THERMOTRON-RF8®

Made IN JAPAN

YAMAMOTO VINITA CO.,LTD.

VINITA

THERMOTRON-RF8®

Radio-frequency Hyperthermia System

THERMOTRON-RF8
EX Edition

For “Reliable” Cancer Treatment

“What treatment reduces physical and psychological burdens on patients?”
“What treatment is compatible with radiation- and chemo-therapies and can be combined with them?”
“What treatment can be consistently implemented throughout the treatment period including standard treatment and palliative care?”
These are what cancer patients and physicians have been longing for.

Hyperthermia is a method for cancer treatment developed based on knowledge in molecular biology and thermal physiology. THERMOTRON-RF8, which non-invasively applies radio-frequency energy to cancer tissues, is a pioneer in the field of hyperthermia in the world, and has been selected as a leading treatment device by significant numbers of physicians and health care institutions with a keen eye for effective cancer treatment options.

THERMOTRON-RF8 / EX Edition

A treatment method to appropriately heat lesions by taking advantage of a characteristic of cancer cells - intolerance of heat

The history of hyperthermia for cancer treatment dates back to as far as the 19th century. Empirical knowledge: “Cancer cells are intolerant to heat”, was obtained when elimination or reduction of sarcoma was identified in many patients following the onset of fever due to bacterial infection and other causes. The discovery was applied to the development of THERMOTRON-RF8, a radio-frequency hyperthermia system. THERMOTRON-RF8 can be used not only for hyperthermia treatment, but can also be combined with various other approaches, such as radio-, chemo-, and immunotherapies.

Principle of hyperthermia

Hyperthermia heats local cancer tissues for 30 to 60 minutes to 42 to 43°C or higher. In addition to its original therapeutic effects, hyperthermia increases the effects of radio- and chemo-therapies, and can be combined with immunotherapy and other treatment.

1 The thermo-sensitivity of cancer tissues is higher than that of normal tissues

In general, pH levels in cancer tissues are lower compared to normal tissues, and the thermo-sensitivity of tissues under low-pH conditions is high.

2 It is easy to increase the temperature of cancer tissues by heating them

When cancer tissues are heated, the blood flow does not increase or sometimes decreases. Therefore, it is easy to increase the temperature of cancer tissues by heating them because they will not be cooled by the blood flow.

3 Hyperthermia increases the effects of radiation

Although radiotherapy is effective in the vicinity of the capillaries in which the oxygen partial pressure is high, its effects become lower in areas located far from blood vessels in which the oxygen level is low. Since hyperthermia increases temperatures in areas located far from blood vessels, the effects of radiation and hyperthermia are expected to complement each other.

4 Hyperthermia increases the effects of many types of chemotherapeutic agent

Research results have suggested that hyperthermia facilitates the absorption of chemotherapeutic drugs into the cells of cancer tissues to increase their antitumor effects.

Changes in the blood flow in normal skin and muscles and cancer tissues when they were heated to varying temperatures

