

# Competitive-Kinesthetic Interaction Therapy

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**Abstract:** The competitive-kinesthetic interaction therapy is based on several clinical observations of patients who are treated with the Brügger therapy in the "Murnau approach" and who are suffering from different pain syndromes in their movement system. These patients reported definite lessening of their tinnitus, including (in some cases) a complete cessation of their subjective ear noise, as a result of our therapy on the movement system. Our goal is to modulate and automate the civilizatory unfavorable engraved individual global movement patterns. This success, which accompanied the therapeutic removal of movement imbalance and related posture and motion disorders, suggests the possibility of influencing the balance-surveying organs of the complex equilibrium system, summarizing the information from the equilibrium tetrad within a central space-oriented data processing system, via the muscles of the entire locomotor system. A very important point is that the subjective improvements can be objectified in brain electrical activity mapping of vestibular evoked potentials. Two-hundred patients were treated with this therapy and were examined between April 1998 and April 1999.

**Keywords:** competitive-kinesthetic interaction therapy; tinnitus; Brügger-Therapy physiotherapy; Brain-electrical-activity-mapping (BEAM); vestibular evoked potentials; rehabilitation

Competitive-kinesthetic interaction therapy is based on several clinical observations of patients who are treated with the Brügger therapy in the "Murnau approach" [1,2] and are suffering from different pain syndromes in their movement system.

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The competitive-kinesthetic interaction therapy is based on the realization that the majority of tinnitus patients suffering from chronic tinnitus, no matter what its type [13,14], also exhibit considerable to severe movement imbalance in their entire locomotor system.

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moval of movement imbalance and related posture and motion disorders, suggests the possibility of influencing the balance-surveying organs of the complex equilibrium system, summarizing the information from the equilibrium tetrad within a central space-oriented data processing system, via the muscles of the entire locomotor system.

## FUNDAMENTALS OF THE MURNAU APPROACH TO BRÜGGER THERAPY

Understanding the connection between the Murnau approach to Brügger therapy and the treatment of tinnitus requires an explanation of Brügger's ideas, which primarily are concerned with the function of the locomotor system. The principle underlying Brügger's therapy is the theory of nociceptive somatomotoric blocking (NSB) [1,2].

The central element is a supraspinal modulation of the conceptual locomotor system that acts to correct body movements that are in progress and, thus, either to prevent potential damage to the movement system or to limit existing damage. The mechanism involves

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complex changes to the operation of the movement system.

The nociceptive impulses emanating from a localized injury are registered supraspinally, and the kinetic sequence in progress is transformed in such a way that the muscular action that would have aggravated the injury is limited automatically in its scope or even is blocked completely. As the motions of the human body proceed in complex kinetic patterns, these modulations also intervene in a complex manner with other regulatory loops within the emotional perceptual data processors of the central nervous system (CNS).

Up to a certain intensity threshold, this intervention occurs unconsciously in a quasireflex manner. If the nociceptive input exceeds the threshold, it is additionally transmitted to the cerebral cortex, where it is perceived as pain. This pain perception causes affected individuals to refrain from any motion that could worsen the degree of peripheral injury and, thus, increase nociception.

These relatively abstract concepts, which nevertheless determine a great proportion of routine clinical procedures in the locomotor system, become somewhat easier to grasp when one considers a number of common phenomena from the vantage point of NSB. The change in muscular function is illustrated here by the example of a so-called locked knee with the symptom of the joint giving way owing to a loop (or "bucket-handle") fracture of the medial meniscus. At the moment the lacerated part of the meniscus becomes trapped, usually a sudden and very painful restriction to movement occurs, often accompanied by an acute loss in the ability of the affected leg to bear weight. This is a direct expression of the damage-limiting modulation of the kinetic pattern "walking" by NSB.

This restriction of motion cannot be a purely mechanical block, as the restriction due to the meniscus tissue could be overcome without difficulty by muscle strength. This would, however, lead to increased damage of the knee joint. NSB thus causes a rapid and needs-related restriction of muscular action. The same phenomenon can be observed, for example, in the case of compensating scoliosis as a result of a disc prolapse or in the limping observed in those suffering from coxarthrosis. Indeed, the ultimate cause of many clinical phenomena is the little-known NSB effect first described by Brügger.

