Title	Doc Id	Rev	Page
Tinearity G1 Survey Report	Doc-10713	0	1(13)
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Reviewed by Jörgen Olsson, QA/RA Consultant	*Date* 2023-05-24		
Approved by Fredrik Westman, CEO	*Date* 2023-05-24		

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1 Revision History

Rev	Author	Note
0	Anneli Johansson	First Edition

2 Executive Summary

Medical Device	**Tinearity G1**
Sponsor	**Duearity AB**

Introduction and purpose of the survey

The Tinearity G1 device is intended to be used as treatment for Tinnitus. The device can be used for immediate relief as well as the sound source used in sound therapy or Tinnitus Retraining Therapy (TRT).

The primary purpose of this survey is to investigate the immediate relief (suppression, masking) effect of the Tinearity G1 device for the intended user population.

Description of the survey populations

The Tinearity G1 device is available on the European market and is purchased directly by the patient. The patient is upon the purchase informed about the intended medical indication and any contraindications.

This study is performed in Europe (Sweden) for the intent of marketing the device in US where the device is a prescription device, in contrast to Europe where it is an over the counter (OTC) product.

The study is performed with two user groups, one for evaluating performance and one for evaluating side-effects.

<u>Performance (first part of the study)</u>

To represent the US intended patient population, the subjects are subjected to the intended diagnosis and fitting performed by a qualified audiologist and thus the inclusion criteria presented below will be applied.

Inclusion criteria for customer survey;

- Voluntary Adults (at least 18 years at the time of inclusion)
- Normal hearing on at least one ear
- Tinnitus tone: Pure tone

The sponsor follower database is utilized for identification and recruiting of candidates for evaluating immediate relief of Tinearity G1.

<u>Side-effects (second part of the study)</u>

Identification of subjects for evaluating possible side effects is performed by review of the distribution records and optimizing on longest use-time by selection of shipping dates.

The sponsor customer database is utilized for identification and evaluation of skin irritation or side effects from mechanical vibrations due to the use of Tinearity G1.

Methodology

The strength of the data is a combination of the number of responses and accompanying clinical data (audiogram and established tinnitus frequency and amplitude).

The survey was held as an interview with a pre-defined questioner. The questioner was handled by the sponsor's test leader (monitors) who also collected the answers and forwarded these anonymized to The sponsor head of QA/RA.

The survey was performed in Sweden.

Survey period

First part (performance)

The survey was conducted on the 24th, 25th and 26th of April. Each participant spent approximately one hour for the hearing test and one hour for the test and evaluation of the device. The survey was done at a hearing clinic in Stockholm, Sweden.

Second part (Side-effects)

The survey was conducted on the 5th, 8th and 9th of May. Each participant spent approximately a half hour for evaluation of side-effects. The survey was done over the telephone.

Result

First part: Performance

A responder is a subject answering "Very good", "Good" or "Acceptable" to the question "Do you get instant relief of perceived Tinnitus".

The primary objective is to test the null-hypothesis that the proportion of responders is less than 40%. All 21 subjects were classified as responders (100%). As the p-value (one-sided) when testing the null-hypothesis is less than the pre-defined significance level 2.5% the null-hypothesis is rejected and hence it is accepted that the proportion of responders is more than 40%. The 95% confidence interval for the portion of responders is [98%, 100%].

Second part: (Side-effects)

Reported side effects (secondary objective) and severity on a scale from 1 to 5 where 1 is lowest possible severity and 5 is highest possible severity. Only one subject reported side effect (nausea) which was on severity level 3.

Conclusion

The performed survey shows that subjects with normal hearing suffering from tinnitus can perceive an immediate relief (suppression, masking) from the tinnitus sound with the use of Tinearity G1 when used for masking of tinnitus sound.

As a secondary objective, the survey also indicates that side-effects from the use of Tinearity G1 for masking of a tinnitus sound is very limited.

It is concluded that the benefits in form of instant relief of tinnitus outweighs the risks in form of side-effects for the use of Tinearity G1.

Furthermore, we can conclude that the indication area (tinnitus pitch) is wider than anticipated and further studies is recommended to be conducted to address the finding.