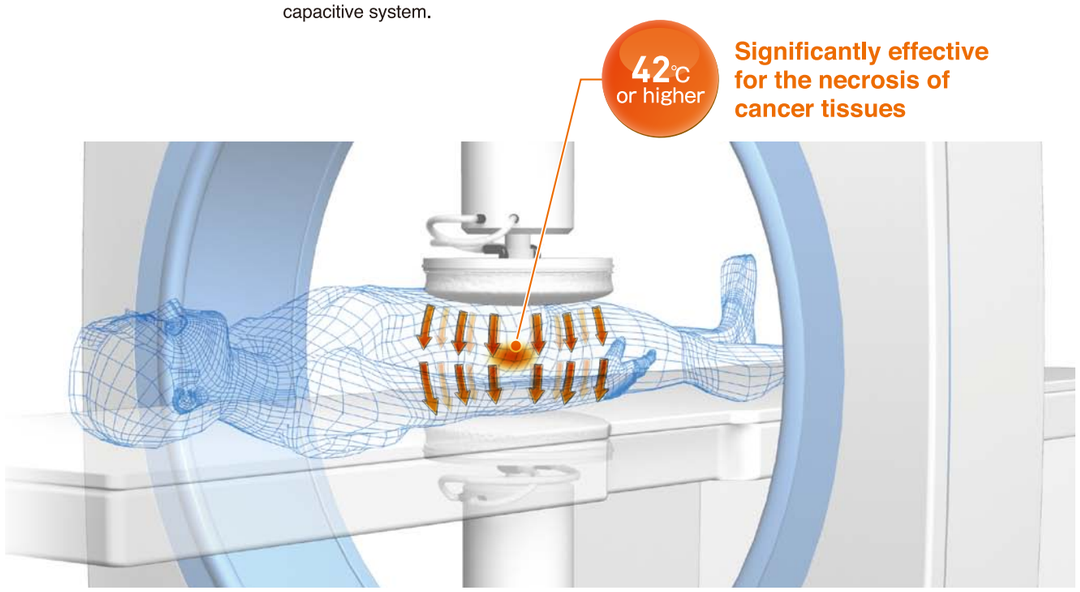
※Chang Won Song, ph.D

Efficient treatment provided using technology to apply heat to the center of cancer tissues

Principle of hyperthermia

Hyperthermia using dielectric heating to appropriately apply heat to lesions

Based on the results of long-term research and development, THERMOTRON-RF8 has adopted RF (radio frequency) of 8 MHz, which is between the frequencies used for AM radios and those for FM radios and best suited for heating the body of a patient. A radio-frequency (8 MHz) electric current is applied to the body through a pair of electrodes attached to the front and back, and the generated Joule heat increases the temperature of the affected site - the capacitive system.



Adoption of the capacitive system ··· A site to be heated is sandwiched between a pair of plate electrodes facing each other.

Primary characteristics

Radio frequency of 8 MHz to supply energy deep into the body

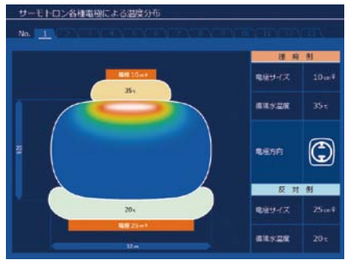
1. Hyperthermia to avoid placing a burden on the body
2. The radio frequency reaches deep into the body to efficiently heat the organs
3. Appropriate treatment can be provided according to the depth of the affected site
4. Treatment for all sites except for the brain and eyeballs can be implemented
5. Synergistic effects are generated when hyperthermia is combined with radio- and chemo-therapies

Temperature distribution

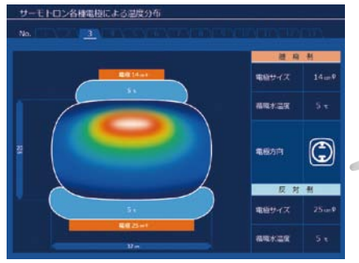
Combinations of electrodes of different sizes provide selective heating

The electrodes of THERMOTRON-RF8 come in various sizes. A variety of hyperthermia options are available to address all types of lesions: small and large electrodes for cancer tissues in shallow and deep sites, respectively.

Selectively heating the surface of the body

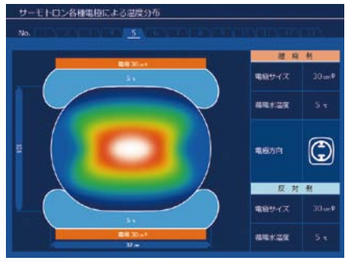


Selectively heating sites located close to the surface

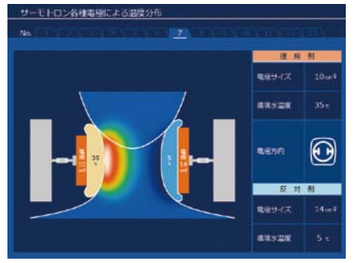


● Electrodes of varying sizes

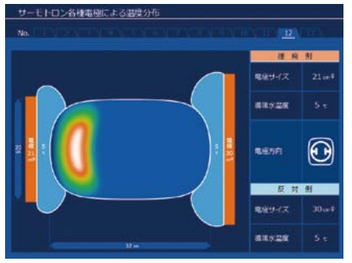
Selectively heating sites located deep in the body



