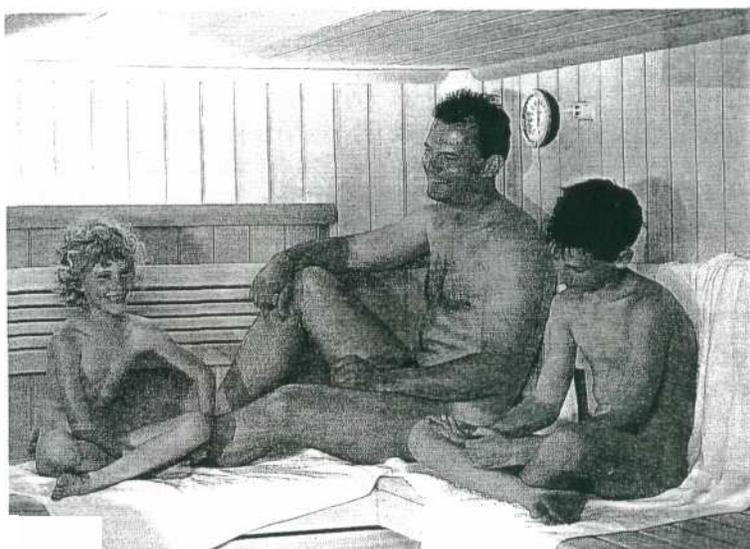
In China, business dealings are often done after a meal, when the opponent is well fed, in comfortable surroundings and is therefore most agreeable. Finnish businessmen take their dealings to the sauna for a similar reason. There are no power plays possible when you are naked and after a sauna, your business associates will be more agreeable and willing to explore new ideas and embrace new solutions.

note: Mixed saunas are generally not practiced for business meetings unless associates are family members, relatives or very close friends.

The city of Tampere, Finland Media Tampere is a company which designed a sauna with on line video conferencing capability. The sauna has a web camera and microphone inside the sauna. In this city, sauna use is 100% of the population and the internet use is 70%. It was a natural to video conference inside the sauna because the place is a part of everyday life.

Infrared Saunas

Infrared saunas are not really saunas but closed systems for infrared heat therapy. The word sauna refers to a Finnish sweat bath. There is no such thing as an infrared sauna. The therapy does have value due to the ability of infrared waves to penetrate the skin to create deep heating.



The Benefits of Sauna Baths

The sauna bath is a holistic experience which produces a psychosomatic event. There are measurable and predictable physical, psychic and social impacts. Additionally, the sauna leads to relaxation, enjoyment and a feeling of well-being. While there are many physical and mental benefits, a primary outcome is simple pleasure.

In the sauna, psychic and somatic elements come together in a unified experience. The sauna can provide a needed escape and refuge and is a place where bathers leave the rational mind, unnecessary analysis and criticism on the outside. The proper sauna attitudes are positive, sympathetic and good natured. Aggressive behavior and power plays are shed along with the cloths.

Measurable sauna bath benefits include increased blood flow, especially to the skin and hormonal and metabolic changes which induce thermal and tactile sensations which may become pleasant and lead to positive impacts. The after effects include a feeling of well-being, calm and a lasting and pleasing feeling of peace and comfort. The benefits are due to the effect of exposure induced changes in brain neuro-transmitters or peptides.

The Finnish sauna bath has been documented to provide benefit for respiratory conditions. While physiological changes in ventilation remain small, cutaneous vasodilation caused by the sauna can decrease pulmonary congestion. While the effect is positive on obstructive pulmonary disease, it is negative on inflammatory respiratory diseases. Because of this, those persons with known inflammatory respiratory disease should not use the sauna bath.

note: Use of the sauna bath during an acute respiratory infection can increase the inflammation.

The sauna bath is often used for physiotherapy in treatment of chronic bronchitis. Frequent sauna bathing can decrease the incidents of breathlessness. The cool down should be at room temperature because a cold shower, a dip or rolling in snow could cause a rapid pulmonary artery pressure increase which is dangerous.

