

## PARADIGM

# The interaction and outcomes of acupuncture, both traditional Chinese medicine and intramuscular stimulation, with Deep Oscillation® Treatment: a case study-based discussion



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## Abstract

This article first explains what Deep Oscillation® Treatment (DOT) is and how it works, then focuses on four case studies in which the author has used acupuncture and DOT together effectively as part of overall patient treatment and management.

*Keywords:* Electrostatics, oscillation, tissue response, lymphatics, pain reduction.

## Introduction

DOT is an internationally-patented electro-mechanical therapy method based on the Johnsen-Rahbek effect in physics. It supplements and intensifies all types of connective tissue work without pressure, and reaches to a depth of 8 cm as proven by a burns study by Tápanes *et al.* (2010) and in a diagnostic ultrasound visual verification test by Medina Cabezas.

Research into the therapeutic uses of this effect on tissue was first carried out by two German physiotherapists, Wolfgang Walder and Hans Seidl, in the early 1980 s. It works on the theory that if a semi-conductor is put between two electrodes and a voltage is applied, it creates an electrostatic force similar to rubbing a balloon on your clothes and holding it over your head so your hair stands up. This generates a minimal electrostatic field, and with a semiconductor layer this force can be transferred to human tissue without heat or the use of electrical stimulation. If we transfer this to deep oscillation, the membrane of the applicator or gloves of the therapist are the vinyl layer

(semiconductor); the adhesive electrodes as well as the metal plate, the applicator, and the titanium element held by the patient perform as the electrodes. It is a biphasic application in microampere range, thus metal implants are not contraindicated. To explain the working electrostatic field, the circuit is in the Deep Oscillation® machine. As the circuit changes polarity, the tissue is dropped and the circuit stopped temporarily through an active discharge device in the machine, which is part of the therapy's patented circuitry. There is no problem using the oscillator all day by the therapist or patient. Studies conducted in 1988 saw no adverse effects to therapist (Portnov & Zabelina 1988). The Deep Oscillation® machine can produce an electrostatic field at a low, medium or high frequency ranging from 5 Hz to 250 Hz. This alternating current is able to pick up treated tissue and then drop it at a variable speed, depending on the selected frequency. For example, at 5 Hz this occurs at 5 times a second, and at 250 Hz it occurs at 250 times a second. In treatment, this deep oscillation massage penetrates a depth of 8 cm through the skin, connective tissue, fat tissue and muscle, to reach its sphere of activity (Fig. 1).

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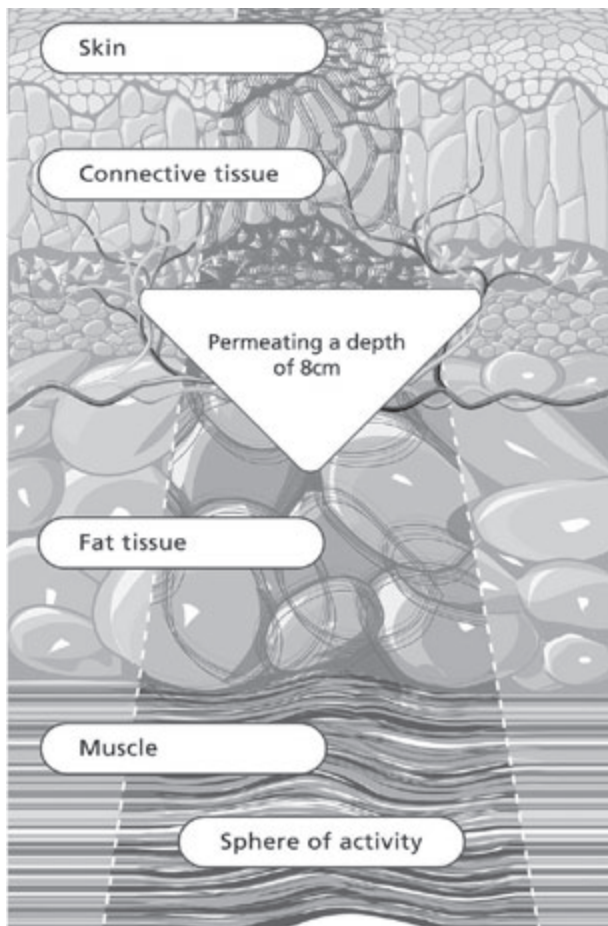


Figure 1. Deep Oscillation® permeates a 8 cm depth.

