HiToP®
HighTone
Power Therapy
An Introduction
gbo Medizintechnik AG can look back on a long experience in the field of medical engineering as a qualified manufacturer for well-known companies like Siemens. Due to the know-how acquired during the years and our focus on R&D, gbo has an important role in new development in the division of Physical Therapy. Since the beginning, Siemens was the main partner of gbo and shaped our comprehension of quality. Until today, R&D and quality management are strongly represented. Due to our extraordinary development, Siemens in 1994 transferred the entire business branch of Physical Therapy to gbo. With the customer in view, a Siemens tradition of more than one hundred years was incorporated into gbo and the business was successfully continued. Based on this know-how and decades of experience, it is only natural that the company rigorously breaks new ground.

In collaboration with Dr. med. H.-U. May gbo developed the HiToP®-Therapy, the new generation of electro therapy. In addition to the classical indications, this therapy opens up completely new possibilities to the therapist.

Since 2002, HiToP®-Therapy has also been established in the areas of wellness and sport, with, for example, programs especially developed for adipolysis, cellulitis, muscle building, body shaping and sport.

Hence, much of the know-how gained from medicine was adopted in the areas of wellness/sport – for the well-being of users, customers and patients.

Driven by the ambitious goals persecuted by the people and products of gbo, it is only natural that gbo Medizintechnik AG established a certified quality management system in accordance with DIN EN 9001 and DIN EN 13485.
Preface
Intention and content

The aim of this introduction to HighTone Power Therapy is to explain in simple words the fantastic therapeutic success of the many devices that are in operation today.

Answers to basic questions are given that shall inspire further investigations in this field. The complete range of possibilities of HighTone power therapy is far from being completely explored.

This introduction is not meant to be a scientific document. It is meant to be read by a broad range of readers and, thus, as far as possible does without technical terms and simplifies complex processes for better understanding.

Presently the ‘father’ of HighTone power therapy, Dr. Hans-Ulrich May, medical specialist in neurology and psychiatry, is writing a basic scientific book on HighTone power therapy, which will then lead to a broad academic discussion.

As to the content, essentially the following three questions will be answered:
- What is the origin of HighTone power therapy?
- What are the basic mechanisms of this method?
- What are the main areas of practical use?
HighTone power therapy is a very efficient therapy

- 70% to 80% of all patients experience a pain relief after the first treatment or are even free of pain altogether.

- The first treatment of almost 600 patients resulted in the following table:

  Overall Result of 120 registered practice tests with HiToP® 184

<table>
<thead>
<tr>
<th>Number of Patients</th>
<th>Painfree</th>
<th>Pain relief</th>
<th>No Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>594</td>
<td>32%</td>
<td>55%</td>
<td>13%</td>
</tr>
</tbody>
</table>

  Individual result of practice tests with HiToP® 184

  Clinical picture: Knee Arthrosis

<table>
<thead>
<tr>
<th>Number of Patients</th>
<th>Painfree</th>
<th>Pain relief</th>
<th>No Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>142</td>
<td>32%</td>
<td>63%</td>
<td>5%</td>
</tr>
</tbody>
</table>
Origin of the HighTone power therapy

- HighTone power therapy is a new quantum leap in the field of electro therapy.

- Conventional electro therapy stimulates nerves and muscles. The primary aim of HighTone power therapy is a direct effect on the metabolism of the cells. The differences can be seen in **effect, technology** and **practical use**.

- The differences in effect relate to two main mechanisms of HighTone power therapy: First, it introduces energy into the body to increase the cell energy potential. Second, it makes the cell structures oscillate to normalise the metabolism.

- From the technical point of view the classical electro therapy is a modulation of amplitude: The current intensity is modulated, but the frequency remains constant. Electro therapy uses modulation frequencies between 0 and 200 Hertz in the low frequency range, and mostly 4.000 Hertz in the medium frequency range.

  In HighTone power therapy the amplitude and the frequency are modulated simultaneously. The higher the frequency, the more energy can be introduced corresponding to the individual threshold curve of the patient's electrosensitivity.

  Thus, it is a **SIMULTaneous Frequency and Amplitude Modulation**. In the following it will always be called **SimulFAM® i**.

  The letter *i* stands for intensity, which increases simultaneously with rising frequency.

  In the HighTone power therapy device **HiToP®** HighTone frequencies between 4.096 and 32.768 Hertz are applied.

- HighTone power therapy differs in two further practical points:

  1. Classical electro therapy is applied for 5 to 10 minutes, but HighTone power therapy for up to 60 minutes.

  2. In classical electro therapy, as a rule, one channel and two electrodes are used. In HighTone power therapy up to 4 channels are in parallel operation, with at least 10 electrodes.
What are the two main effects of HighTone power therapy?

