

## THE EFFECTS OF THE TOMATIS METHOD ON TINNITUS

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### ABSTRACT

The Tomatis method was developed as a technique for the training of the neuro-psychological and physiological systems by listening to special music program. The aim of the study was to determine the effectiveness of Tomatis method in patients with tinnitus. A young male patient with chronic tinnitus from 6 years was selected. The patient was assessed with Tinnitus Handicap Inventory (THI), Tinnitus Sample Case History (TSCH), psychological questionnaires, pure tone audiometry, pitch and loudness of tinnitus, loudness discomfort level. THI gave a result of 34 (grade 2). He suffered from a bipolar disorder. The hearing was normal and the tinnitus was prevalent in the left ear with the pitch at 3000 Hz and the loudness at 30 dB HL. The treatment consisted in listening Mozart music and Gregorian chants both with a headphone and bone vibrator. The music frequencies were filtered using different intensities of stimulation and delays between air and bone conduction. After 70 hours of Tomatis treatment THI decreased to 6 (grade 1) and the tinnitus loudness decreased to 18 dB HL. After 105 hours of treatment THI went down to 2 (grade 1) and the tinnitus loudness decreased to 13 dB HL.

**Keywords:** Tomatis method, Mozart music, audio-psycho-phonology, tinnitus.

### 1. INTRODUCTION

The Tomatis Method [1] was developed as a technique for the training of the neuro-psychological and physiological systems by listening to special music programs.

The method is applied for speech disorders, behavioural problems (anxiety, depression and stress) and for learning problems (dyslexia and dyscalculia) [2].

Tinnitus is often associated with psychological disorders like anxiety and depression [3]. The aim of the study is to verify if the Tomatis Method can lead to a reduction of tinnitus in relation with the improvement of the psychological component.

### 2. METHODS AND MATERIALS

The therapy [4] starts with the Listening Test which measures the hearing thresholds (air and bone conduction), the discrimination of tones (selectivity) and individuates the dominant ear (laterality). There is a relationship between listening and behaviour; the Listening Test can be interpreted from a physical and psychological point of view. The results of the Listening Test

are compared to the ideal curve, reported in figure 1 and obtained from the audiograms of talented musicians.

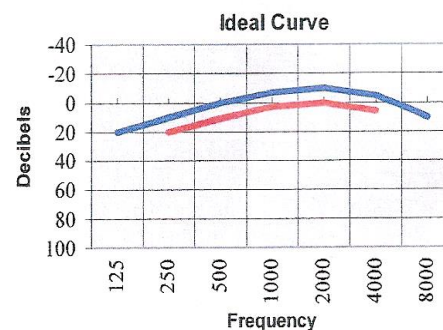


Figure 1. The ideal curve of the listening test.

The result of the Listening Test represents a good physiological response of the ear muscles and also gives a global psychological balance of the patient on the base of specific parameters such as the inversion of the curves, the presence of distortions and the “listening loss” in specific frequencies.

The aim of the therapy is to modify the listening curves in order to reach the ideal referring model as much as possible.

A male patient (47 years old) suffering with chronic tinnitus from 6 years and previously treated unsuccessfully with TRT was assessed with Tinnitus Handicap Inventory (THI), Tinnitus Sample Case History (TSCH), the Millon Clinical Multiaxial Inventory III (MCMI-III), the Symptom Checklist 90 (SCL90) [5], the Eysenck Personality Inventory (EPQ) [6], the Beck Depression Inventory II (BDI-II) [7], the State Trait Anxiety Inventory-X Type (STAI X1 and X2) [8], pure tone audiometry, pitch and loudness of tinnitus, loudness discomfort level. THI gave a result of 34 (grade 2). He suffered from a bipolar disorder treated with oxcarbazepine 300 mg/day. The hearing was normal and the tinnitus was prevalent in the left ear with the pitch at 3000 Hz and the loudness at 30 dB HL.

The treatment consisted in listening Mozart music and Gregorian chants both with a headphone and bone vibrator. The music frequencies were filtered using different intensities of stimulation and delays between air and bone conduction, according to an individual program. Figure 2 represents the equipment used for the Tomatis treatment, that is composed by the Brain Activator and the Mozart Brain Lab (MBL) Player.



Figure 2. The Brain Activator and the MBL Player used for the Tomatis treatment.

The treatment promotes the activity of the middle ear muscles and of the neurological pathways through the alternative amplification with high frequencies (tension) and low frequencies (relaxation). The choice of the music

tracks is based on the same principle of alternation between tension and relaxation [9]. The Mozart music has effects on the neurovegetative system by the high-spirited rhythm which characterizes its production. It accelerates the heart-rate and the breathing rhythm, improving attention and concentration to get better learning strategies and cognitive abilities. At the same time the Mozart music is rich in high tones providing cortical stimulation with facilitative effects on associative, creative and superior thinking processes. Its rigorous mathematical structure in melody and rhythm is able to determine the production of serotonin [10]. The relaxation is obtained with Gregorian chants which have a long and soothing rhythm; they lead to a quiet and regular breathing pattern, inducing relaxation and providing an efficient training on body coordination. The patient was submitted to the program of the treatment reported in table 1.