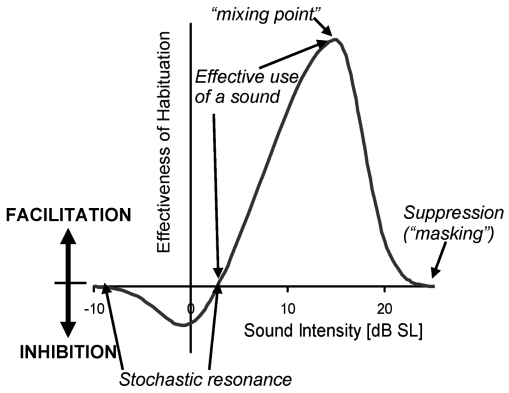
3 Introduction

The Tinearity G1 device was introduced on the European market in February 2023. This survey was performed as part of the Post market surveillance program and as real-world evidence for the US market introduction.

Tinearity G1 is intended to be used in home care environment. Hearing health care professional shall be consulted for diagnosis, fitting of the device, and follow-up care.

Tinearity G1 is intended to relief users with normal hearing suffering from Tinnitus with a tinnitus frequency and amplitude within the generated max sound performance output diagram.

The Tinearity G1 device is intended to be used for Tinnitus treatment. The device can be used for immediate relief as well as the sound source used in sound therapy. The figure below illustrate the two different areas of application.



4 Device and methods

4.1 Description of the device

The Tinearity G1 device is designed to generate sounds to be used in a Tinnitus Management Program to relieve patients suffering from tinnitus.

Tinearity G1 comprises three components: a sound generator, an adapter and a charger. The sound generator is attached to the skin behind the ear by means of the adapter. The sound generator converts white noise into vibrations that are transmitted via the adapter through the skull to the inner ear. The device generates white noise within the frequency span of 700z-10Khz with a maximum output level of 48dB HL.

The adapter is a disposable device that serves as a mechanical connector between the sound generator and the user. The adapter is made up of a plastic holder that is compatible with the sound generator and a medical grade tape to be attached to the user's skin behind the ear. The adapter is a single use device and is designed to be removed daily after each treatment.

The sound generator uses a re-chargeable battery as power source which is charged with the charger.

The Tinearity G1 sound generator and adapter can be used during all times of the day, during sleep as well as during work and spare time.

The Tinearity device has a different way of transmitting sound to the inner ear compared to the traditional devices. Tinearity utilizes bone conduction whereas traditional devices use air conduction.

The advantage of bone conduction is that the method works independently of the ear canal and the middle ear and facilitates the treatment to be performed without obstructing the normal hearing canal.

INTENDED USE AND INDICATIONS FOR USE

INTENDED USE

Tinearity G1 is a device that generate white noise to relieve patients suffering from tinnitus. The target population is adults of at least 18 years of age.
The patient is the intended operator of the device.

INDICATIONS FOR USE

Intended medical indication

Tinearity G1 is intended to generate sounds to be used in a Tinnitus Management Program to relieve patients with normal hearing suffering from tinnitus. Hearing health care professional shall be consulted for diagnosis, fitting of the device, and follow-up care. Tinearity G1 has a performance output as shown in diagram 1. The recommended treatment time is 8 hours per day for 6-24 months.

4.2 Survey Plan

4.2.1 Primary objective

The primary objective was to evaluate the performance of the Tinearity G1 regarding instant relief of tinnitus.

4.2.2 Secondary objectives

The secondary objective was to evaluate the safety of the Tinearity G1.

4.2.3 Survey design

The survey utilized two independent user groups, one for the primary objective (first part of the survey) and one for the secondary objective (second part of the survey).

The group for evaluating the primary objective was equipped with a device at the time of performing the study. The group for evaluating side-effects had used the device for a minimum time of 24 hours accumulated use.

Primary Endpoint

Perceived instant tinnitus relief after 10 minutes of use.

The primary endpoint was the question “Instant relief of perceived Tinnitus” with the answering alternatives “Very good”, “Good”, “Acceptable”, “Poor” and “Very poor”. A subject is considered a responder if the subjects answered, “Very good”, “Good” or “Acceptable”.

Secondary Endpoint(s)

Perceived side effects (from users within EU). The question was asked as an open question to not influence the survey result. The expected side-effects included nausea, headache, dizziness, worsening of tinnitus and skin irritation.

The secondary endpoint was the question “Please rate the performance while using the Tinearity G1 device in relation to the perceived side-effects, if any, where 1 is no discomfort and where 5 is serious side effects/discomfort”. This question is expressed as “Evaluators product specific evaluation - Adverse Events” in the Customer Survey Record - Clean File database, Doc-10730.

4.2.4 Ethical considerations

The survey has gathered data on clinical experience with the Tinearity G1 device. Tinearity G1 device has already market authorization in EU, no patient specific data was collected, no intervention was required, and the survey was not considered a research activity, hence submission to Ethical Committee was not applicable.