- Introduction of energy into the body in order to activate the cells and to vitalise the body.
- Creation of resonances in order to make the cells and the tissue structures oscillate, with the aim to improve metabolic processes and to relieve pain.

Bibliography (excerpt):

12. SCHWARZ F.: Über die Reizung sensibler Fasern des Menschen durch mittelfrequente Wechselströme. Pflügers Arch. 247, 405 - 440 (1944)
Question 1:
How is the energy introduced into the cells?

- The threshold curve of the electrosensitivity defines how much power can be introduced into the body. The higher the frequency of the power entered, the more power the human body is able to tolerate.

- The goal is to transfer as much energy as possible to the body. This can be achieved with high frequencies. The HighTone power therapy operates in the range between 4.096 and 32.768 Hertz. Up to 5.000 mWatt are introduced directly into the body.

- HighTone power therapy increases the mitochondria, the so-called energy ,,power stations", in amount and size.

- After the therapy, the patient feels refreshed, just like after a long walk.

- This energy input is twofold: once locally in the treated area and simultaneously on the whole body.

- The whole-body vitalisation is important, for a disease is rarely limited to one area. The resistance to disease of the whole body is improved.
Question 2: What makes the cell and tissue structures oscillate?

- The electric alternating field makes the charged particles oscillate.
- The frequencies of the oscillations introduced create resonances in the molecules and cell structures.

![Diagram showing charged particles in resting and resonant states](image)

- Charged particles (molecules, cell structures, ...) of different sizes without an electric field (original position).
- Smaller particles get in resonance at 32 kHz.
Resonance phenomena

Different frequencies activate structures of different size.

For this reason it is important to offer a broad spectrum of frequencies.

The oscillations cause the normalization of the cell metabolism.

Waste products are transported away and nutritive substances are introduced.

Cell processes as well as the communication between the cells are normalized again.

It is a therapy of normalization.
**SimulFAM® i**

A new kind of electrotherapy without muscle and nerve stimulation

The applied frequencies range from 4.096 to 32.768 Hertz over 3 octaves in 72 quartertone steps of 1 second each.

It is particularly important that all frequencies are passed through one after the other, in order to make all cell and tissue structures oscillate.

In classical vertical stimulation only one frequency is used. There is no frequency scan.

The oscillations of the different particles in the tissue lead to many effects. One of them is a strongly increased distribution of pain and inflammation mediators as well as a positive effect on the transport of nutritive and waste products.

Thus, the result is an improvement of metabolic processes, purification and pain relief.

The diffusion, i.e. the movement of particles from locations of high concentration to low concentration, is greatly enhanced. Important: No unnatural procedures are forced onto the patient but the body's own processes are alleviated.

Due to the strong diffusion effect the HighTone Therapy is very well suited to transflect medication that is made for iontophoresis into the body.

Compared with classical iontophoresis this new HighTone Iontophoresis yields better results while avoiding the typical and well known disadvantages.
SimulFAM® X
Classical stimulation frequencies with innovative technique

- With this function also nerves and muscles can be stimulated (yellow effect). The letter 'X' stands for the crossing with the threshold curve.

- The effects on the metabolic processes of SimulFAM® (green effect) are always present, as the HighTone frequency alternating electrical fields are also always present.

- The below shown HighTone stimulation frequencies indicate, **how often in one second the process passes through from upper frequency of 32.768 Hertz to lower frequency of 4.096 and back again.**
  
  That means it is not a classical method of current stimulation therapy.
  
  0,1 - 1,5 Hz  slow muscle movement for muscle relaxation
  activation of the muscle pump
  3 Hz  activation of lipolysis (reduction of fat)
  10 Hz  vasoconstriction, treatment of edema, reduce swelling
  20 Hz  muscle stimulation with pauses
  100 Hz  analgesia according to the principle of counter-irritation

- The frequency of 100 Hertz is of particular therapeutic importance. This is used to create an analgesic effect on the patient. Only by this an active therapy of movement is made possible and the patient can be motivated.
Each SimulFAM® X line is defined by the starting point \( I_{4kHz} \) and the ending point \( I_{32kHz} \). From these two points a slope is derived that can take on values between 10% and 200%.

The higher the slope the smaller is the angle with which the frequency scan crosses the threshold curve. With slopes greater than 100% we get the paradox situation that smaller intensity levels at 4 kHz generate the stimulation (action potentials) while the higher intensities at 32 kHz yield no stimulation.