Selectively heating the neck

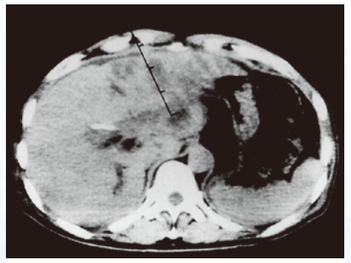


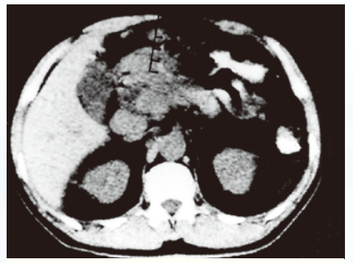
Selectively heating the sides of the body

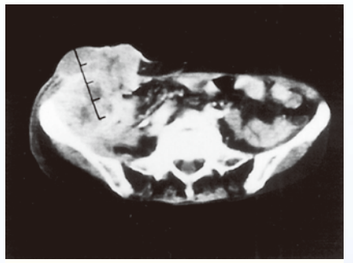


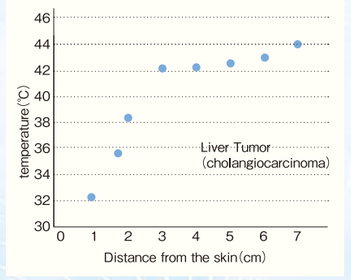
＊Hyperthermia distribution model using a standard agar phantom

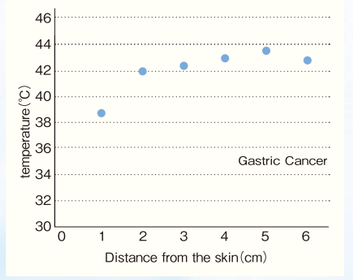
Body temperature distribution

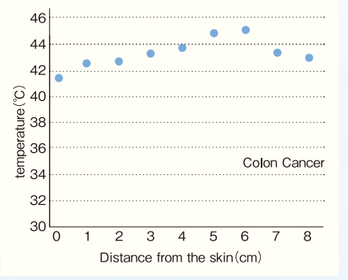












＊Department of Radiation Oncology and Image-Applied Therapy, Kyoto University Hospital

Human-oriented design for treatment providers and patients

Concept of HOSPITALITY DESIGN

THERMOTRON-RF8, designed based on the concept of human-oriented treatment, gives consideration not only to patients but also to the operators of the system.

The security and comfort of patients

Blue color and a round form that exert healing effects

Each time patients undergo treatment, they will stay inside of THERMOTRON-RF8 for approximately one hour. To create space in which patients will be healed and feel relaxed during treatment, coloration associated with cleanliness and a round form that provides a sense of softness have been adopted.

To help health professionals concentrate on treatment

Circulation system

Transparent sliding cover that allows users to read the water temperature, pressure, and levels of remaining liquids.

Gantry

Pictogram display for intuitive operations.

Control console

High-performance GUI, a keyboard and mouse that can be stored compactly to ensure a large work space.

Display

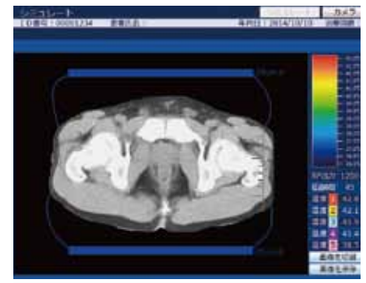
Easy-to-understand display layout to increase the speed and accuracy of treatment

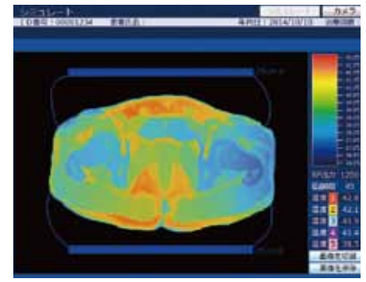
Screen to display the selections and combinations of electrodes

Screen to display outputs power and temperatures during treatment

Temperatures measured at five points during heating are displayed in graphical and digital forms. In addition, RF powers absorbed into heated sites are continuously displayed in graphical and digital forms.