East German physicians prescribe sauna baths for physical therapy, cardiac disorders and circulatory problems. Germany has 7,000 public saunas, which is a high number when compared to countries nearby. This is due to the fact that most sauna baths in Germany are taken in public saunas. In a similar fashion to the Finns, a sauna meister is used to help bathers wash.

Benefits of Sauna

- Relaxation
- Cleanliness
- Refreshment
- Stress reduction
- Sweat to expel toxins
- General feeling of well-being
- Expel heavy metals (lead, mercury and others)
- Improved cutaneous circulation
- Improved nutrient availability to the skin
- Improved skin tone and clarity
- Increased skin elasticity and texture
- Increased skin softness
- Release and removal of dead skin cells
- Reduced severity of acne, eczema and psoriasis
- Strengthened immune system
- More relaxing and deeper sleep
- Arthritis relief
- Muscle tension and spasm relief
- To cleanse
- To refresh
- Mental relaxation
- Simple enjoyment and pleasure
- Improved physical or athletic performance
- Improved immune system function

The Sauna as a Tool

Given the basic benefits of the sauna, it can be used as a tool for a variety of reasons, particularly in sports. It has been long felt and is now known that the heat, cold, water, rest and social contact can activate or stimulate the body's own healing capabilities. In addition to having value in recovery of acute conditions, the sauna has merit for treatment of chronic conditions and possibly prevention of injury and disease. Regular sauna use can also affect our balance and mental well-being.

Due to increased circulation, the sauna can aid athletes and active persons by providing an aid to training, enhancing performance and improving recovery after training or an athletic event. The recovery aspect is particularly valued in cases where physical exertion, performance and contest must be continued day after day. If during performance, muscle imbalance, over-use, excess tension, chronic fatigue or adhesions are occur, performance may be reduced and injury becomes more likely. In these cases, the sauna may have an important role in prevention by decreasing tension, thereby reducing the risk of injury.

Depending on the type of injury and condition, the sauna may also help athletes who are in recovery. Assuming that the injury treatment does not require cold treatment, the sauna may be effective in accelerating recovery by stimulating the body's ability to heal itself. While largely due to increased blood flow to the outer portions of the body, the tension relieving effects of heat and mental renewal associated with the treatment make the sauna an attractive physical therapy.

Roles of Sauna and Physical Therapy

- Improve/ maintain quality of life
- Improve/ maintain mental health
- Improve/ maintain physical health
- Improve/ maintain physical performance
- Improve/ stimulate recovery

Just as it is with exercise, the sauna causes measurable and predictable changes in the physical body and mental function. While the impacts of the changes have been appreciated for centuries, the actual effects of sauna are only beginning to be understood and accepted. It is getting easier to sell the concept as Western medicine accepts the concept of exercise and physical therapy as medicine. Also, the realization of a mind:body connection, further enhances the potential value of the sauna.

The value and use of the sauna will vary depending on the level of sports participation desired and enjoyed by the athlete. The types of persons include non-participants, the weekend warriors who suffer from over-use of muscles during their short two day weekend and competitive or elite athletes who are constantly training and in need of recovery.

Sauna and non-participants - These are de-conditioned persons who may suffer over-use response, excess muscle tension and strains as a result of casual participation or performance of daily chores. Without treatment, the level of impairment may grow, creating a chronic pain or pre-disposing the person to eventual injury.

Common Athletes and Participants - Activity can lead to muscle imbalances, over-use conditions, excess tension, fatigue and a wide variety of other conditions which may require treatment by a sports physician or physical therapist. The sauna may be part of the treatment or an important part of post treatment and recovery.

Elite Athletes and Competitors - Training can continue constantly and with more progress when sauna is used to maintain function, increase rate of recovery after a hard workout and hereby reduce the chances of injury. In this case, the sauna can reduce the risk of down time in the training schedule which caused loss of conditioning and reduced level of performance.