## Treatment

The treatment is applied through vinyl-gloved hands or applicators, which also enable self-management. The patient holds an electrode, and another is adhered to the physiotherapist's forearm. The physiotherapist wears vinyl gloves and treats normally, while the electrostatic field comes through the gloves and into the tissue. With the mechanical therapy effect reaching to a depth of 8 cm into the tissue, there is no need to exert pressure during a treatment session. Also, since no heat is produced by the treatment, it can be used immediately after injury or day one after surgery, as it is suitable for use on hot or swollen joints and tissue.

Brenke and Siems (1996) have described how the technique uses electrostatic attraction and friction "to produce mechanical vibrations in treated tissues of the body, not only at the skin but also in deeper tissues." Schönfelder and Berg (1991) refer to a "penetrating vibration and pumping effect deep in the tissue."

DOT has effects on the microcirculation of the interstitial connective tissue. Treatment results in a normalization of the steady state, i.e. of the permanent fluid flow between the tissue surrounding the cells and the lymph and blood cells.

When one considers the physiological effects with DOT, it is highly effective in reducing pain and has an anti-inflammatory effect. There is promotion of wound healing and an improvement in tissue quality and it is also effective in resorbing oedema. Tissue detoxification and improvement in trophicity have been noted; there is an anti-fibrotic effect and it can have a rubor reduction.

The clinical effects include pain relief and increased functional mobility and movement. It relaxes muscle and tissue, thereby increasing range of movement (ROM). It is highly effective in decreasing swelling and encouraging the movement of fluids.

DOT is an integral part of a treatment programme involving manual therapy, connective tissue release and exercise programming.

In a visual verification test of Deep Oscillation® using diagnostic ultrasound, Dr Luis Felipe Medina Cabezas concluded: "Although this is an initial trial, resonance and kinetic movement of the connective tissue effected by an electrostatic field generated by Deep Oscillation® can be evidenced and visualized. The illustrated test series visualizes for the first time the impact on tissue of Deep Oscillation® in real time. The method offers an interesting methodical approach for future studies" (Fig. 2; Fig. 3).

## Treatment time and frequency

DOT is used in a range of treatment times and frequencies in relation to the presenting tissue and musculoskeletal condition (Table 1; Table 2; Table 3).

## Contraindications

Contra-indications for DOT include:

- acute infections
- acute systemic inflammations with pathogenic germs participation
- active tuberculosis
- acute venous diseases (untreated thrombosis)
- untreated malignant diseases



**Figure 2.** Still image from video of verification test of Deep Oscillation® by Dr Luis Felipe Medina Cabezas.



**Figure 3.** Still image from video of verification test of Deep Oscillation® by Dr Luis Felipe Medina Cabezas.

**Table 1.** Deep Oscillation®: treatment time and frequency range in relation to tissue condition.

Condition	Treatment		Frequency range
	time	Duration	
acute	short	approx. 8–10 min	high frequency
		approx. 5 min	low frequency
subacute	long	approx. 10–20 min	high frequency
		approx. 5 min	low frequency
chronical	long	approx. 5 min	medium frequency
		approx. 15 min	high frequency
		approx. 10 min	low frequency

- erysipelas or cellulitis
- patients with cardiac pacemakers or other electronic implants
- untreated heart complaints and diseases
- pregnancy
- hypersensitivity to electrostatic fields
- infectious skin diseases.

## Deep Oscillation® therapy and acupuncture

The following question was asked of Dr Jens Reinhold, CEO of Physiomed, the manufacturer

of Deep Oscillation®: “Why does DOT pre-needling make the needles go in more easily?” According to Dr Reinhold, there are four possibilities:

- (1) The fact that acupuncture points are more sensitive to thermal or mechanical stimuli, involving a higher temperature, might be due to an increased number of TRPV1 pain receptors on the cells. A study by Boissic and Branchet (2013) showed DOT led to a significant reduction in the number of TRPV1 pain receptors represented on keratinocyte cells which is an explanation for the statistically significant pain alleviating potential DOT.
- (2) The mechanical resonance vibrations of DOT and their effects on afferent neurons might simply have analgesic effect by influencing the gate control mechanism (Melzack & Wall 1983).
- (3) Kuti-visceral or somato-visceral effects resulting from DOT could have effects on pain reception, resulting in ‘tissue softening’.
- (4) Depending on the overall physiological and psychological condition of the patient, it may be the case that DOT just relaxes the patient who ‘lets go’ and tolerates the needles better.

