



Balneotherapy & Balneology: The Science and Art of Mineral Water Therapy

What is Balneology?

Balneology is the scientific study of the therapeutic benefits of naturally occurring mineral waters. In Australia, this science is not very well known, and is even less seldom practiced. However, throughout Europe and Japan, balneology and hot springs therapy is very much a part of routine medical care. Medical prescriptions are given by licensed doctors for the treatment of a wide range of conditions, and utilizing mineral waters as a part of preventative medicine is widely recognized and encouraged.

Hot spring soaking has a deep and far reaching tradition in North America, starting with the indigenous North American Native Tribes who considered choice hot springs to be "power spots" in nature. Native cultures universally utilized the natural waters for healing, purification ceremonies, sacred gatherings, and tribal meetings.

The rest of this article is designed to 'clear away the pervasive fog' associated healing waters, as much as possible based on scientific research and prevalent scientific theory. Most of the information included is derived from European and Japanese medical sources.

What Makes a Mineral Hot Spring a Mineral Hot Spring?

In Australia, there are no real standards to classify the properties of hot springs. However, in Europe and Japan, there are general standards that are widely accepted by balneologists.

The Hot Springs Source

There are two primary classifications of hot springs:

- 1. Filtration Hot Springs:** A filtration hot spring is a geothermally heated mineral water that is initially fed by rain water that seeps into the Earth through faults and fractures. As it travels into the Earth, it becomes subject to increased energy from natural geothermal heat, and is exposed to gases and an often wide variety of minerals from rock and mineral deposits. The water adsorbs the minerals via leaching, is heated by the geothermal heat source, and then returns to the Earth's surface.
- 2. Primary Hot Springs:** A primary hot spring is a geothermally heated mineral water, where direct volcanic activity plays a far greater role in the process of the hot springs formation. One of the fundamental physical distinctions between a filtration spring and a primary spring is the mineral and gas content of the water, such as radon and bromide. Primary hot springs are often "powered" by magma chambers which exist miles under the Earth's surface, as well as in volcanically active regions.



What is the Classification of Peninsula Hot Springs?

Peninsula Hot Springs are filtration hot springs. The water that surfaces is estimated to have been deep within the Earth for more than 10,000 years.

The Hot Springs Temperature: Cool, Warm, or Hot?

Balneologists generally accept the following classification of mineral springs:

- **Cold Springs** - temperatures below 25° C (77° F)
- **Tepid Springs** - temperatures ranging from 25°-34° C (77 - 93° F)
- **Warm Springs** - temperatures ranging from 34° - 42° C (93 F - 108° F)
- **Hot Springs** - temperatures above 42° C (108° F)

What is the Classification of Peninsula Hot Springs?

Peninsula Hot Springs are classified as Hot Springs. At a depth of 637 meters the water is over 50° C. By the time it is pumped up to the surface the temperature is approximately 50° C. The temperature of the pools varies from 42° C to 36° C depending on the pool and the time of the year. There is also a fresh cold water plunge pool with an ambient temperature of 12° C.

The Hot Springs Mineral Content

The legal classification of a mineral spring varies in different parts of the world. Generally speaking: A mineral spring contains greater than 1000 mg/l (PPM) of naturally dissolved solids.

What is the Classification of Peninsula Hot Springs?

Peninsula Hot Springs are classified as true mineral springs, and have dissolved solids measuring over 2000 mg/l (PPM), based on the assessment conducted by the Institute of Geological and Nuclear Sciences in New Zealand.

The Hot Springs PH Level

Waters may be classified as acidic, basic, or neutral, according to the balance of hydrogen in the water.

Acidic waters are waters that measure below 7.0 on the PH scale. **Neutral waters** are waters that measure 7.0 on the PH scale. **Basic/Alkaline waters** are waters that measure above 7.0 on the PH scale.

What is the Classification of Peninsula Hot Springs?

Peninsula Hot Springs are sulfur, sulfate alkaline hot springs, with a ph level of 6.8. The alkalinity is primarily the result of the potassium, calcium, magnesium, and sodium ions.



