

Francesco

# A Controlled Study of NeurOptimal™ Neurofeedback in Tinnitus Patients



Dr. Raponi

Milano

Italy



Dr. Messina

Palermo

## Preliminary Results

Presented by  
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# Study and Investigators

**“A randomized study of Neuromodulation, using Neurottimo® brain training system, on tinnitus symptoms and associated psychological distress factors in patients diagnosed with tinnitus”.**

Investigators are:

- Dott. Aldo Messina, Oto Laryngologist and Audiologist
  - Head Department of Audiology of the University Hospital "Paolo Giaccone" of Palermo
- Dott. Giorgio Raponi, Oto Laryngologist and Oto Neurologist
  - Expert in Tinnitus-Vertigo-Deafness Diagnostic and Management
- Dott. ssa Michela Maria Di Nardo, Masters Statistician
  - Consultant and Analyst, Expert in collection and analysis of clinical data
- Dott.ssa Marianna Franco, Psychotherapist of the University Hospital "Paolo Giaccone" of Palermo
- Dott.ssa Elisa Tocco, Oto Laryngologist of the University Hospital "Paolo Giaccone" of Palermo.

Zengar Institute has supported our research with loaner equipment.

What is Tinnitus?

*Perception of a Sound  
in the Absence of Acoustic Stimulation*

# What is Tinnitus?



## Tinnitus often causes:



**Sleepless** Nights,  
Constant **Anxiety**,  
Crazy **Mood Swings**,  
Helpless **Depression**,  
Energy Sapping **Exhaustion**,  
Overall **Stress in Your Life**.

***“The Ringing Just Won’t Stop!!!”***

# Our Thesis:



# Research Protocol

- We are offering **NeurOptimal** training to up to 60 recruited patients with a run-in using “sham” training to establish the control value or baseline.
- The “sham” training should last for 5 weeks (10 sessions) and the standard training should last for 10 weeks (20 sessions).

We are collecting baseline data:

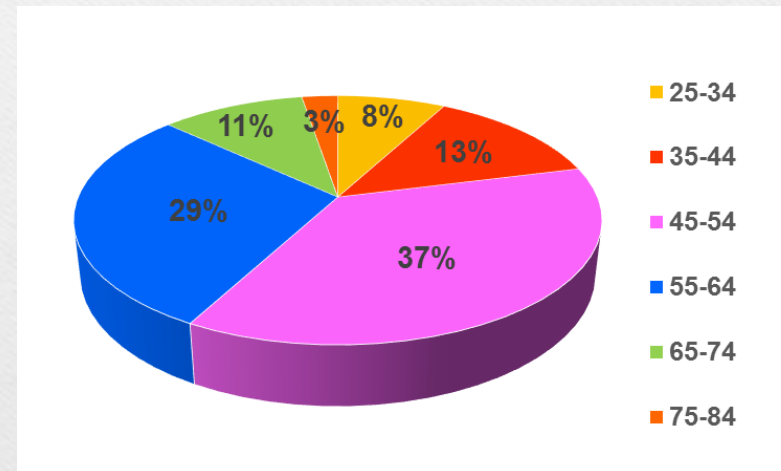
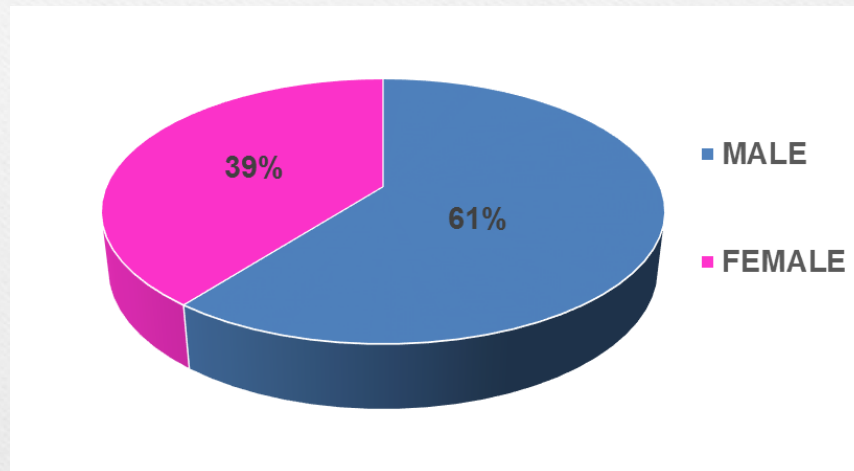
- Depression, anxiety and stress (**DASS21 Questionnaire**)
- Audiometric measurements of acuphenometry (**Residual Inhibition**)
- Tendency to pathological preoccupation (**PSWQ Questionnaire**)
- Sleep quality (**PSQI Questionnaire**)
- Handicap level provoked by tinnitus (**THI Questionnaire**).