However, not only structural defects, such as a lacerated meniscus, initiate nociceptor activity. Unilateral parakinesis—often due to so-called civilization-related factors—and continuous biomechanically incorrect posture are primary causes of decontraction disorders or mechanical overloading of the musculature, which also can trigger nociceptor activity. These muscular disorders also are protected by NSB and, consequently, are

the ultimate cause underlying many pain syndromes affecting the locomotor system. The majority of the complaints of a "degenerative" nature are caused in this way.

However, besides these interpretations strictly related to orthopedic kinetics of the NSB, the impact of the NSB-oriented therapeutic method could be observed clinically also to relate to effect within other lightly stashed functions within the CNS holding for regulatory loops within the perceptual and emotional data processors, or the CNS. These circuits are based mainly supratentorially.

Our observations of tinnitus patients by far exceed the interpretations of monosegmental polysegmental reflex actions. Subcortical interactive data forks between motion and tinnitus start to be unveiled through the application of the NSB concept in modern tinnitus therapy. Interestingly, Shulman (like Brügger) postulated the influence of infundibular stress mechanisms. Later, Shulman described his concept of the common final pathway of tinnitus [3,15].

## METHOD

### Functional Analysis: A Central Component in the Murnau Approach to Brügger Therapy

The foundation of the clinical diagnosis and therapy remains Brügger's functional analysis, though it is supplemented by the modifications and extensions developed in Murnau. In this approach, the diagnosis and the specific therapy of functional disorders of the locomotor system merge right from the start. The results of each stage of therapy are monitored and used to establish the next steps in treatment. The course of therapy, therefore, is not determined solely by the initial findings but is adjusted continuously to take account of the latest control parameters (see later). The ultimate goal of therapy is the greatest possible elimination of movement disturbances of the locomotor system and the permanent canalization of biomechanically favorable kinetic patterns that—as has been observed clinically—frequently are accompanied by a reduction in the subjective perception of tinnitus.

The procedure of functional analysis is characterized by studying so-called control findings, subsequently applying a suitable therapeutic technique, and then renewing monitoring of the control parameters (e.g., in cases of disabling tinnitus), according to Shulman and Goldstein [3].

### Clinical Concept of the Competitive-Kinesthetic Interaction Therapy

These therapeutic concepts contain the complex process of learning motor activity and, at the same time, of

motoric emotional interactions in a special way. All components of this program are set out in a logically progressive manner for suiting our transfer into a clinical therapeutic application according to our basic concept of competitive-kinesthetic interaction therapy.

The indication is disabling tinnitus. Contraindications are acute hearing loss, serious concomitant cardiopulmonary diseases, requirement of nursing care, and accompanying diseases (excluding physiotherapy). The potential for rehabilitation in the classic sense must be present. Affected patients must be able to find and make their way about the clinic independently, and they must be able to cope with normal day-to-day activities.

Before admission, all patients receive comprehensive information detailing what they can expect at the clinic. This is particularly important because patients must be fundamentally willing to alter their postural and kinetic behavior. Generally, an otorhinolaryngological condition is present in many of the patients who often have been suffering for many years.

After being admitted, each patient undergoes a routine laboratory examination with respect to important background disorders (erythrocyte sedimentation rate, blood count, aspartate aminotransferase level,  $\mu$ GT, creatinine clearance test, blood serum lipid count, blood glucose level), and a resting electrocardiogram. For following up the course of therapy, use is made of various tools: audiometry (Audiometer PA 444 of Hortmann) including the determination of the hearing threshold, the discomfort threshold, and tinnitus masking; craniocorpography (USCCG-System of Zebris) [4–6,12,16]; the Neurootological Anamnesis System (NOASC) (C-F Claussen, Bad Kissingen, Germany); a tinnitus questionnaire of the Research and Training Centre for Brügger Therapy; and systematic case documentation at the Centre.

### Visual Assessment: Analogous to Well-Being Score

The most important investigation for recording central functional changes is the brain electrical activity mapping of vestibular evoked potentials (BEAM-VbEP method) [3–5]. Therapy is performed as inpatient treatment over a period of 4 weeks at the Nordsee-Reha-Klinik II (North Sea Rehabilitation Clinic II) in St.Peter-Ording, Germany.