4.2.5 Data Quality Assurance

The investigation site (Audioteket) was visited by the sponsor representatives (monitors) during evaluation of the primary objective.

All personnel involved in the survey were identified and documented in the survey plan. CV from all personnel involved in the survey are kept within the sponsor QMS. A script was established prior start of the survey for the monitors to follow.

4.2.6 Selection of subject population

The sponsor follower database was utilized for identification and recruiting of candidates for evaluating immediate relief of Tinearity G1.

Identification of candidates for evaluating of immediate relief was performed by sending an e-mail to persons registered in the sponsor follower database. The e-mail included inclusion criteria as well as a description of the survey. All replays were followed up with a phone call to verify the inclusion criteria. Final selection on participation was based on geographical location to the audiological clinic. Due to the nature of the inclusion criteria an excessive number of participants are requited to the clinic. The participants who fulfilled all the inclusion the criteria proceeded to device evaluation. The participants who fell outside the inclusion criteria proceeded anyhow to the device evaluation, but their results are presented separately.

The sponsor customer database was utilized for identification and evaluation of skin irritation or side effects from mechanical vibrations due to the use of Tinearity G1. Identification of candidates for evaluating possible side effects was performed by review of the distribution records and optimizing on longest use-time by selection of shipping dates.

4.2.7 Inclusion criteria

- Voluntary Adults (at least 18 years at the time of inclusion)
- Normal hearing
- Tinnitus tone: Pure tone

4.2.8 Exclusion criteria

No exclusion criteria were established.

4.2.9 Sample size

Twenty-one (21) subjects fulfilling the inclusion criteria was the planned sample size for this survey and based on the primary objective in the first part of the survey.
If we assume 40% of subjects treated with an assumed ineffective device (placebo will be responders (defined as subjects answering, “very good”, “good” or “acceptable” on the first survey question) and we assume the proportion of responders in an infinitely large population treated with the assumed efficacious device is between 70% and 100%. However, as a conservative approach it is used 70% in the sample size calculations and then there is a need of 21 fully evaluable subjects in order to reach 80% probability to reject (i.e., get a one-sided p-value less than 2.5%) the null-hypothesis that the proportion of responders is less than 40%.

The inclusion of study subjects continued until 21 fully evaluable subjects were achieved. A fully evaluable subject is a subject using the test device for at least 10 minutes.

4.2.10 Treatments

Immediate relief (suppression, masking) of the perceived tinnitus sound.

4.2.11 Identity of Medical Device

REF	Description	UDI-DI
6000	Tinearity G1	07350136210006

4.2.12 Treatment allocation schedule

The subject tested the device for a minimum time of 10 minutes for the performance (first part of survey).

The subject had used the device for a minimum time of 24 hours accumulated for the side-effect (second part of the survey).

4.2.13 Concomitant medications/treatments

Not collected.

4.2.14 Follow-up

N/A.

4.2.15 Statistical methods

Throughout the analyses, data will be summarized using descriptive statistics implying that number of subjects, min values, median values, max values, mean and standard deviation will be presented for continuous data and frequency and percentage for categorical data.

All p-values will be two-sided as well as the confidence intervals except for the p-value for the primary objective in the efficacy part of the trial which is one-sided.

No adjustment for multiplicity will be done and hence the interpretation of the results should consider the increased level of the type I error.

Missing values will not be imputed. Suspected outliers, if any, will be identified and handled by presenting statistical analyses both with and without the suspected outliers.

No sub-group analyses are planned but may be conducted ad hoc.

5 Results

5.1 Survey period

The survey was performed between the 24th of April and 9th of May 2023.

5.2 Disposition of subjects and devices

For the primary objective (first part of the study), the subjects visited Audioteket, an Audiology Clinic in Stockholm, Sweden. At Audioteket the subjects hearing, and tinnitus sound were evaluated. Finally, the Tinearity device was tested and evaluated by the subjects. The device was returned to the

sponsor after the test. After performed survey, the responders were offered to buy a new unused Tinearity device to a reduced price.

For the secondary objective (second part of the survey), the subjects were contacted via telephone and interviewed. The devices used were purchased by the subject prior inclusion in the survey.

5.3 Number and demographics of subjects

For the primary objective (first part of the survey), 22 subjects completed the survey to receive 21 fully evaluable subjects.

For the secondary objective (second part of the survey), 21 subjects completed the survey to receive 21 fully evaluable subjects.

5.4 Survey compliance

5.4.1 Major survey deviations

N/A.

