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Cochlea Size and Shape Variation from the Russian Population and a New Cochlea Parameter for a Safe Cochlea Implant Electrode Insertion

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TITLE:

Cochlea Size and Shape Variation from the Russian Population and a New Cochlea Parameter for a Safe Cochlea Implant Electrode Insertion

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SUMMARY:

This article presents the size and shape variation of the cochlea from the Russian population. The study also reports a new cochlear parameter that defines the longest straight segment of the cochlear basal turn, with implications for safe cochlear implant electrode insertion.

ABSTRACT:

This study investigates the size and shape variation of cochleae in the Russian population. Also, introduces a new cochlear parameter that defines the longest straight segment of the basal turn, with the implication of a safe cochlear implant electrode insertion. A medical-grade, CE-marked DICOM viewer (OTOPLAN) was used to measure cochlear parameters, including A- and B-values, which define the length and width of the basal turn. The shape of the cochlear basal turn was estimated by the ratio between B-and A-values. The new cochlear parameter, I-value, defines the effective straight segment of the basal turn as the longest straight line connecting the cochlear entrance to the lateral wall at the opposite end, passing tangentially to the inner wall. Ratio between B-, and A-value determines the shape of the cochlear basal turn, with the cut-off value ≥0.75 for round-shaped and <0.75 for elliptical-shaped cochlear basal turn. CT scans of the temporal bone from 112 ears with normal inner ear anatomy were used in this study. The cochlear size of the Russian population, as measured by A-value, ranged from 8.04–10.03 mm, with a mean of 9.03 mm. The B-value ranged from 5.84–7.59 mm, with a mean of 6.70 mm. A round-shaped cochlear basal turn was observed in 48% of the population, leaving the remaining 52% of the population with an elliptical-shaped basal turn. The I-value that defines the effective

straight segment of the basal turn ranged from 6.7–9.6 mm, with an average of 8.3 mm. The trend line indicates that the I-value is approximately 0.7–0.8 mm shorter than the A-value. For the first time in the literature, cochlear size, as measured by A-value, is presented for the Russian-speaking population. The round-shaped cochlear basal turn is seen in 48% of the population. The new cochlea parameter, the I-value, is approximately 0.7–0.8 mm shorter than the A-value.

INTRODUCTION:

Cochlear Implantation (CI) is a prescribed treatment solution for several indications, including severe-to-profound hearing loss, partial deafness, asymmetric hearing loss, auditory neuropathy, and single-sided deafness[1,2]. CI electrode insertion is a key surgical step, and preservation of intra-cochlear structures during insertion has become mandatory in every CI surgery. This is because structural damage during electrode insertion has been reported to negatively affect hearing outcomes with CI[3]. Intra-cochlear structural damage is influenced by multiple factors, including electrode design and stiffness[4], insertion approach (round window vs cochleostomy)[5], insertion speed[6], surgeon's skill in handling electrode insertion[7], and anatomical variation of the inner ear[8].

Eshraghi et al. have scaled CI electrode insertion trauma into 5 different grades (0-4). Grade 0 refers to no observable damage, grade 1 refers to elevation of the basilar membrane, grade 2 refers to rupture of the basilar membrane, grade 3 refers to electrode in the scala vestibuli, and grade 4 refers to severe trauma such as fracture of the osseous spiral lamina or modiolus or tear of stria vascularis[9]. Electrode scalar deviation (ESD) is considered grade 3 trauma, well reported in the literature, with a higher rate of ESD associated with a pre-curved peri-modiolar electrode compared to a straight lateral wall electrode[10,11]. Rau et al. reported that by electrode design, a peri-modiolar electrode must be inserted inside the initial straight segment of the cochlea for a certain insertion depth before the stylet wire is pulled out to enable the electrode to curl around the modiolus wall[12]. The new peri-modiolar electrode that comes with a polymer sheath follows the same technique: it enters the initial segment of the basal turn to a certain insertion depth, then the polymer sheath is pulled out so the electrode wraps around the modiolus wall[13]. This is the reason for the Contour Advance electrode from Cochlear to have a white marker in the electrode array at channel 10 from the apical end (8.5mm from the electrode tip)[14], and the Mid-Scala electrode from Advanced Bionics LLC to have a blue marker at channel 5 from the apical end to indicate the electrode insertion depth before retracting the stylet wire[15]. In other words, these coloured markers indicate the insertion depth before the electrode tip encounters the lateral wall. Depending on the overall size variation of the cochlea, the straight segment of the basal turn will vary, and this is where the initial segment of the basal turn gains attention when it comes to the pre-curved peri-modiolar electrode.