## Practitioner feedback

A questionnaire was sent out to medical professionals in the UK who are currently utilizing Deep Oscillation® as part of their treatment protocols. Responses to the questions asked were as follows:

**Question: Do you use Deep Oscillation® pre- or post-acupuncture? What is the effect on tissue; does it help needling?**

Answers:

- Pre-acupuncture:
  - “Helps ease muscles, relaxes patient”
  - “Needle insertion more comfortable after using DOT”
- Post-acupuncture:
  - “Lessens the discomfort of needling”
  - “Generally used to enhance physiological changes brought on by needle insertion”

**Table 2.** Examples of different frequencies used to treat musculoskeletal (MSK) presentations.

MSK presentation	Treatment
an arthritic setting	160 Hz × 10 min followed by 85 Hz × 5 min
tennis elbow/golfer's elbow	160 Hz – 180 Hz followed by 85 Hz × 5 min
sciatica setting	170 Hz – 200 Hz × 10 min followed by 28 Hz – 40 Hz × 5 min
mixed tissue response	250 Hz × 20 min, then 60 Hz × 20 min (considering what the different frequencies do to the tissue – a 'pain' setting initially followed by a more 'pumping' effect)
adhesive capsulitis	25 Hz – 80 Hz × 5 min then 80 Hz – 250 Hz × 15 min then 5 Hz – 25 Hz × 10 min

**Table 3.** The effect of different Deep Oscillation® frequencies.

Frequency	Effect
high frequencies (80–250 Hz)	<ul style="list-style-type: none"> <li>• pain significantly reduced</li> <li>• lymphatic drainage pathways opened and activated</li> <li>• trapped cellular metabolic waste/abnormal fluid build-up broken down</li> <li>• hardened fibrotic tissue &amp; scar tissue dispersed</li> </ul>
medium frequencies (25–80 Hz)	<ul style="list-style-type: none"> <li>• microcirculation in the interstitial spaces of the connective tissue is boosted</li> <li>• tissue layers are relaxed</li> <li>• biological waste products move out to the lymph system for removal</li> </ul>
low frequencies (5–25 Hz)	<ul style="list-style-type: none"> <li>• vasodilation causes slight lowering of blood pressure.</li> <li>• a powerful, gentle, pumping action causes strong movement in the tissue.</li> <li>• re-instigation of flowing fluids encourages essential nutrients back to the tissue</li> </ul>

- *“Good for pain and spasm”*
- *“Use a combination of DOT and acupuncture for stubborn injuries”*
- *“Positive changes with acupuncture and DOT on lymphatic presentations”*

**Question:** Do you feel that using acupuncture and Deep Oscillation® has reduced treatment times? If so, by how much?

Answers:

- *“Not sure if it has reduced treatment times, but result is more effective”*
- *“Each treatment is longer but I'm seeing faster results in fewer sessions”*
- *“DOT has helped with pain and movement in 85–90% of patients”*
- *“Patients see results in probably 25% fewer sessions”*
- *“Not treatment times, but perhaps the frequency of treatments”*

**Question:** What do you feel DOT does to help/interact with acupuncture?

Answers:

- *“Decreases tissue tension so needles insert easier”*
- *“Increased ROM with DOT and needles”*
- *“It softens tissue in areas where manual massage is difficult”*

- *“Each treatment complements each other; it offers a calming and soothing effect on clients”*
- *“Encourages relaxation prior to needling; relaxation both of the patient mentally, and of the tissues physically”*

**Question:** What do your patients feel about your use of DOT; what feedback do you regularly get?

Answers:

- *“Players generally comment that they feel that have come back more quickly than they expected and feel a lot more mobile following treatment”*
- *“They love it. They are surprised it is effective as it feels so comfortable”*
- *“Reduction in pain, feels less tight and looser”*
- *“Most patients respond favourably to DOT and are quite intrigued by its concept. Most have found relief of symptoms when applied to painful neck and shoulders”*

## Case studies

Used in conjunction with acupuncture as part of the treatment protocol, the author has found that the use of DOT prior to (and post-) needling helps the tissue feel softer, allowing the needles to go in better, particularly with intramuscular stimulation (IMS).