5.4.2 Minor survey deviations

Three minor survey deviations were noted;

- Responder no 10 for performance (first part of the survey) has a mild hearing loss at the left ear. The inclusion criteria do not specify that the hearing must be normal at both ears and thus the responder is included and it was decided that normal hearing is defined as normal hearing on at least one ear.
- Responder no 7 for performance (first part of the survey) did the test from home guided by the test leader through phone due to anxiety from the audiology test environment.
- Side effects (second part of the survey) investigated during first week of May rather than planned April.
- Inclusion criteria was updated in rev 4 of the customer survey plan after feedback from the FDA. The updated plan has not been distributed to the FDA prior start of the survey.
- In section 6.5.2 minor typo corrected from skin effect to side effect.

None of the above-mentioned deviations are evaluated to impact the survey results.

5.5 Statistical methods

5.5.1 Primary objective

Assume π is the real proportion of *responders*, defined as answering “Very Good”, “Good” or “Acceptable” on the the question “Instant relief of perceived Tinnitus” and 40% is the performance goal (could be the assumed placebo proportion).

The hypotheses of interest are then (H_0 is the null-hypothesis which should be rejected in a successful trial)

H_0: $\pi < 40\%$
H_1: $\pi \geq 40\%$

The null hypothesis will be tested using the exact Binomial test and will be rejected if the one-sided p-value is less than 2.5%.

As well a two-sided 95% confidence interval for the proportion of responders (i.e. π) will be constructed using the formula[1] (x is the number of responders and n is the total number of subjects):

$$\frac{x}{n} - 1.9600\sqrt{\frac{\frac{x}{n}\times\left(1-\frac{x}{n}\right)}{n}} - \frac{1}{2n} \leq \pi \leq \frac{x}{n} + 1.9600\sqrt{\frac{\frac{x}{n}\times\left(1-\frac{x}{n}\right)}{n}} + \frac{1}{2n}$$

5.5.2 Secondary objectives

The secondary objective is to evaluate the safety of the Tinearity G1.

A two-sided 95% confidence interval for the proportion of subjects with skin irritation will be constructed using the formula (x is the number of subjects with skin irritation and n is the total number of subjects):

$$\frac{x}{n} - 1.9600\sqrt{\frac{\frac{x}{n}\times\left(1-\frac{x}{n}\right)}{n}} - \frac{1}{2n} \leq \pi \leq \frac{x}{n} + 1.9600\sqrt{\frac{\frac{x}{n}\times\left(1-\frac{x}{n}\right)}{n}} + \frac{1}{2n}$$

A two-sided 95% confidence interval for the proportion of subjects with side effects from mechanical vibrations will be constructed using the formula (x is the number of subjects with side effects and n is the total number of subjects):

$$\frac{x}{n} - 1.9600\sqrt{\frac{\frac{x}{n}\times\left(1-\frac{x}{n}\right)}{n}} - \frac{1}{2n} \leq \pi \leq \frac{x}{n} + 1.9600\sqrt{\frac{\frac{x}{n}\times\left(1-\frac{x}{n}\right)}{n}} + \frac{1}{2n}$$

Each subject will be asked if they perceived any side-effects on a five graded scale (“none”, “slight”, “acceptable”, clearly noticeable side effects” and “severe side effects”) and the proportion of subjects in each of these five categories will be presented.

5.6 Analysis

5.6.1 Performance analysis (first part of the survey)

Out of 22 subjects, 21 subjects were included in the statistical analyses. The excluded subject was not fulfilling the entry criteria due to a mild hearing loss. Even with a mild hearing loss, the subject received a relief in tinnitus sound when using the device for masking of the tinnitus tone.

When compiling the results from the primary objective it is seen that 100% of the included subjects received an instant relief in Tinnitus. I.e., 100% of the included subjects rated the masking effect as a (3), (4) or (5) were (1) meaning no masking and (5) meaning complete masking of tinnitus sound.

Out of the 21 included subjects to the primary objective, only 6 included subjects have a tinnitus sound that falls within the Tinearity device out-put performance graph. Nevertheless, all the 21 included subjects indicates that they are experiencing a sense of relief from their tinnitus sound when using the device for masking of their tinnitus tone.

[1] Statistical methods for rates and proportions. JL Fleiss. John Wiley & Sons, New York, 1981.

5.6.2 Side-effects (second part of the survey)

When compiling the results from the secondary objective it is concluded 4.8% of the responders (1 responder) received a side effect (nausea) after at least 24h accumulated use. The perceived severity was rated to a (3), where 1 is no discomfort and where 5 is serious side effects/discomfort.

All subjects were included in the statistical analyses of the second part of the study.