Hot Springs Therapy: Mineral Content

European balneologists have extensively studied the therapeutic value of mineral waters. Mineral springs with different mineral content are often recommended above others for various therapeutic uses. In addition to the value of the trace minerals found in most hot springs, and the stimulating benefits of highly mineralized waters, balneotherapists generally agree on the following observations:

Bicarbonate

In Spain, bicarbonate water is classified as such if the water contains more than 250 PPM of free carbon gas. However, springs that contain bicarbonate gasses (sodium bicarbonate, calcium bicarbonate, carbon dioxide, etc.) may also be utilized for the observed benefits commonly associated with bicarbonate hot springs.

Bathing in bicarbonate water, according to what balneologists believe, assists opening peripheral blood vessels and helps to improve circulation to the body's extremities.

European balneotherapists also utilize bicarbonate waters for bathing to address hypertension and mild atherosclerosis. For these conditions, tepid to warm baths are utilized (30 - 37° C).

Some researchers believe that bicarbonate baths also assist cardiovascular disease and nervous system imbalances.

How do the Peninsula Hot Springs Rate?

Peninsula Hot Springs contain 1163 PPM bicarbonate content, although the bicarbonate content does not produce a distinct "carbonated" effect such as the Chatel-Guyon Hot Springs in France.

Sulfur and Sulfates

Hot Springs rich in Sulfur, in France, Spain, and Japan, are used to address a wide variety of conditions, including skin infections, respiratory problems, and skin inflammations.

Hot springs rich in sulfates (i.e. sulfur compounds) have a far reduced "sulfur" effect as compared to Sulfur-rich springs. Such waters are often prescribed internally for liver and gastrointestinal conditions, as well as for some respiratory conditions with inhalation therapy, in European spas.

How does Peninsula Hot Springs Rate?

Peninsula Hot springs contain a small amount of sulfurous gas. Peninsula Hot Springs have been measured to contain 2.7 PPM of sulfate compounds.

Chlorides

Saline hot springs are rich in **sodium chloride**. Mineral springs naturally rich in chlorides, in amounts between .5 - 3%, are considered by some researchers to be beneficial for rheumatic conditions, arthritis, central nervous system conditions, posttraumatic and postoperative disorders, as well as orthopedic and gynecological disease.



How does Peninsula Hot Springs Rate?

Peninsula Hot springs contain 1432 PPM chloride content.

Other Mineral Research:

- ***Benefits Boron*** - Boron builds muscle mass, increases brain activity and strengthens bones. Peninsula Hot Springs contains: 1.3 PPM boron.
- ***Benefits of Magnesium*** - Magnesium converts blood sugar to energy and promotes healthy skin. Peninsula Hot Springs contains: 90 PPM magnesium.
- ***Benefits of Potassium*** - Potassium assists in the normalization of heart rhythms, assists in reducing high blood pressure, helps to eliminate body toxins and promotes healthy skin. Peninsula Hot Springs contains: 64 PPM potassium.
- ***Benefits of Sodium*** - Sodium and natural salts assist with the alleviation of arthritic symptoms, and may stimulate the body's lymphatic system when used in baths. Peninsula Hot Springs contains: 868 PPM sodium.

Alkaline water that is high in calcium, magnesium, and potassium may assist the body in cleansing through the skin.

What do the medical balneologists have to say about the temperature of mineral water for therapy?

It is believed among some circles that warm spring soaking is more beneficial (37-39° C) than thermal therapy.

European medical doctors have conducted research into thermal therapy, and have found that:

- Hydrostatic pressure in the body is increased. This results in increased blood circulation and cell oxygenation. The elimination systems of the body are thus stimulated, improving the body's capacity to detoxify
- The body's metabolism is stimulated. This results in improved digestion
- 3 to 4 weeks of regular thermal bathing can assist in the normalization of endocrine glands and assist the automatic nervous system

Many of the stimulating benefits of hot springs water are temperature dependent. Balneologists have found that hot springs soaking temporarily relieves chronic pain directly associated with inflammation, even in cases where inflammation has not been reduced. This effect is heavily reliant upon the temperature of the waters.