### Case study 1

Fifty-eight-year-old Ms C. first came to see the therapist having had problems with her neck, left-sided shoulder girdle pain and left-sided facial pain. Her previous medical history included 15 years of neck pain; diagnosis with left-sided facial neuralgia in the summer of 2016; and diagnosis in 2017 with left-sided temporomandibular (TMJ) problems.

Her problem list included a lack of neck movement with both rotations and side flexions along with a loss of cervical spine extension and combined rotation with extension. She was stiff in the thoracic spine from the cervico-thoracic junction (CTJ) to T8-T9 and had stiffer first ribs bi-laterally. She was also having regular neuralgic type left-sided neck and cheek pain which was sharp most of the time and had not cleared since some dental work in 2014.

Treatment included manual therapy for joint work, including sustained natural apophyseal glides (SNAGs); posterior-anterior (P–A) and anterior-posterior (A–P) joint mobilizations; rotational mobilizations plus adjustments at the cervical spine and thoracic spine; and connective tissue releases for soft tissue on the anterior, lateral and posterior neck and shoulders. DOT was used for stiffness, pain and tissue ‘softening’ with frequencies of 200 Hz and 60 Hz for 20 min each or more in a session.

Further treatment included IMS to the neck, shoulders and thoracic spine for tissue changes. Notably the upper trapezius, levator scapulae, splenius capitis and cervicis, and sternocleidomastoid (SCM) and further into the rhomboids and the thoracic spine. Traditional Chinese medicine (TCM) points for the neuralgic-type pain (mostly upper cervical spine) were given, also for symptoms of headache and migraine, which included Gall Bladder (GB) 20, GB 21, Bladder (BL) 10, Large Intestine (LI) 4, BL 60 and Kidney (KI) 3, plus manual therapy for joint range of movement (ROM) improvement at C1/C2 to C3/C4. Also, left-sided points were used for the neuralgic-type pain affected by the upper cervical points such as Governor Vessel (GV) 20, BL 7, BL 9, BL 10 and BL 11. Specific home exercises were given for the

upper cervical spine rotation and neck/shoulder ROM.

After eight 1-h sessions, the patient felt the pain had reduced significantly and was 98% improved. She was no longer suffering from the neuralgic-type constant pain.

Clinical reasoning: Firstly the TCM points abolished the neuralgic-type problem. Secondly, the IMS changed the tissue pain/tension. Thirdly, the DOT helped the tissue stiffness and ‘pain,’ and encouraged ROM and ultimately daily function. An important point here to note was that when needling post-DOT, the tissue was softer and less ‘crampy’ than pre-DOT treatment.

### Case study 2

Seventy-three-year-old Mr P. attended the clinic with severe migraine and blurred vision. His previous medical history included suffering with headaches and migraines since his twenties. His past treatment included drug therapy which had helped, although he did feel that when he was on beta blockers it had made things worse. He also had longstanding stiffness with his neck and shoulders.

After initial assessment, his problem list included joint and connective tissue tightness, and a reduced ROM with both shoulder joints, but there was no neural referral or signs and symptoms of such. The migraines were in an area that suggested the GB channel, with pain in the area of GB 14 and GB 20 in the neck.

Initial treatment included Mulligan’s headache SNAG at C0/C1 and rotation at C1/C2, but this only made small changes for the better. TCM points were then applied at GB 20 initially, then at BL 10, GB 41, LI 4 and Stomach (ST) 8, and IMS at the upper trapezius, levator scapulae, rhomboids, infraspinatus (IS) and pectoral major and minor, subscapularis, deltoids/splenius capitis and cervicis. Further manual therapy involved SNAGs, mobilizations and adjustments to the CTJ and thoracic spine. DOT was added at 200 Hz and 60 Hz between 20 and 40 min in a session for pain and tissue softening. This always left the patient’s neck moving more easily and it was even more comfortable with warmth applied after the treatment sessions.

It should be noted that while some patients talk of feeling a warmth from the gloves during DOT, this is not from the machine but from the friction of the gloves on the skin. DOT does not produce warmth.

The patient was given exercises to do at home and advice. Within five sessions over six weeks he had no further headaches/migraines and less joint stiffness.