Results are to be compared before and after training to see if there is an effect.



# Our Sample: Sex and Age

- We have recruited a sample of 38 patients up to 15th April 2018, in the two sites (Milan + Palermo).
- About 60% are males
- 66% are between 45 and 64 years.



# Our Sample: Origin of Tinnitus and Age of Onset

- **Origin of tinnitus can be auditory Deafferentiation or other sensory (Cross Modal)**
- **In most cases, patients have had tinnitus for less than 2 years.**

<b>ORIGIN</b>	<b>100%= patients at time T0</b>
<b>DEAFFERENTATION TINNITUS</b>	<b>55%</b>
<b>MODAL CROSS</b>	<b>45%</b>

<b>AGE OF ONSET</b>	<b>100%= patients at time T0</b>
<b>0 TO 2 YEARS</b>	<b>73%</b>
<b>FROM 2 YEARS MORE 1 DAY TO 5 YEARS</b>	<b>11%</b>
<b>FROM 5 YEARS MORE 1 DAY TO 10 YEARS</b>	<b>5%</b>
<b>MORE 10 YEARS</b>	<b>11%</b>

# Tinnitus at Time T0: Where, Type and Performance

The highest incidence is for tinnitus Monolateral, Persistent, with sound Whistle.

WHERE	100%= patients at time T0	TYPE	100%= patients at time T0	PERFORMANCE	100%= patients at time T0
MONOLATERAL ON THE LEFT	42%	WHISTLE	50%	PERSISTENT	68%
MONOLATERAL ON THE RIGHT	26%	BUZZ	13%	INTERMITTENT IN THE DAY	19%
BILATERAL	23%	SWISH	7%	OCCASIONAL	13%
BILATERAL MORE RIGHT	3%	WHISTLE + BUZZ OR BUZZ + SWISH	17%		
BILATERAL MORE LEFT	3%	SOUND DEAF	13%		
IN THE CENTER ENCEPHALO OR NUCALE	3%				

# Scores at Time T0: Moderate to Severe

Our Tinnitus recruits display, on average baseline scores:

- Tinnitus Handicap Inventory: **Moderate** (THI score = 53)
- Pathological Preoccupation Tendency: **Moderate** (PSWQ score = 49)
- Sleep Quality: **Poor** (PSQI score = 7).

<b>THI</b>	100%= patients at time T0
POOR	0%
MILD	27%
MODERATE	30%
SEVERE	27%
CATASTROPHIC	16%

**AVE SCORE 53 VS SEVERITY RATING**

0 - 16 POOR  
18 - 36 MILD  
**38 - 56 MODERATE**  
**58 - 76 SEVERE**  
78 - 100 CATASTROPHIC

<b>PSWQ</b>	100%= patients at time T0
VERY LOW	0%
LOW	18%
MODERATE	68%
HIGH	13%

**AVE SCORE 49 VS SEVERITY RATING**

0 - 16 VERY LOW  
17 - 37 LOW  
**38 - 59 MODERATE**  
60 - 80 HIGH

<b>PSQI</b>	100%= patients at time T0
POOR SLEEP QUALITY	78%
GOOD SLEEP QUALITY	22%

**AVE SCORE 7 VS SEVERITY RATING**

**>=5 POOR SLEEP QUALITY**

# Scores at Time T0: DASS21 Mild to Moderate

Our Tinnitus recruits display, on average DASS baseline scores:

- DASS **Mild** Depression (Score = 6),
- DASS **Moderate** Anxiety (Score = 6) and
- DASS **Mild** Stress (Score = 9).