Screen to display the thermo-simulator





Temperature changes are continuously displayed using color images. The thermo-simulator can be used to develop therapeutic plans including the size of electrodes, RF power, and heating time.

Specification

• Classification of equipment	Equipment for physical therapy
• General name	RF hyperthermia system (JMDN: 40782000)
• Classification of the type of medical equipment	Medical equipment for advanced management (Class III), special maintenance and management, installation-type medical management equipment
• Medical equipment approval number of Japan	15900BZZ01728000
• Product name	Thermotron-RF8
• Heating format	RF dielectric heating

● RF-wave oscillator

• Radio-frequency outputs	1,500W (maximum)
• Oscillation frequency	8MHz

● Gantry unit / Circulation system

• Electrode size	70㎜φ -2pcs 100㎜φ -2pcs 140㎜φ -2pcs 210㎜φ -2pcs 250㎜φ -2pcs 300㎜φ -2pcs
• Cold/hot water circulation in the electrode pad	Constant-temperature water stored in four independent tanks / Forced-circulation system (COLD [5-25°C] or HOT [25-40°C] can be selected.)

● Treatment table unit

• Movement of the treatment table	Automated movement in the front-back and vertical directions
• Table shutter	Automated operation of the opening
• Positioning	Automated cessation of movement at prescribed positions
• Holding devices for patients	Arched gripped handles

● Control console section

• Temperature measurement	Thermocouple temperature sensor (Simultaneous measurement display)
• Temperature control	Automated control of RF output power to maintain the temperature at the pre-set level (accuracy: within a range of 0.2°C) until the prescribed time
• Display	RF output power (graphs of incident and reflected RF waves), heating temperature and time, results of the tabulation of measurements obtained from hyperthermia treatment, retrieval of treatment data, monitoring of progress in treatment
• Thermo-simulation	Real-time simulation of the distribution of temperatures

● Other accessories

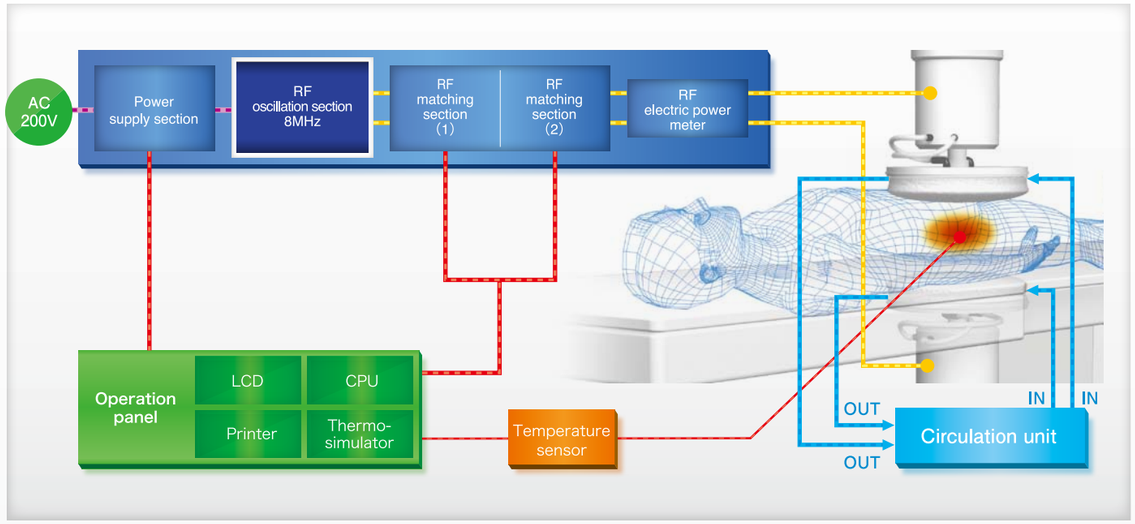
• Temperature sensor	Thermocouple flexible sensor ▪ One point-type (Diameter 0.64mm, length 1,500mm) ▪ Four point-type (Diameter 0.80mm, length 1,500mm)