This especially slow and soft crossing of the threshold curve results in very important characteristics of HighTone Therapy:

- The softer (high slope) the threshold curve is crossed the more comfortable the sensation is for the patient.
- The higher the slope the higher is the energy that can be introduced to the body using SimulFAM® X.
- The metabolic effects known from SimulFAM® i are more present with SimulFAM® X when using higher slopes.

These particular advantages also become evident in the treatment of diabetic polyneuropathies with the application of medical muscle stimulation with SimulFAM® X.
HighTone power therapy in the practice: Basic therapeutic procedure

- Due to the above described effect the HighTone power therapy comprises the following three forms of application:

  **Application 1**
  Local electrode application on the treatment spot for **local cell activation** with SimulFAM®.i

  **Application 2**
  Local or central electrode application for **pain relief** with SimulFAM®X 100 Hertz.

  **Application 3**
  Whole-body electrode application for **whole-body cell activation** with SimulFAM®.i

- The electrodes are applied in the above indicated order. The intensity of the corresponding channels are also adjusted in the same order. That means, the whole-body treatment is **always adjusted at the end**.

- All three therapies are conducted simultaneously. The duration of therapy is 60 minutes each. Every channel can be used for every application.

- The treatment with SimulFAM®i is a causal treatment which is conducted locally on the spot and also always simultaneously on the whole body. As a rule, 10 sessions are necessary to achieve a long-lasting treatment success.

- The treatment with SimulFAM®X 100 Hertz is a symptomatic treatment to achieve an immediate partial or total pain relief. The treatment is conducted locally on the spot or centrally at the upper end of the spine (pain relief of cervical spine), in order to reduce all the pain in the body according to the principle of counter-irritation.
HighTone power therapy in the practice: Conditions and accessories

- For the HighTone therapy a separate cabin is preferable. The bench for the patient should be at least 80 cm wide. To the left of the bed there must be sufficient space to place a device trolley of 70 cm width.

A cushion to support the leg is needed as well as a neck cushion to rest the head. After adjustment of the current intensities, the patient should be covered with a blanket.

In case of treatment of the back the patients should wear an elastic undershirt. The ladies should not wear panty hoses, as electrodes must be placed also on the feet.

- Treatment lasts approximately 60 minutes. Therefore, 80 to 90 minutes should be allowed from one patient's appointment to the next, to allow sufficient time for the patients to get prepared.

Attention: Before starting the treatment the patients should empty their bladder, as often the diuresis is stimulated.

- After adjustment of the intensities many patients sleep during therapy, the full 60 minutes. Some patients listen to relaxing music with earphones. After 60 minutes the patient is woken up by the gong of the device or gently by the medical assistant.

- On average a total of ten treatments is necessary, ideally with at least 3 sessions per week. Best results are achieved with daily treatments.

In some cases worsening of the medical problem can occur in the beginning. This is a sign that the therapy takes effect. In this case the consecutive treatment must always be undergone the next day in order to stop the primary worsening.

- Most important, however, is the correct diagnosis. This, and the exact localization of the pain spot, is very important for an effective treatment.
Main indications of HighTone power therapy

- Knee arthrosis
- Hip arthrosis
- Lumbar spine syndrome
- Cervical spine syndrome
- Thoracic spine syndrome
- Shoulder-arm syndrome
- Diabetic polyneuropathy
- Tennis elbow
- Pain following injuries and operations
- Open wounds (Ulcus cruris)
- Edema treatment
- Physical and psychic stress and exhaustion
- Refreshment treatment for an overall vitalization

Also patients with varicose veins, metallic implants and endoprotheses may be treated.

Contraindications of HighTone power therapy

- Patients with feverish systemic infections, local bacterial infections, cardiac pacemakers and pregnant women must not undergo HighTone power therapy.
Comprehensive description of the whole-body treatment

Since the whole-body treatment is always used, it is described here in detail.

- Five large flexible electrodes are moistened with Aloe Vera contact spray. Thus the electrodes have optimum contact to the skin. The advantage of the Aloe Vera spray is that it does not evaporate too quickly, as it is a natural product made of the juice of a palm tree.

Under each sole, on the outside of both forearms and on the neck a flexible rubber electrode will be fixed with an elastic band.

- The rubber electrodes are connected with one of the four channels. It is unimportant, which channel is used for it. It is only preferable that the black plugs are fixed on the rubber electrodes of the soles and the white plugs on the rubber electrodes of the forearms.

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Whole-body treatment
SimulFAM® i
60 minutes

There are four Distribution cables:
I = red
II = green
III = yellow
IV = blue

One distribution cable is connected to up to four white and two black connectors.

(In this application the fourth white connector is not used)
Now with this setup energy can flow through the body.
From the forearms to the soles.
The body cells are activated.