<b>DASS Depression</b>	100%= patients at time T0
NORMAL	42%
MILD	16%
MODERATE	24%
SEVERE	8%
EXTREMELY SEVERE	11%

## **AVE SCORE 6 VS SEVERITY RATING**

0 - 4 NORMAL  
5 - 6 **MILD**  
7 - 10 **MODERATE**  
11 - 13 SEVERE  
14 + EXTREMELY SEVERE

<b>DASS Anxiety</b>	100%= patients at time T0
NORMAL	34%
MILD	32%
MODERATE	11%
SEVERE	8%
EXTREMELY SEVERE	16%

## **AVE SCORE 6 VS SEVERITY RATING**

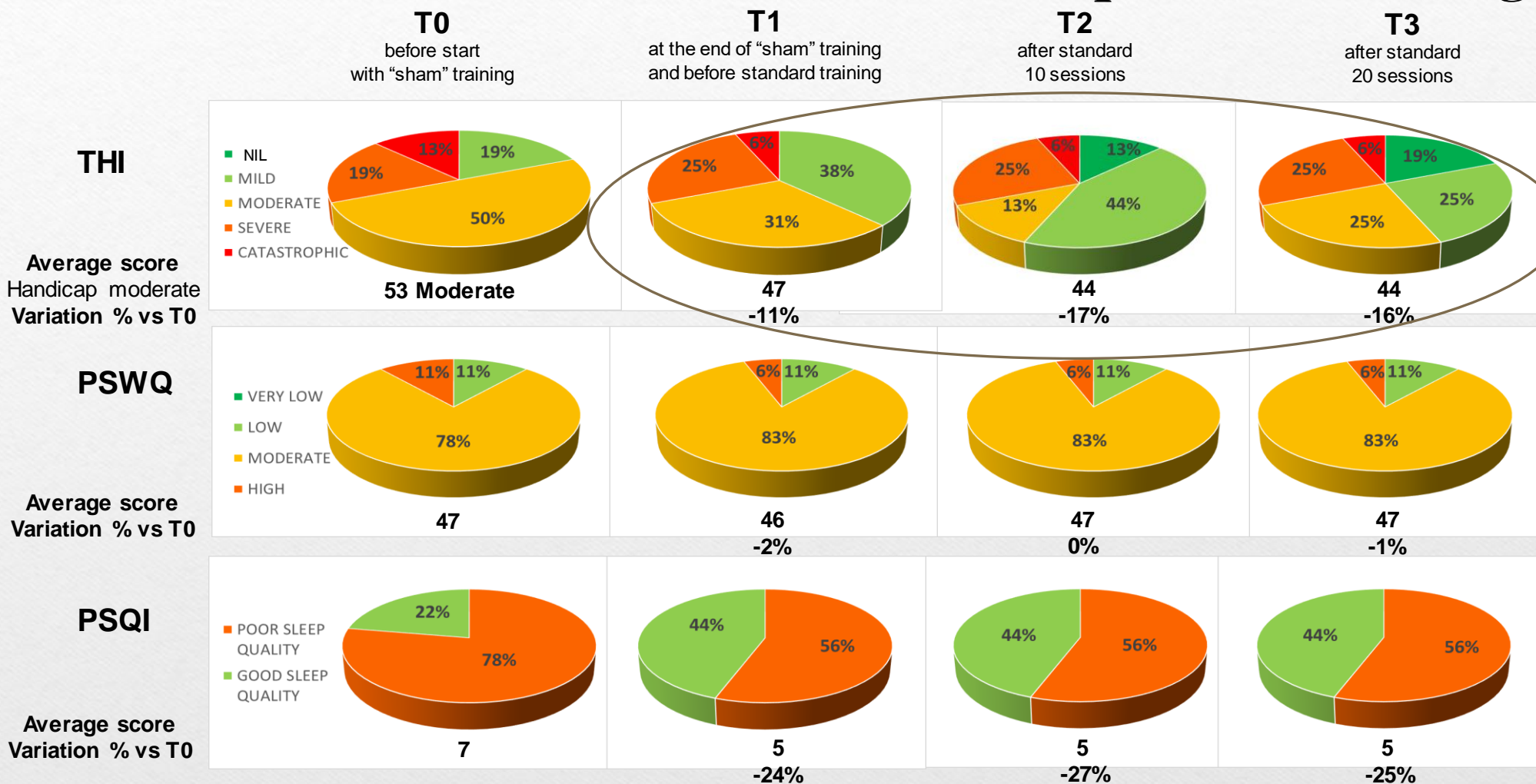
0 - 3 NORMAL  
4 - 5 MILD  
6 - 7 **MODERATE**  
8 - 9 SEVERE  
10 + EXTREMELY SEVERE