TV, CD players for BGM, cameras for patient monitoring, intercoms, electrode cabinets

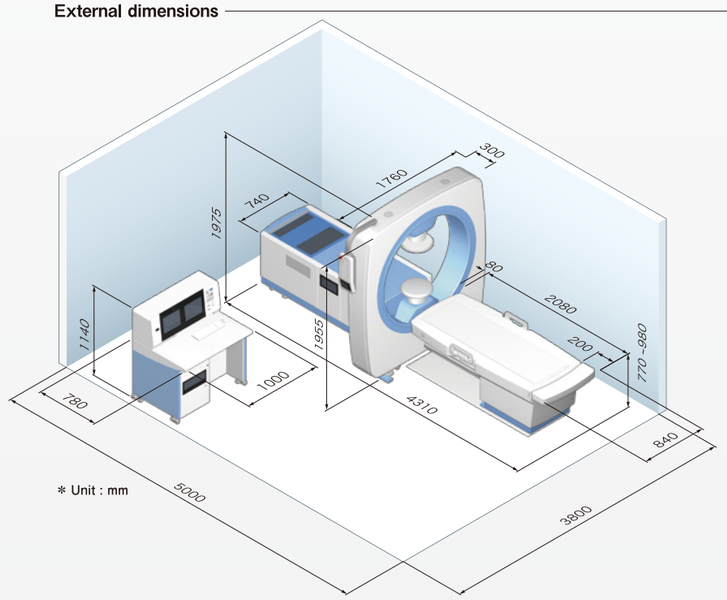
● Electric rating

• Rated power-supply voltage	AC, Single-phase 200V
• Maximum input current	32.5 ± 10%
• Maximum power consumption	6.5KVA ± 10%
• Rated power frequency	50/60Hz
• Classification according to the protection level	Class-I equipment

Block diagram



External dimensions



＊Unit : mm

● Dimension and weight

Names of parts	Dimension (mm) Height	Width	Depth	Internal diameter	Weight (kg)
RF oscillator / Circulation system	695	740	1850		500
Gantry (rotating drum)	1955	1760	300	(1380)	450
Treatment table (when lowered down)	980 (770)	840	1880		400
Control console	1140	1000	780		250

Total weight of the equipment : 1,600kg

Manufacturer and distributor

YAMAMOTO VINITA CO.,LTD.

■HQ / Medical Division
6-3-12 Ueshio, Tennoji-ku, Osaka-shi, Osaka
543-0002, JAPAN
TEL.06(6771)0608 / FAX.06(6771)6898
E-mail : thermotron@vinita.co.jp
http://www.vinita.co.jp

■Tokyo Sales Branch
1-5-8 Misuji, Taito-ku, Tokyo 111-0055, JAPAN
TEL.03(3861)0437 / FAX.03(3861)0438
E-mail:tokyo@vinita.co.jp

■Nagoya Sales Branch
1-7-1 Hananoki, Nishi-ku, Nagoya-shi, Aichi 451-0062, JAPAN
TEL.052(521)7571 / FAX.052(531)3822
E-mail:nagoya@vinita.co.jp

■Yao Factory
1-3-21 Shibukawa-cho, Yao-shi, Osaka 581-0075, JAPAN
TEL.072(991)3601 / FAX.072(991)0509
E-mail:yao@vinita.co.jp

- Please note that the appearance and specification of the product are subject to change without notice for remodeling and other purposes.
- Read the attachment and instruction manual carefully prior to using the product.
- The product needs to undergo regular inspections and overhauls for the maintenance of its performance. Please contact the person in charge of the sales division for details.

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