The Sauna and Massage

The sauna can provide a valuable adjunct for sports massage and massage therapy. The use of heat has long been recognized by therapists to allow muscles to relax, yet the use of a sauna prior to massage has many more benefits. The fact is that a sauna will improve the effectiveness of a massage in terms of short and long term impact.

In the short term, a sauna prior to massage will optimize the ability of the masseuse to work muscles. After the sauna, the person is in a state of relaxation, the skin is clean and elastic and the muscles have relaxed.

In the long term, one of the benefits of massage is to move metabolites out of muscles to be excreted from the body by the blood supply. Also, to repair damage and strengthen the muscles, individual fibers and cells need access to nutrients which are only available in the blood. The sauna increases circulation which creates optimal conditions for removal of waste products and at the same time, facilitates delivery of amino acids, carbohydrates and nutrients which are required for optimum muscle repair and growth.

note: The axiom of the Greek healer Heraclitus is still valid. "Without good blood supply, there can be no relaxation of the muscles or spirit, nor new cell building or improvement of our muscular condition."

Effects of the Sauna on the Body

While there are some effects which are in common, individual impacts depend on the physical capacity of the person, the state of hydration of the person and the acclimatization by past exposure to sauna baths. A common impact is the increase in cutaneous circulation. In general, it is advisable to avoid alcohol, a heavy meal and dehydration prior to the sauna bath. Circulatory responses are tied to the intensity and duration of exposure to sauna heat.

Variables Which Affect Sauna Impact

Intensity of heat
Duration of exposure
Humidity
Quality of air
Age
Sex
Health status
Physical fitness
Fluid balance
Medication
Posture
Emotional status
Psychological response

The hypothalamus acts as the thermo-regulatory center which collects input impulses, compiles inputs and provide a coordinated response. Neurotransmitters and receptors are involved in the process. The skin has 3 types of receptors which react to sauna heat. When the temperature is 30-45 degrees C, the main thermal sensation is heat. Some cold receptors are activated between 30-40 degrees C which causes some sauna users to experience an initial "cold feeling". Pain receptors can be stimulated when air temperature is over 42 degrees C, from hot bench surfaces and hot steam (Loyly).

note: Over-use of steam is not advised. The increased humidity of Loyly causes condensation in the respiratory tract which can cause a sensation of breathlessness.

Sweating begins at differing times, depending on the level of acclimation. Evaporation begins within 1-2 minutes of the initiation of sweating and usually reaches a maximum within 15 minutes.

The impact of sauna bathing depends on the amount of skin surface to body weight. Due to less weight per unit of skin surface, children may experience a more rapid increase in core temperature than adults.

Common Effects of Sauna Bathing

Initial decrease in blood pressure
Increase in cardiac output
Increased heart rate
Decreased blood flow to organs
Increased flow of blood to muscles and skin

Impact of Thermal Load and Sweating

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Excess thermal load induced on the body is mainly removed by sweating and mediated by increased circulation within the skin. An average of 0.5 kg of sweat is excreted during a normal sauna bath. Acclimatization to the sauna leads to an increase in the sweating capacity. Physical fitness and training also improve the thermal regulatory capacity.

note: Those acclimated to the sauna will begin to sweat earlier and at a rate which may be double normal. Those who are acclimated may release up to 2 liters per hour of sweat and circulation may be increased from 20-40 times the resting level.

Impact on Fluid Balance

Sauna exposure also will affect fluid balance, electrolyte level and acid:base balance. Factors affecting regulation of fluid balance include individual characteristics, the sauna design, operation and duration of the sauna bath. The amount of sweat which evaporates is mainly dependant on humidity of the air within the sauna.

Sauna Design and Use

Factors Affecting Fluid Balance

Duration of bath
Temperature and humidity of air
Velocity and volume of air movement
Design and structure of sauna
Cooling pauses

Due to the intense nature of a sauna, fluid replacement is recommended during sauna exposure. If a sauna is taken after physical exertion, additional fluids may be required before the sauna to prevent dehydration.