<b>DASS Stress</b>	100%= patients at time T0
NORMAL	55%
MILD	8%
MODERATE	8%
SEVERE	18%
EXTREMELY SEVERE	11%

## **AVE SCORE 6 VS SEVERITY RATING**

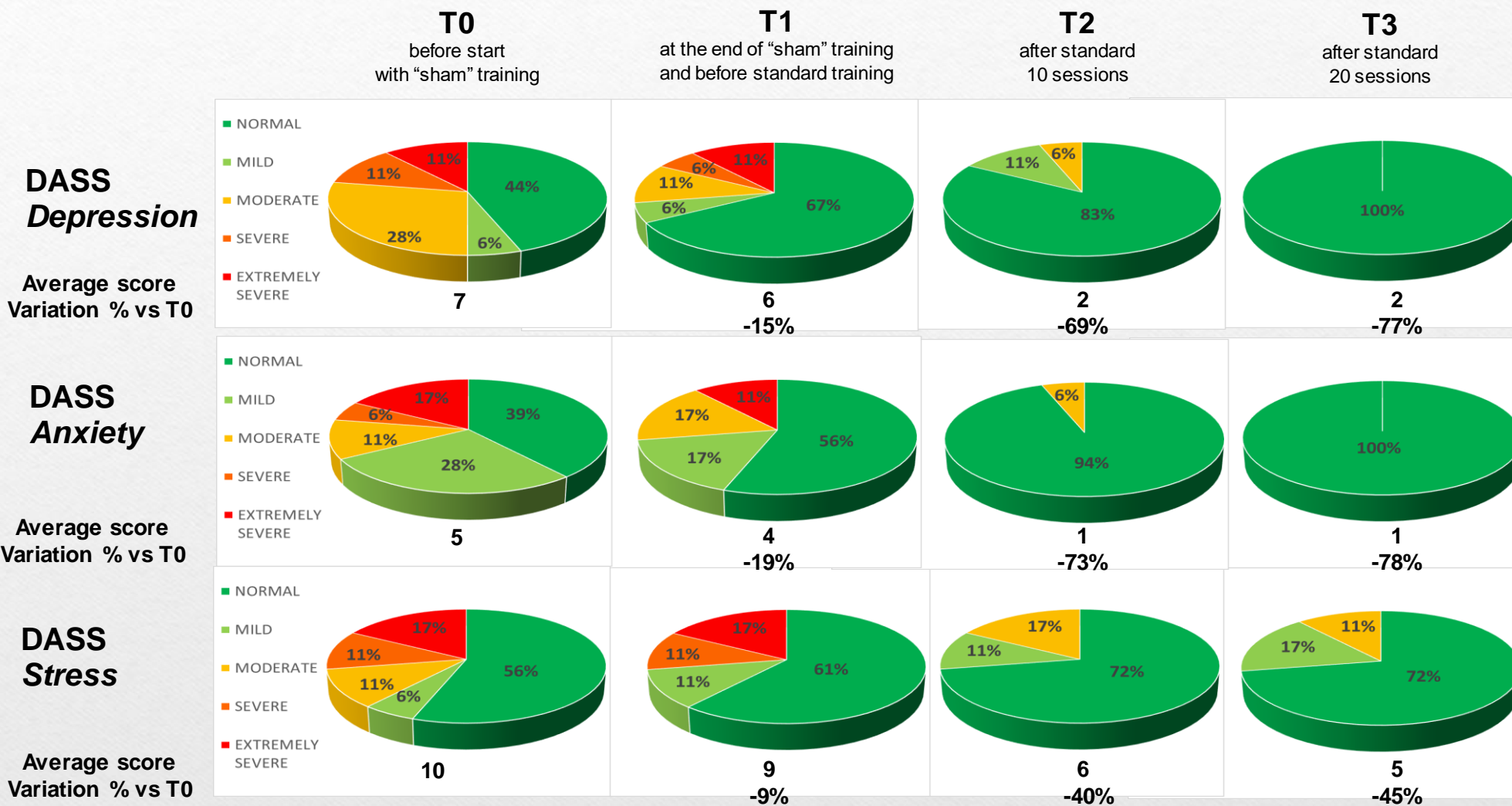
0 - 7 NORMAL  
8 - 9 **MILD**  
10 - 12 MODERATE  
13 - 16 SEVERE  
17 + EXTREMELY SEVERE

# Tinnitus Patient Profile after NeuroOptimal Training



Note: Patients that concluded sham + standard training and completed all questionnaires up to 15th April (18 cases).