### Therapeutic Elements

Every patient will be furnished with an exactly fixed therapy plan lasting 4 weeks. This plan will cover all therapeutic elements:

- Systematic monitoring and checkups—so-called

control findings, with the procedure of functional analysis

- Determination of an individually adapted movement program with competitive-kinesthetic goals
- Specific decontractions of contracted groups of muscles
- Global decontractions of the entire muscular system, with therapeutic examinations in global movement pattern (e.g., training of patients' gait, therapeutic jogging, or modified medical training therapy)
- Patients' "homework" individually compiled for each patient by the physiotherapist
- Individually compiled Fango and massage application
- Various forms of body positioning
- Training of differentiated perception

At the end of the treatment in our clinic, another investigation is carried out with the questionnaires, craniocorpography, and audiometry. The most important test is the BEAM-VbEP control.

During our first stage of a 12-month application of our competitive-kinesthetic interaction therapy in a clinical study, our results are still single-case-oriented. This is exemplified by the patterns of changes in the cortical epiphenomena in the cases presented in Figures 1–3, which we relate into the same direction of improvement as the subjective tinnitus reduction assessed by the questionnaire.

Investigations indicated that the modifications of postural and body movement patterns achieved as part of the competitive-kinesthetic interaction therapy do indeed result in objectively measurable changes within the cerebral cortex in the areas known to be concerned with tinnitus (see Figs. 1–3) [4,5].

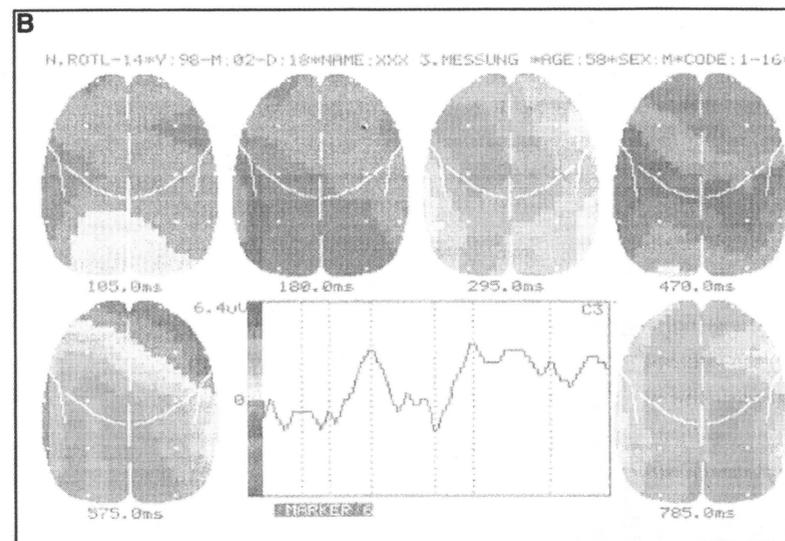
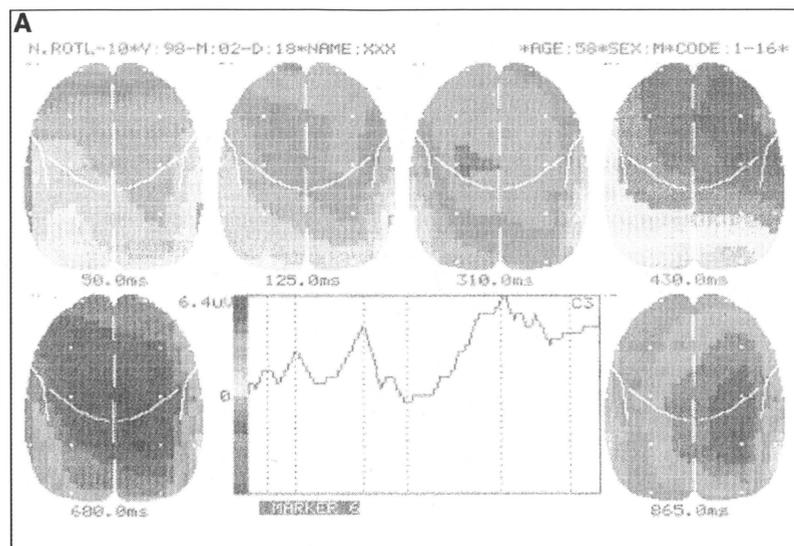
## RESULTS

Between April 1998 and April 1999, we treated 200 patients. We received a tremendous amount of data, which had to be worked through and specified in the next month. Also, we began the follow-up-examination at this early stage.