**Progressive filtering**

MNF	GC	GC	GC	MF3000	MF5000	MF6000	MF7000
GC	MF1000	MF2000	MF3000	MF4000	MF5000	MF6000	MF7000
MNF	GC	GC	GC	MF4000	MF6000	MF7000	MF8000
3 x	twice	twice	Once	Once	once	once	once

**High-pass filters on tinnitus frequency and on 6000 Hz**

MF6000	MF3000
MF6000	MF3000
MF6000	MF3000
10 x	10 x

**High-pass filters**

MF3000
MF4000
MF6000
10 x

MNF: not filtered mozart music;

**Progressive defiltering**

MF8000	MF6000	MF6000	MF3000	MF1000
MF8000	MF6000	MF5000	MF3000	MF1000
MF7000	MF5000	MF4000	MF2000	MNF
MF7000	MF5000	MF4000	MF2000	MNF
once	once	Once	Once	Once

GC: gregorian chants.  
**MF1000**: high-pass filter on 1000 HZ on mozart music;  
**MF2000**: high-pass filter on 2000 HZ on mozart music;  
**MF3000**: high-pass filter on 3000 HZ on mozart music;  
**MF4000**: high-pass filter on 4000 HZ on mozart music;  
**MF5000**: high-pass filter on 5000 HZ on mozart music;  
**MF6000**: high-pass filter on 6000 HZ on mozart music;  
**MF7000**: high-pass filter on 7000 HZ on mozart music;  
**MF8000**: high-pass filter on 8000 HZ on mozart music.

Every song is given for 30 minutes.

Table 1. The program of the Tomatis method used in

the patient with tinnitus

### 3. RESULTS

The tinnitus was triggered by high level of stress and by negative emotional components related to family problems.

Based on the psychological interview, the subject showed very high internal defences. He described the physical symptoms in detail with a clever control of his words in a steady voice's tone. When the discussion reached the emotional substrate the subject reacted with confusion and less control. The use of irony and the ability to reduce and remove the problem emerged clearly. The tinnitus was a symptom by which his body forced him to take care of himself, distracting his attention from family problems.

Psychological assessment showed the effort of the patient to give an extremely positive and a strong image of himself. The Millon test did not reveal any clear pattern of personality; the SCL-90 highlighted the nuances in the fields of somatization, anger, hostility, paranoid ideation and psychoticism and in the specific dimension of obsessive compulsive disorder and depression. The Eysenck and BDI -II, STAI -X1 and X2 tests did not reveal any significant element. The cognitive behavioral counseling for at least 3 months (one session per week) was suggested to the patient but he stopped the counseling after few sessions.

On the base of the Listening Test, it is possible to identify the very high internal defences emerged by the psychological interview.

According to Tomatis, the psychological dimension has an impact on every single component of the Listening Test. The most important element which emerged in the first listening test, as reported in the figure 3, compared with the ideal curves, was the distance between bone and air curves.

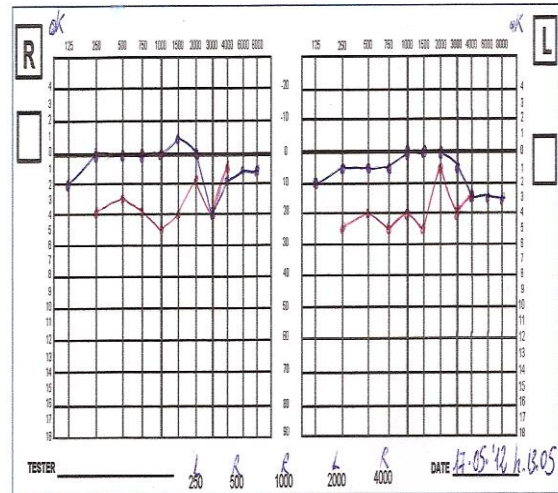


Figure 3. The first listening test of the patient before the Tomatis treatment.

According to the Tomatis' theory, the bone conduction is dominant when listening to oneself, it represents the subject himself and it reveals the perception of his own internal world and his "resonance". This concept can be explained by a metaphorical image: the bone conduction is like the string of instruments like violin, piano, harp etc.. The greater is the tension on the string the sooner it will vibrate even in response to the finest touch bordering the threshold of tactile perceptibility. In the same way, according to the Tomatis' theory, the bones in the body vibrate when there is an optimal tension which is an expression of the energy level in the body and from a psychological point of view in the character. The air conduction is dominant in the perception of sounds coming from outside and it represents the surrounding world and the others.

The relationship between the two curves represents the distance between the self and the others, it reflects the harmony between the subject's internal and external world and between his real self and public self.