The sauna bath has short and long term impacts on fluid balance. The direction of flow of fluids in the body depends mainly on changes in the function of the capillary network. The initial change is increased blood flow through the skin and muscles, followed by a decrease in blood flow to the organs. Veins respond more quickly to changes in temperature than arteries, dilating when exposed to heat and contracting when exposed to cold.

Fluid Balance

Personal Variables Affecting

Age
Body build and structure
Acclimatization to sauna
Physical fitness
Hydration state
Diseases state and medication use

The position of the body within the sauna affects fluid balance. When sitting, 70% of the blood is below the heart and 75% of this volume is in the veins. Blood plasma volume is also affected by position. The decrease in plasma volume is 17% in the sitting position and only 2% in when lying. Sitting upright slows the venous return of blood to the heart.

Impact on Hormones

Exposure to an 80 C sauna can triple the noradrenaline concentration in blood. This level of increase is similar to that induced by maximal exercise. The concentration of growth hormone in the blood increases after 15 minutes of exposure. Sauna exposure increases the secretion of insulin, produces a reduced insulin response and decreased glucose utilization.

Impact of Sauna on Blood Pressure

The impact of sauna on blood pressure is well researched, yet interactions of air temperature, humidity and duration of exposure are not well understood. While the initial sauna bath exposure may increase blood viscosity up to 40%, continued exposure leads to acclimatization where viscosity returns to near normal. Frequent sauna use leads to rapid acclimatization which increases tolerance for the sauna and to a lesser extent, all heat stress. Intensive and prolonged sauna bathing can cause arterial pressure to drop enough to cause fainting. The risk is increased for the elderly and those on medication for hypertension.

Circulatory Impacts of a Sauna Bath

Increased blood volume
Decreased heart rate
Increased cardiac output
Increased cutaneous blood volume
Increased cutaneous blood flow

note: The changes are enhanced by physical training immediately prior to the sauna bath

When sitting upright, there can be difficulty in maintaining adequate blood pressure. The risk of fainting is increased by sitting upright, overly intensive and long heat exposure leads to cutaneous vasodilation which impairs the return of blood to the heart in the veins.

note: Intensive and lengthy heat exposure can lead to fainting due to insufficient cerebral blood flow. As time in the sauna increases, so does heart rate.

The cardiac work load induced by a sauna bath is 1.5 to 3.0 times greater than that caused by vigorous walking. The work load is largely due to increased volume rather than increased pressure. The increased cardiac output increases the blood volume and the body directs blood flow away from the internal organs and to the skin. As a result, cardiac output may increase by up to 75%. Arterioles in the skin dilate to allow 200 to 300% more blood flow and the total percent of blood reaching the skin will elevate from 5-10% to 50-70% of peak heart volume.

Steps to Reduce Blood Pressure Impacts

Lay down for a portion of the sauna bath
Drink water to replace water lost through sweat
Habituate to the sauna by practicing

Impact of Heat Adaptation

Profuse sweating through exposed skin makes it possible for the human body to adapt to hot environments. The ability to tolerate heat is tied to the ability to increase evaporative cooling, thereby adapting to the heat. Methods to improve heat tolerance include being naked to maximize exposed skin while in the sauna, spreading the extremities to maximize exposed surface area, increasing air velocity to improve evaporation, acclimatization to increase sweating and the use of dry air to optimize evaporative cooling.

Methods to Increase Evaporative Cooling

Bathe in the sauna while naked
Spread extremities to expose all skin
Increase air velocity
Increase sweating through practice
Use dry air to facilitate evaporation

Heat stress is increased by initial dehydration but can be reduced by starting in a hydrated state and replacing fluid loss during the sauna bath.

Impact of Cooling Off in Cold Water or Snow

Sudden exposure to intensive cold causes large, instantaneous changes in circulation which include a sharp decrease in cutaneous circulation and a corresponding increase in the central circulation. The most extreme impacts are induced by immersion by cold water plunges and rolling in the snow.