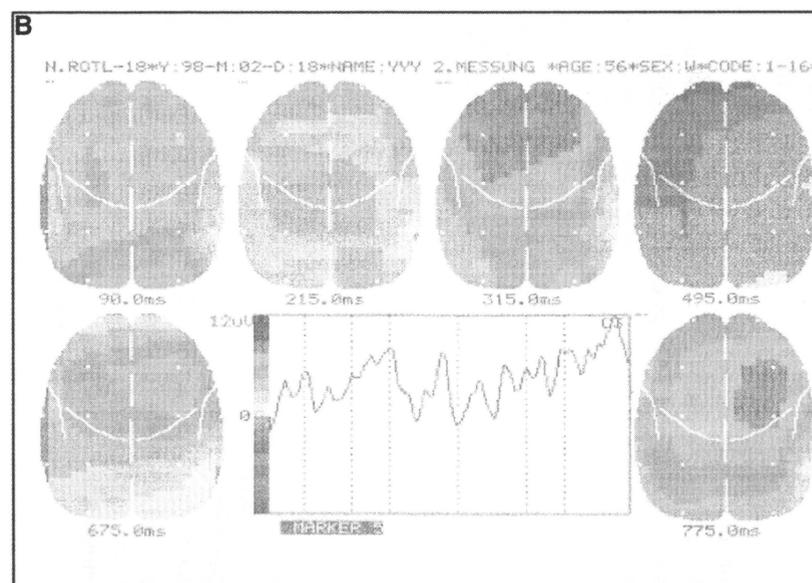
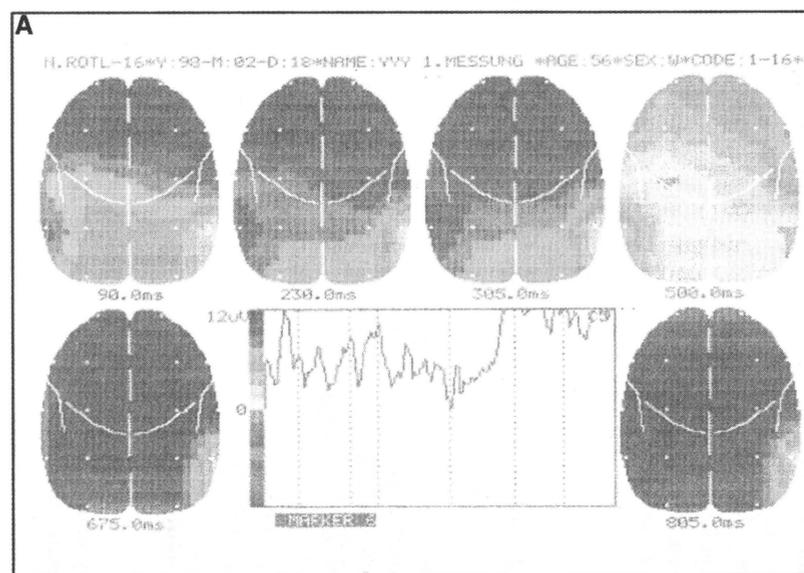
The preliminary results are based on evaluation of the tinnitus questionnaire of the Research and Training Centre for Brügger therapy and the visual assessment score. They represent improvement in terms of subjective tinnitus reduction. This is exemplified by the patterns of changes in the cortical epiphenomena in BEAM.

Two hundred patients are represented in this study (107 male and 93 female). The average age was 54 years; our youngest patient was 14, and our oldest was 77 years old (Fig. 4).