Observing the first listening curve it is very clear the lack of energy and the weak character of the patient due to the very low bone curve. The high sensibility in the air curve demonstrates that his attention and therefore his psychological dimension is directed towards the others more than to himself. It can be described like a

strategy in order to avoid his own frailty, according to the psychological interview. Moreover he gives an image of himself very strong, as the high air curve (public self) demonstrates which the cause of a stress condition is. The last listening test after 105 hours of the Tomatis method is reported in the figure 4.

The curves improved after 105 hours of treatment, even if a gradual change in their movement towards the ideal curve began after 40 hours.

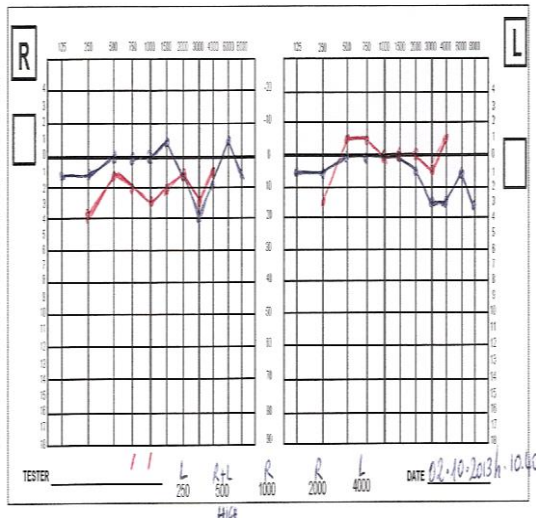


Figure 4. The last listening test after 105 hours of the Tomatis method.

The reduced distance between the bone and the air curves showed an association with an increased energy and a reinforcement of the character which permitted him to live deeply the contact with the others, independently from defence and protection strategies.

The VAS of tinnitus loudness was 40 before the Tomatis treatment and 10 after 105 hours. A significant improvement in the VAS evaluation was reported after 46 hours of the Tomatis treatment.

The audiological evaluations of the patient before and after the Tomatis method are reported in table 2.

EVALUATION	BEFORE TREATMENT	AFTER TREATMENT
Pitch and loudness of tinnitus	3000 / 30 dB	3000 / 12 dB
THI	34 (grade 2)	2 (grade 1)
Loudness discomfort level	Bilateral mild hyperacusis on high frequencies	Normal

Table 2. The audiological evaluations of the patient before and after the Tomatis method.

The reduction of the tinnitus perception was accompanied by important changes in the listening tests which are representative of an important positive evolution of the psychological behaviour.

### DISCUSSION

If we consider the most recent neuro-physiological models of tinnitus [11], a primary role is played by the high frequencies together with a maladaptive cortical reorganization related to the peripheral deafferentation [12]. We suppose that the Tomatis treatment can be effective on the auditory pathways and cortical level or on the inhibitory mechanism of the limbic and paralimbic areas.

If the reduction of tinnitus depends from the cortical level, we can explain it through the phenomenon of attraction of lateral inhibition. Pantev et Al hypothesize that in the processing of auditory information, the auditory pathway is formed by excitatory and inhibitory networks. Each neuron has a characteristic frequency (CF) to which it is most responsive. If a neuron is excited, it not only receives excitation but also distributes inhibition laterally to adjacent neurons.

If we give a greater excitation in the regions spectrally neighboring the lesion, the weakened inhibitory networks are reinforced. The figure 5 is a representation of the excitatory-inhibitory mechanism in the auditory cortex.

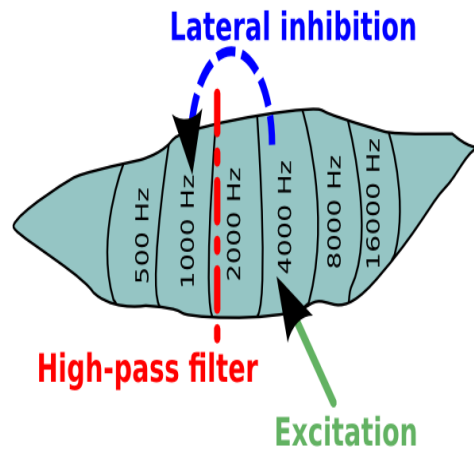


Figure 5. The lateral inhibition by filtered music is realized by excitation in the regions spectrally neighboring the lesion.

If the reduction of tinnitus depends from the subcortical area, we can suppose that limbic and paralimbic structures are stimulated to recognize the unpleasant sound with an activation of the serotonergic neurons in Nucleus Accumbens – Thalamic Reticular Nucleus (Nac-TRN). These neurons can modulate the transmission of the sounds from peripheral receptors and brainstem to the cerebral cortex [13]. The NAc-TRN system is able to cancel out the perception of the unpleasant sounds before the arriving in the cortex in which conscious perception resides. Other music therapies are proposed for tinnitus as Neuromonics [14], Heidelberg Model [15], the Mozart effect [16] and the tonal tinnitus-tailor-made notched music training (TMNMT) [17].

It could be interesting to verify the effectiveness of the Tomatis treatment with neuroimaging techniques to exclude a placebo effect and to verify the activation of specific brain regions.

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