Intensive cold exposure increases the risk of abnormal heart rhythm (arythmia) and myocardial ischaemia. While irregular heart rate is lessened with acclimation, any instance can pose a serious threat to health for sensitive persons. Irregular heartbeat has been associated with sudden deaths. For commercial operations, risk may be reduced by having a defibrillator near the sauna.

note: Standing naked in cold air is sufficient to cause a substantial elevation of blood pressure.

There have been recorded instances of sudden death associated with these impacts. With ice cold water plunges and snow, the incidence of sudden death is 1:400,000 sauna baths for those aged more than 60 years and 1:900,000 for those aged less than 60 years. Assuming 1 sauna bath per week, the odds of death are 1:7,692 to 1:17,308 persons. The majority of sauna deaths are related to ischaemic heart disease at some level. In 3% of the deaths, alcohol was a contributing factor. Also, excessive heat exposure may have been a factor in some of the deaths.

Common Impacts of Cold Water Shower or Snow

Rapid cutaneous vaso-constriction
Elevation of arterial blood pressure
Increase in central venous blood volume

Sauna Lifestyles

One of the best summaries of hot air and steam bathing was written by Mikkel Aaland in the book titled "Sweat". Now out of print, the book studies each variation on the theme of sweat bathing. Studies include the Finnish sauna, native American sweat lodge, Mediterranean baths, Russian banias and a wide variety of other wet baths. Mikkel is considering an update to the book, which is now a collector's item.

While there are hot air baths and wet baths, the sauna is the only sweat bath which can alternate from dry hot air to moist air. Many variations exist and lifestyles have been built around each.

Sauna Lifestyles in Finland

Based on historical records, the sauna was used in Finland for thousands of years and therefore cannot be considered new. In Finland, the sauna is almost a holy place. In fact, many Finns will state that only two places are holy, the church and the sauna. The word sauna is a Finnish word which evokes notions of intense cleansing, both physical and mental. The Finns value the sauna for remedy from pain and sickness.

note: There is a saying in Finland that if tar, spirits and sauna do not help, the disease is fatal.



"Kids in Sauna" taken from article by Elmar Badermann "Dad and Boys" in Sauna taken from book Giselle Roeder

Unlike those taking a sauna in the U.S., Finnish sauna bathers are usually nude, which for a variety of reasons, makes more sense than taking a sauna in a swimsuit. Other than family and close friends, the saunas are usually sex segregated. During the cold war, Finland evolved a sauna culture which included sauna parties. Other concepts include moose hunting with sauna evenings.

The sauna is not only a nearly sacred place, it is a place where business negotiations are done and where deals are made. Equally important is the sauna as a sacred place of routine, where the family can come together and there is quality personal recovery time for stressed or tired adults.

In Finland, Saturday is sauna day although many Finns take saunas during the week. Sauna etiquette is to talk little and respect the quiet atmosphere of the sauna. A general rule is to act like you would act in church.

The Finnish Sauna Society

The society is basically a private cultural association which seeks to foster the heritage of the national bath. The 3,100+ members share the goals of preserving the traditional, native sauna culture, to spread information about it, to correct wrong impressions and to emphasize sauna bathing as part of a healthy lifestyle. The society publishes a quarterly magazine titled "Sauna".

The Finnish Sauna Society maintains a model sauna site in Helsinki, Finland. The sauna site is surrounded by nature, much like a modern retreat or spa. The club has 5 wood fired saunas, outdoor ocean swimming, a library, conference rooms and office. There are outside decks for cooling down and different hours are provided for men and women. The facility is open 5 days per week and individuals can join as members and businesses as supporting members. Dues are set at the annual general meeting.

Finnish Sauna Society
Vaskiniementie 10 Fin-
00200 Helsinki Finland

Sauna Lifestyles in Other Countries

While the sauna has spread to other countries, each location has altered the concept a little or a lot. Other countries such as America have not widely embraced nudity in the sauna or use of the sauna for business dealings. As winter rages, many Canadians head for their local sauna house to relax, warm up and sweat.