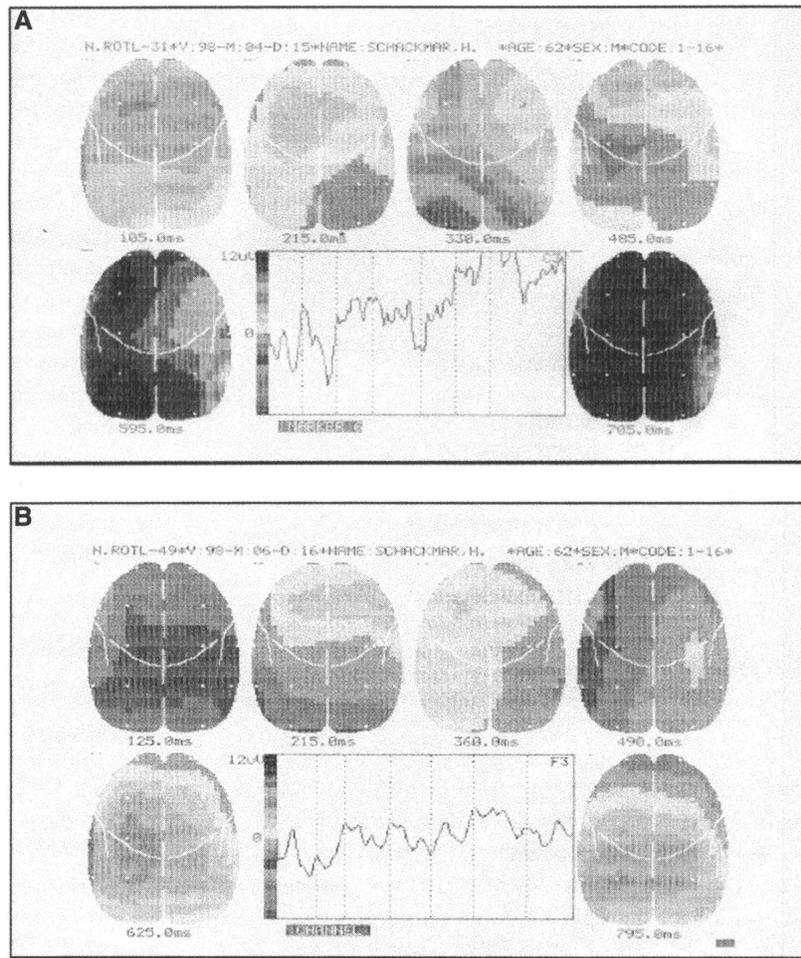
On the basis of the gathered data, we devised three



**Figure 1.** BEAM-VbEP in a 58-year-old male patient with tinnitus in the left ear and typical electroencephalographic (EEG) wave modifications in the VbEP. (A) Pretreatment BEAM of the vestibular evoked potential with rotation to the left. Reduced latent period of the EEG waves are typical. (B) BEAM-VbEP with rotation to the left after treatment (competitive-kinesthetic interaction therapy). Latent period now has a normalized temporal profile.



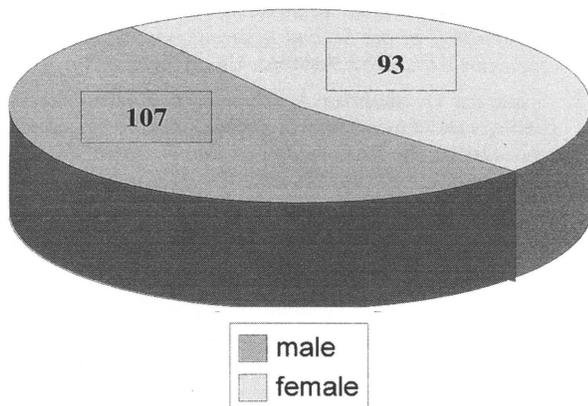
**Figure 2.** BEAM-VbEP in a 56-year-old female patient with tinnitus in the left ear and typical EEG wave modifications. (A) Pretreatment BEAM of vestibular evoked potential with rotation to the left. Greater-than-average magnitude of electrical DC shift in the cerebral cortex deviation. (B) BEAM-VbEP with rotation to the left after treatment (competitive-kinesthetic interaction therapy). Magnitude of electrical DC shift in the cerebral cortex now has returned to normal.



**Figure 3.** BEAM-VbEP in a 62-year-old male patient with tinnitus in the left ear and typical for tinnitus EEG wave modifications. (A) Pretreatment BEAM of vestibular evoked potential with rotation to the left. Greater-than-average magnitude of electrical DC shift in the cerebral cortex deviation. (B) BEAM-VbEP with rotation to the left after treatment (competitive-kinesthetic interaction therapy). Magnitude of electrical DC shift in the cerebral cortex now has returned to normal.