Expected side-effects were nausea, headache and/or dizziness due to the use of bone conduction, worsening of tinnitus due to the use of white noise and skin irritation due to the use of adhesive for placement of the adapter to the subject's skin.

5.6.3 Subgroup analyses

A subgroup analysis is presented in Table 12 in the statistical report, Doc-10732-0. The subgroup analysis is performed with intention to identify if there is a difference between the subgroups "within Tinearity performance" and "outside Tinearity performance".

The subgroup analysis shows that the subjects within Tinearity performance receive a higher degree of instant relief (total masking) compared to the group outside Tinearity performance, 67% compared to 33%. The responders within Tinearity performance rate the masking effect as a 4 or a 5, whereas the responders outside Tinearity performance rate the masking effect as a 3, 4 or a 5.

However, the differences observed are not statistically significant (p=0.1838).

5.6.4 Accountability of all subjects

For the first part of the study, one subject did not fulfil the inclusion criteria due to a hearing level outside normal hearing (mild hearing loss) on both ears. For the second part of the study, no exclusions were done.

Five minor survey deviations are recorded as described in section 6.4.2.

Missing data are marked with an "x" or an "-" in the data file Doc-10730-0 Customer Survey Record - Clean File.

Raw data was recorded by the monitors on paper records. The paper records were transferred into a spread sheet by the sponsor head of QA/RA and reviewed by the independent reviewer. After completed review and corrections, the file was locked and sent to the statistician for analysis. As basis for this report, a statistical analysis report was established by the statistician.

No follow-up data is planned to be compiled.

6 Discussion and overall conclusions

The primary objective was to investigate the immediate relief (suppression, masking) effect of the Tinearity G1 device for the intended user population.

The initial hypothesis was that the indication area was equal to the device out-put performance area. During the study, all subjects with normal hearing and where the tinnitus sound could be established were included. The study included establishment of the tinnitus sound in order to support the initial hypothesis that the indication area is equal to the device out-put performance area.

This study is performed in Europe (Sweden) for the intent of marketing the device in US where the device is a prescription device, in contrast to Europe.

The results show that a masking effect is present for all the included subjects, regardless of the tinnitus pitch (frequency). With this stated, we can conclude that the initial hypothesis is confirmed. Furthermore, we can conclude that the indication area is wider than anticipated and further studies is recommended to be conducted to address the finding.

The secondary objective of this customer survey was to verify potential side-effects due to the use of white noise and bone conduction for masking of tinnitus.

The anticipation was that side effects could occur in the form of headache, dizziness and nausea due to bone conduction, worsening of tinnitus due to use of white noise and skin irritation due to the use of adhesive.

Only one of the expected side-effects were observed during the survey. One subject stated nausea graded as 3, where 1 is no discomfort and where 5 is serious side effects/discomfort. The nausea immediately disappeared after ended treatment[2].

No unexpecting side-effects were observed.

7 Investigator(s) and survey administrative structure

The survey was performed on behalf of the sponsor with below organization;

- Anneli Johansson, Sponsor
- Bengt Bern, Test leader
- Jörgen Olsson, independent reviewer
- Dragos Cruceat, Administrator
- Aylin Ågren, Clinical expert / Audiologist
- Mikael Åström, Statistician

8 APPENDIXES

8.1 Survey plan

Doc-10674-4 Tinearity G1 survey plan

8.2 Measurement equipment

During the hearing test, equipment as deified below are used;

- Audiometer: Callisto från Interacoustics
- Headphones: DD450 High Frequency Headset
- Bone conduction: B71 Bone conductor Headset

Calibration certificate from Aussco Calibration Certificate is available in appendix 1. Next calibration is planned in May 2023.

[2] This data is collected after the raw data file is locked and outside the protocol, 2023-05-16.

8.3 List of names and addresses of any third parties (such as laboratories, CROs, consultants or other contractors) that contributed to the investigation

CV for all survey members is attached as appendixes;

- Anneli Johansson, see Appendix 2
- Bengt Bern, see Appendix 3
- Jörgen Olsson, see Appendix 4
- Dragos Cruceat, see Appendix 5
- Aylin Ågren, see Appendix 6
- Mikael Åström, see Appendix 7

8.4 Tabulation of all relevant data sets

See Doc-10730-0 Customer Survey Record - Clean File.

See Doc-10732-0 Statistical Report Tinearity G1 Survey

Note. Raw data is physical available in binder “Survey 2023” in The sponsor archive. Raw data includes;

- Concession
- Audiogram including tinnitus pitch and amplitude
- Performance questioner

Or

- Safety questioner