He had been pain-free for almost ten months when he returned to the clinic with similar problems although not as acute as initially. A similar choice of acupuncture treatment was carried out at GB 20, GB 21, GB 14 and ST 44, ST 7, ST 8, Ex-3 and GV 20. DOT was also used again at the same frequencies. This reduced his problems, significantly decreasing his headaches and joint stiffness within two weeks. After two months he returned with some minor problems wishing to 'nip them in the bud'. Treatment included IMS as before with some manual traction; TCM points at GB 20, BL 10, GB 14, ST 7, ST 8, Ex-3 and LI 4; plus DOT as before. Again, he was significantly better.

At review two months later, the patient said he was still 95% better. Treatment included manual therapy with upper cervical techniques including manual traction and joint mobilizations and SNAGs; TCM points at GB 20, GB 21, GB 1 and Ex-3; IMS points as previously; plus DOT as before.

Five months later, the patient returned to the clinic with only intermittent headaches, but his eyes were cloudy and he found it hard to keep them open. Treatment included both TCM and IMS approaches: GB 20, GB 21, BL 10, Ex-1, GB 1, plus DOT at chronic tissue settings for 15 min (initially done with 200 Hz × 20 min and 60 Hz × 20 min) plus an occipital stretch.

Post-treatment the patient felt the DOT had eased the tissue and joint stiffness. His eyes were clearer, and he had no problem keeping them open.

He returned one week later with clear eyes and no headaches. Treatment included GB 20 and BL 10. DOT was repeated for chronic tissue for 30 min (5 min at a medium frequency, then 15 min at a high frequency and 10 min at a low frequency).

Clinical reasoning: Overall, the TCM and IMS points eradicated his headaches and decreased much of his neck and shoulder tension. According to the patient, the whole of his neck and shoulders felt much improved after the DOT treatment. He had more mobility and the tissue felt relaxed. He was discharged with a home exercise programme.

### **Case study 3**

Thirty-year-old Mr M. was a professional singer working on a Christmas show over 12 weeks. He presented with an achy and very stiff back with loss of forward flexion and increased left-sided pain. He had no neural problems but had been gradually worsening over the last month or so.

His main problems were very limited movement with lumbar spine flexion and left-side flexion, but he also had a positive cough and sneeze suggestive of a central problem, possibly discal.

Initial treatment was for just 10 min in the first aid room at the theatre, using myofascial trigger points (MFTPs) and adjustments to T5-T8 and L5/S1 bi-laterally. The patient was given self-flexion SNAGs. He left feeling 70% improved. In the clinic four days later, he had improved ROM but still some pain. Treatment included IMS at the left quadratus lumborum (QL), tensor fascia latae (TFL) and extensor muscles from L1-L5, and DOT for 5 min at 200 Hz for pain relief. He was also advised to do extension work regularly in standing and lying to counteract the flexion 'tension,' using a centralization type of approach.

A week later he was moving more easily but still had some left-sided pain with sneezing and turning over in bed. He was more sensitive in the mornings. He was able to continue on stage.

Treatment included adjustments at the CTJ, thoracic spine and lumbar spine as above; IMS at T8-L5 on the left side in spinalis thoracis, longissimus and iliocostalis and QL; also DOT, as above, for pain and movement release up to 20 min at 200 Hz and 60 Hz. He was much improved after this session.

He was reviewed just over a week later for an in-depth session looking at specific exercises

to enable improved movement and counteraction of his flexion-based normal movements. He continued to sing – sometimes two shows a day – until the end of the run.

Clinical reasoning: Overall, the IMS had good outcomes. DOT decreased his pain and movement stiffness and when used before IMS, the needle entry was smoother and easier until the trigger point was hit. The DOT was used at 200 Hz and 60 Hz × 15–20 min for pain relief and tissue changes.

#### **Case study 4**

Forty-two-year-old Mr J. is a carpenter who presented in the clinic with a severely painful and limited right elbow and forearm. He was unable to shake hands and was carrying his elbow in a supported position with his left arm. Although his forearm/elbow had been getting worse over the last few months, John had continued to work due to commitment pressure. He often used a nail gun repeatedly and he now felt the forearm area was ‘dead’/numb.

His main problems included a painful and decreased grip, elbow extension and resisted supination. He was unable to do wrist extension and had a positive resisted test. There was pain at the teno-osseous site and muscle bellies of the extensors. After assessment there was a suggestion of some neural inhibition with possible interosseous nerve entrapment and an extensor tendinopathy.