We choose SimulFAM® $i$.

At first the intensity at the lower frequency of 4.096 Hertz is adjusted until the patient feels a slight prickle which is very pleasant.

After that, the intensity is adjusted also at the medium frequency of 16.384 Hertz, until the patient experiences also a pleasant prickle.

Now the frequency spectrum is passed *automatically* from 16.384 Hertz up to 32.768 Hertz in quartertone steps. Back again to 32.768 Hertz, down to 4.096 Hertz and up again to 32.768 Hertz.

Each frequency run lasts 144 seconds.

With rising frequency also the introduced power increases up to the maximum value of 5.000 mWatt.

As a consequence, from a certain frequency on - which differs from patient to patient - the intensity indicated in mWatt remains constant.

After 60 minutes the power is automatically reduced to zero. It is also possible to reduce the power manually. This has the advantage that the patient will not be woken up by the device gong. The point of time can be varied individually by the medical assistant.

Important:
The whole-body application is always the last to be adjusted, only after the other applications were adjusted.
Central and local pain relief according to the principle of counter-irritation SimulFAM® X 100 Hertz

- The pain relief with SimulFAM®X 100 Hertz is an important part of the therapy.

  This analgesia is taking effect, until the healing effect of SimulFAM®i takes place.

  The pain information is transferred over the nerves to the brain. Using the principle of counter-irritation SimulFAM®X 100 Hertz adds 100 stimulation impulses to the pain information on the nerves. The brain is confused by this large amount of data and thus cannot localise anymore the pain information.

- This analgesia is performed locally at the treatment spot or centrally at the upper end of the spine (cervical pain relief).

  Depending on the indication either local or central pain relief is preferable.

- The advantage of analgesia at the upper end of the spine is that all pain information below this application does not penetrate into the brain.

  For patients with lumbar spine syndrome a central pain relief is advisable, as the pain situation can be very considerable locally. The energy flows from one side of the spine to the other.

- For patients with knee arthrosis local pain relief with SimulFAM®X 100 Hertz is advisable. Energy is adjusted up to a stimulation that can just be tolerated, from the rubber electrode on the upper thigh to the rubber electrode at the inner part of the calf.
HiToP® 191
The Medical Muscle Stimulation

The HiToP® 191 is a HighTone Therapy unit for muscle stimulation that has been especially designed to treat diabetic polyneuropathy.

The diabetic polyneuropathy causes symptoms like numbness, burning, pain, paraesthesia or muscle weakness in legs and feet that reduces the patients quality of life significantly. Especially encumbering is the painful diabetic polyneuropathy that is found in 11% of the patients with diabetes type 1 and 32% with type 2.

Specific medication for this type of disease does not exist. Typically used are psychotropic drugs or drugs from the field of epilepsy. Unfortunately these drugs are not very effective (for diabetic PN), have many side effects and are very expensive.

That is why it is good to know that these patients can be helped much better by applying the medical muscle stimulation with the HiToP® 191. A study at the DDZ (German Diabetes Center, the Leibnitz Institute at the Heinrich-Heine-University Düsseldorf) has not only shown that the HiToP® is very successful with a 80% positive responder rate but also that it is much more effective than the conventional electrotherapy with a 33% success rate.

This study was published in the leading European Diabetes Journal DIABELOGIA in May 2005 ("Effective treatment of symptomatic diabetic polyneuropathy by high-frequency external muscle stimulation"; Reichstein L., Nickell S., Ziegler D., Scherbaum W.A., Martin S.).

The scientists at the German Diabetes Center have continued their research into the positive effects of HighTone Therapy and found out that the insulin sensitivity is increased and a significant reduction in weight was achieved. This study is due to be published soon.

For further information see www.hightonetherapy.com
Knee arthrosis

Due to a relieving posture, often with an existing knee arthrosis there occur sensations of pain in the knee which is actually unaffected. Therefore it is recommended to treat also the healthy knee.

**Application technique:**

1. **1st channel** whole body (SimulFAM®)
2. **2nd channel** medially (inside) and laterally (outside) to the knee joint, one electrode each (SimulFAM®), affected knee
3. **3rd channel** one electrode ventrally on the mid thigh, one electrode on the mid calf (SimulFAM® X 100 Hz), affected leg.
4. **4th channel** one electrode each medially and laterally to the knee, unaffected leg (SimulFAM®)

Hip arthrosis

Since for patients with hip arthrosis not only the hip, but due to a relieving posture and the changed body statics also the spine is affected, it is recommended to treat also the lumbar spine if this is given.