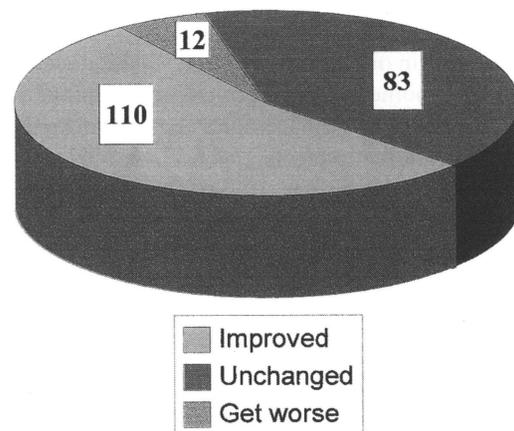
categories: improved, unchanged, and changed for the worse (Fig. 5). In 110 cases (55%), patients reported an improvement related to the subjective perception of the tinnitus. We arrived at a total of five cases more than patients, because some patients had bilateral tinnitus and different results in each ear.

In a second trial, we tried to specify the amount of improvement in the 110 cases. Hence, the improvement group was subdivided into three groups: patients with a

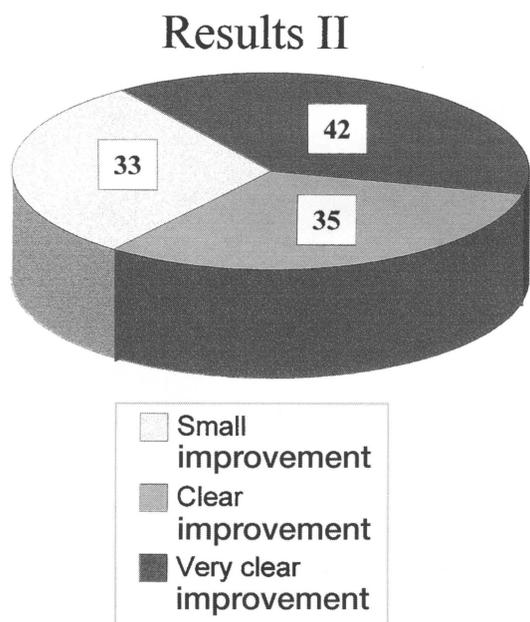


**Figure 4.** 200 patients: 107 male and 93 female.

### Results I



**Figure 5.** Subdivision of cases into three categories: improved, unchanged, and changed for the worse.



**Figure 6.** Small improvements, 1–25% better; clear improvements, 26–50% better; very clear improvements, 51% better.

small amount of improvement, those with clear improvement, and those with very clear improvement (Fig. 6).

We combined the results of the visual rating scale for the loudness of tinnitus with patients' statements at the end of the therapy. Thus, we define *small improvement* as a benefit of up to 25%; *clear improvement* as a benefit of 26%–50%; and *very clear improvement* as a benefit of more than 51%. In 28 cases of the clear and very clear groups, a temporary tinnitus cessation was seen; in 8 cases, complete cessation was the result of the competitive-interaction tinnitus therapy.

## DISCUSSION

The patients in our preliminary investigation clearly exhibit epiphenomena of overexcited or disinhibited electrical activities of the cerebral cortex formerly described in tinnitus patients [3,4,6,7]. A reduced latent period of the electroencephalograph waves also could be shown as a higher magnitude of electrical impulses in the cerebral cortex (DC shift) [3–5].

The now-inaugurated method of competitive-kinesthetic interaction therapy is able to normalize the electrical epiphenomena of tinnitus in BEAM-VbEP [8]. In conjunction with this finding, we note definite improvements in the subjective tinnitus of treated patients. In some cases, a complete cessation of tinnitus occurred. According to the regular application of their topodiagnostic functional neurootometric method,

Claussen et al. [9] found in a major sample of patients suffering from disabling tinnitus that the etiological focus for this sign lies in the statoacoustic periphery in 24%, within the brain stem in 31%, and in the supratentorial region in 45%.

According to our observations in tinnitus cases (rated with respect to the Claussen network analysis), all three aforementioned groups contain responders to the competitive-kinesthetic tinnitus inhibition. At the border of various medical specialties (e.g., otorhinolaryngology, orthopedic surgery, rehabilitative medicine, neurootology), competitive-kinesthetic tinnitus inhibition therapy has become so interesting that we established a noninvasive rehabilitation program at the Nordsee-Reha-Klinik II in St.Peter-Ording, Germany. The clinical observations from our first 12 months of experience are so promising that we dare to publish this preliminary report.

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