Initial treatment included IMS to the extensors (brachioradialis, extensor carpi radialis longus, extensor digitorum, abductor pollicis longus (APL), extensor pollicis longus (EPL), supinator, pronator teres) and he was fascially taped to ‘offload’. On return to clinic four days later he was 20% improved. At this session he was treated with DOT, used at a fibrosis setting (160 Hz – 180 Hz × 15 min then 60 Hz – 100 Hz × 5 min) as the tissue was still sore from the IMS. He was taped for a tennis elbow (TE) and more fascial offloading. Four days later he had an increased active wrist dorsiflexion which was still quite severely restricted due to pain and dysfunction/neural inhibition of muscle power. Treatment included DOT on the fibrotic setting (for pain relief and tissue

softening) plus IMS at the extensor MFTPs and re-taping. The therapist adjusted him at the CTJ – T4/T5 and at C6/C7 bi-laterally – and was questioning the need for an ultrasound to ascertain possible elbow tendinopathy and other further interventions.

However, in clinic six days later the patient was 70% better, although his thumb EPL power and active movement were still decreased. All his other muscles had increased power but with the EPL and APL there was ‘weakness’. Treatment involved IMS to these areas, deep soft tissue massage and DOT on a fibrosis setting again. He felt much better after treatment. He was re-taped for TE fascially, not mechanically.

Six days later he was 90% better with an increase in his extensors power. There was still some ‘weaknesses’ with his EPL and APL, however IMS to these muscles improved the EPL, although less with APL. DOT was also given. On review two weeks later, he was working and functioning well. There was still some slight weakness with his thumb, but this was not preventing him from being able to work fully. DOT was repeated for 30 min at 200 Hz and 60 Hz for pain and tissue mobility.

The patient continued with self-treatment involving tissue massage plus Mulligan’s self-TE mobilizations with movement and was discharged.

Clinical reasoning: Overall, the IMS worked very well, while the DOT decreased the pain and ‘deep’ ache felt by the patient. In addition, the tissue/skin felt softer and less sore. The therapist has observed that this is the case for the majority of his patients who find that DOT used after IMS eases the needling soreness and tissue tension.

#### **Research**

Deep oscillation has been successfully applied therapeutically for more than two decades and concomitantly examined scientifically with respect to its tissue effects and clinical results (Melzak & Wall 1983). Currently there exist a substantial number of randomized controlled trials, pilot studies, case studies, field reports and studies (several in PubMed-indexed international

journals) to provide a medical evidence base for deep oscillation.

Full references for Deep Oscillation® research and studies can be obtained via the website [www.physiopod.co.uk](http://www.physiopod.co.uk) and in Reinhold (2017).

## References

- Boisnic S. & Branchet M.-C. (2013) Anti-inflammatory and draining effect of the Deep Oscillation® device tested clinically and on a model of human skin maintained in a survival condition. *European Journal of Dermatology* **23** (1), 59–63.
- Brenke R. & Siems W. (1996) Adjuvante therapie beim lymphödem [Adjuvant therapy in lymphedema]. *Zeitschrift für Lymphologie* **20** (1), 31–35.
- Medina Cabezas L. F. Visual verification of deep oscillation with diagnostic ultrasound. [Online video.] <https://youtu.be/LiiiktcNENM>
- Melzack R. & Wall P. D. (1983) *The Challenge of Pain: Exciting Discoveries in the New Science of Pain Control*. Basic Books Inc, New York.
- Portnov V. & Zabelina Y. (2002) *New method for deep massage of tissues: first results of Hivamat 200 system clinical application in Russia*. President Affairs Department of the Russian Federation Medical Center Central Clinical Hospital, Moscow, Russia.
- Reinhold J. (2017) Mechanisms of deep oscillation. *The Journal: Manual Lymphatic Drainage UK* [WWW

document.] <http://www.physiopod.co.uk/assets/images2017/2017-MLD-6pp-web.pdf>

- Schönfelder G. & Berg D. (1991) Nebenwirkungen nach brusterhaltender therapie des mammakarzinoms. erste ergebnisse mit Hivamat® 200. [Therapy for a carcinoma of the breast followed by early treatment with Deep Oscillation® therapy] *Gynaekologische Praxis* **15**, 109–122.
- Tápanes S. H., Suárez A., Acosta T. B., *et al.* (2010) Value of deep oscillation therapy in the healing of AB burns. *Cuban Journal of Physical Medicine & Rehabilitation* RNPS 2244, Folio 148.

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