**Application technique:**

1. **1st channel** whole body (SimulFAM®)
2. **2nd channel** one electrode, each on both sides of the femoral head (SimulFAM®)
3. **3rd channel** one electrode dorsally on the opposite side of the spine, height L3-L5, one electrode ventrally on the mid thigh (SimulFAM® X 100 Hz)
Lumbar spine syndrome

For lumbar spine syndrome pain often occurs not only in the lumbar spine area, but it radiates additionally to the leg.

**Application technique:**

1\textsuperscript{st} channel: whole body (SimulFAM\textsuperscript{®} i)

2\textsuperscript{nd} channel: 2 electrodes on the stomach, one electrode transversally on the lower part of the lumbar spine (SimulFAM\textsuperscript{®} i)

3\textsuperscript{rd} channel: one electrode on the opposite side of the spine, height L1-L3, one electrode dorsally on the thigh of the affected leg (i.e. along the pain) (SimulFAM\textsuperscript{®} X 100 Hz)

4\textsuperscript{th} channel: one electrode each on both sides of the pelvis (SimulFAM\textsuperscript{®} X 100 Hz)

Shoulder-arm syndrome

Due to the limited mobility as well as the fear of sudden pain after certain combined movements the patient with shoulder-arm syndrome acquires a posture with which he tries to avoid pain. This is characterized as follows: slightly upturned shoulder, head bent to the affected side, arm often flexed. This posture leads to tensions of the trapezius muscle and the rhomboid muscles as well as to an abnormal posture of the cervical spine.

**Application technique:**

1\textsuperscript{st} channel: whole body (SimulFAM\textsuperscript{®} i)

2\textsuperscript{nd} channel: one adhesive electrode ventrally on the shoulder joint and one adhesive electrode dorsally on the shoulder joint (SimulFAM\textsuperscript{®} i)

3\textsuperscript{rd} channel: two electrodes ventrally on the upper arm (SimulFAM\textsuperscript{®} X 100 Hz),
HiToP®-device overview

HiToP® 4touch
Electrotherapy of the next generation

A four-channel pain therapy device for a holistic treatment of the patient.
With its innovative and unique device HiToP® 4 touch gbo Medizintechnik AG presents to the user local and holistic therapies for different indications. Yet the user interface gives a maximum level of usability: With one single touch you can select a therapy from your personal list of favorites. Simply turning the intensity regulator allows a real quickstart.
The modern high-tech design with brushed aluminum surface and the 15” TFT LCD full color touch screen monitor offer to the health care professional an indispensable feature.

Medical programs:
- SimulFAM® i
- Reha
- Mobilization
- Musclepump
- Trauma
- Lymphdrainage
- Edema
- Pain
- Nerveblock
- Universal
- Diab. Polyneuropathy

Wellness programs:
- Vitalisation
- Sport
- Electro massage
- Shaking massage
- Lipolysis
- Fatburning
- Bodyshaping
- Cellulite

HiToP® 2touch
Electrotherapy of the next generation

A two-channel pain therapy device
New two-channel-version of the innovative HiToP®-device (description see HiToP® 4 touch above).

Medical programs:
- SimulFAM® i
- Reha
- Mobilization
- Musclepump
- Trauma
- Lymphdrainage
- Edema
- Pain

Wellness-programs:
- Vitalisation
- Sport
- Electro massage
- Shaking massage
- Lipolysis
- Fatburning
- Bodyshaping
- Cellulite

- 4 independent channels for the treatment in four areas.
- Individual display for each channel
- Easy operation by touch screen
- Graphic display: pictures with applications demonstrate the placement of the electrodes
- Safety circuit to avoid voltage sensations caused by bad electrode placement
- No side effects

- 2 independent channels for the treatment in different areas
- Individual display for each channel
- Easy operation by touch screen
- Graphic display: pictures with applications demonstrate the placement of the electrodes
- Safety circuit to avoid voltage sensations caused by bad electrode placement
- No side effects
HiToP® 181-H

A pain therapy device for the treatment at home

This patient device is designed for home use. It is passed on to the patient by the doctor and the patient performs the treatment on his own. The device is set up by the doctor according to his diagnosis. The number of treatments is limited and programmed. After completion of the set therapy, the patient must have the device recharged at the doctor's, after renewed diagnosis.

The device comes with a single channel. Cause and symptom are treated consecutively.

HiToP® 191

The special unit for the treatment of polyneuropathic pain at home

The HiToP® 191 is a HighTone Therapy unit for muscle stimulation that has been especially designed to treat diabetic polyneuropathy.

The positive effect of the HighTone therapy achieve a very effective contraction of the musculature without unpleasant feeling.