In Japan, at the famous Kusatsu hot spring, a 3-minute 47° F bath is utilized for an extraordinary therapeutic experience. Each visitor is pre-screened by the "bath master" to determine if such a bath would be safe and beneficial for each individual.



Not everyone should utilize high-temperature hot springs for therapeutic use. The state of one's metabolism and the presence of medical conditions is the determining factor when considering the most safe and healthy water temperature to bath in.

Contraindications to Hot Water Natural Mineral Springs Therapy:

- Conditions involving high fevers
- Extreme Hypertension
- Malignant tumors and cancerous conditions (internal)
- Liver, kidney, or circulation disorders
- Conditions presenting the risk of hemorrhaging
- Anemic Conditions
- Pregnancy
- Congestive heart failure, recent stroke, or recent heart attack
- Bathing under the influence of drugs or alcohol

The existence of these or other metabolic conditions does not necessarily mean that there would be no benefit derived from utilizing mineral waters. It does mean, however, that there is a risk associated that may out way any benefit to utilizing hot waters. In such situations, individuals should consult with a medical doctor before bathing, or consult with a European medical balneologist.

In any case, soaking in mineral waters should not be done at excessively high temperatures without medical clearance when any contraindicated condition exists. A tepid to warm bath (35°C - 40°C) is as safe as taking a bath at home.

Other Interesting Notes on Balneology & Balneotherapy

Severe Chronic Illness: The Three Stages of Spa Therapy Response

Researchers and Balneotherapists in Poland have identified three possible response stages to hot springs therapy, where chronic illness spa programs lasting three to four weeks are utilized for a wide variety of conditions.

1. Spa Adaptation

A period of 3 to 7 days of environmental adjustment. This is both a psychological and physiological stage where the mind and body go through a period of adjustment to the external environment, including a physiological response to hot spring therapy.

2. Spa Crisis

A possible spa crisis has been observed approximately two weeks into therapy. Symptoms include malaise, fever, tachycardia, headache, fatigue, insomnia and pain. An acute flare-up of a dormant condition may occur. In some cases, medication may be required to control symptoms, and traditionally, spa treatment is reduced or temporarily suspended during this period. This response is similar to a herxheimer reaction, or the "externalization of symptoms" extremely common as a part of natural healing in natural medicine.



3. Regeneration

Balneotherapists have noted that the final stage of spa therapy results in an overall improvement in the indicated condition, and that beneficial results may not be noticeable by the individual for many weeks after the treatment program has been completed. Balneotherapists have noted that benefits derived from spa therapy can be extended for up to 10 to 12 months after treatment.

Mineral & Water Adsorption - Toxic Waste / Metabolic By-Product Elimination

The movement of minerals into the body as the result of mineral water therapy is dependent upon:

- The fat/water solubility due to the structure of the skin membrane.
- The movement of water into and out of the body during mineral water therapy is dependent upon the osmolality of the bath and the fluid condition of the individual.

Depending upon the osmolality of the bath, water is either adsorbed into the body or pulled from the body. Although we do not have a tonicity report to classify the Tecopa Hot Springs as hypotonic, isotonic or hypertonic, we believe that the Tecopa Hot Springs water provide a slightly hyperosmotic bath; water is pulled from the body.

Mineral adsorption via hot springs soaking is extremely small, and the amount adsorbed into the body is concentration dependent and varies depending on the mineral and its chemical form. Even so, medical balneotherapists have noted that even minute amounts of therapeutic minerals adsorbed into the body via the skin have a significant therapeutic value.

The ion exchange capacity of hot springs mineral waters also influences mineral and water adsorption, and is defined by the ionic dissociation of the minerals in the water. A higher free ion content equates to a greater ion exchange capacity.

In short, the osmotic qualities, the mineral concentration, the PH level, and the mineral form effect the transdermal carrier effects of any mineral waters, as well as the fluid conditions of the individual soaking.