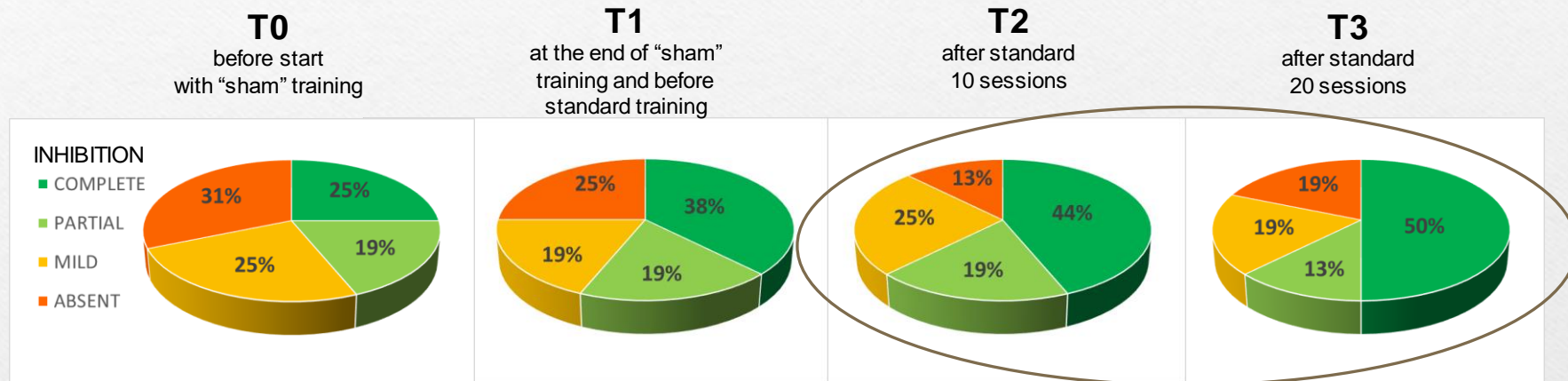
# Tinnitus Patient Profile after NeuroOptimal Training



Note: Patients that concluded sham + standard training and completed all questionnaires up to 15th April (18 cases).

# Residual Inhibition Profile after NeuroOptimal Training

**Residual Inhibition:** The Residual Inhibition test evaluates the "residue" of the tinnitus after administering a masking tone for one minute.



**Acuphenometry (Average acuphenometry: average of frequencies from 250hz to 8.000hz and average of right ear and left ear in case of bilateral tinnitus).**

**Variation % vs T0**

**-12%**

**-15%**

**-21%**

Note: Patients that concluded sham + standard training and completed all questionnaires up to 15th April (18 cases).



# Preliminary Results and Next Steps

- Basing on these measurements of the partial sample, the impact of NeurOptimal training seems to be *very positive on emotional states, stress and sleep quality*.
- For tinnitus handicap and pathological preoccupation, slight improvement has been seen in the mild-moderate groups.
- In addition, both Acufenometry and Residual Inhibition measurements have improved, permitting this relief modality to be used.
- Other positive effects that we have detected are: improvement in concentration and management of emotions, important reduction or disappearance of headache, sense of serenity and self-control.

# Preliminary Results and Next Steps

- We agree to recruit a minimum of 60 patients, to be able to confirm and validate these results.
- With a larger sample, we'll analyze acuphenometry/ audiometric measurements and questionnaires score to evaluate if there are statistically significant differences between T0 and T1 and T2 and T3.
- It may also be checked (according to sample size) if there are significant differences in the effect of training between cluster/target identified by sex, by age, by tinnitus type, by audiometric type, by THI type, by PSWQ type, by PSQI type and by DASS type.

**Thank You  
For Your Attention**