The well-known cochlear parameters measured in the basal turn are the basal turn diameter and width, also called A- and B-values, respectively, which are useful for estimating cochlear duct length and for selecting electrode length and frequency-mapping based on cochlear size. Dhanasingh et al. reported a new cochlear parameter, the S-value, that connects the cochlear entrance to the lower end of the B-value in the straight portion of the basal turn[16]. But the S-value does not count if the straight portion of the cochlear basal turn extends beyond this point.

This motivated us to investigate the straight segment of the basal turn from the cochlear entrance and to name it a new cochlear parameter to indicate the effective straight segment for safe insertion of the CI electrode. The measurement of the straight segment of the cochlear basal turn will be a clinically useful indicator of the insertion depth at which the CI electrode tip encounters the lateral wall during electrode insertion.

PROTOCOL:

This study was approved by the local institutional review board of St. Petersburg ENT and Speech Research Institute (IRB_23_001) to access anonymized radiographs from the image database without any patient involvement. No patient was directly involved in the study by any means. The software and equipment used are listed in the **Table of Materials**.

1. Data source and inclusion criteria

Computed tomography (CT) scans of potential cochlear implant (CI) candidates with normal inner ear anatomy were included in this study. Images acquired between 2000 and 2023 were provided by the Radiology Department of the St. Petersburg ENT and Speech Research Institute. Subjects diagnosed with malformed inner ear anatomy were excluded.

2. CT image acquisition and analysis

CT images were acquired using an expert-class 64-slice helical CT scanner with 64 detector channels. The slice thickness of the acquired images ranged from 0.36 mm to 1 mm. The CT images were analyzed using the DICOM viewer, OTOPLAN version 4.0 on a desktop computer workstation. No resampling or reformatting of images was required prior to analysis.

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3. Cochlear measurement procedure

After loading the DICOM images in the DICOM viewer, the cochlea view is established by rotating the images using the crosshair feature. The A-and B-values were measured manually following the procedure described earlier by Escude et al.[17]. Briefly, the A-value is measured as the longest distance connecting the center of the round window (RW) passing through the modiolus to the lateral wall (length of the basal turn). The B-value (width of the basal turn) is measured by the straight line drawn perpendicular (90°) to the A-value connecting the lateral wall points above and below the A-value, as shown in **Figure 1B**. The steps for measuring the A-, B-, and I-values are available (see **Table of Materials**). All measurements were made by a single author (ES) supervised by another author (DA). Therefore, no intra- and or inter-rater differences were reported.

4. Determination of Cochlear shape (B/A Ratio)

Ratio between B-, and A-value determines the shape of the cochlear basal turn, with the cut-off value ≥0.75 for round-shaped and <0.75 for elliptical-shaped cochlear basal turn as first described by Khurayzi et al.[18].

5. Measurement of the I-value

I-value, the new cochlear parameter, refers to the straight segment of the cochlear basal turn. This measurement is the longest straight line connecting the center of the RW entrance to the

lateral wall at the opposite end, passing tangentially to the inner wall, as shown in **Figure 1B**. This measurement is made in the same plane as the A-and B-values.

6. Statistical analysis

Regression estimates between the I- and A-values (confidence level 0.95) were determined using the data analysis tool in Microsoft Excel for Microsoft 365 MSO (Version 2512, Build 16.0.19530.20226), 32-bit (https://www.microsoft.com/en-us/microsoft-365/excel).

RESULTS:

The data acquired is from 112 ears. Description of the data is given below:
Diameter of basal turn: A-value; Width of basal turn: B-value; Straight segment of basal turn: I-value. Of the 112 CT scans, 61 were from the left side, and 51 were from the right side. 98 ears were from bilateral CI patients, and the remaining 14 ears from unilateral CI subjects.

Basic cochlear parameters and shape of the cochlear basal turn

CT scans of the temporal bone from a total of 112 ears that were found with normal inner ear anatomy were used in this study. The cochlear size of the Russian-speaking subjects, as measured by the A-value, ranged from 8.04 mm to 10.03 mm, with a mean of 9.03 mm. The B-value ranged from 5.84 mm to 7.59 mm, with a mean of 6.70 mm. The ratio between B-and A-value ranged between 0.64 and 0.83. A round-shaped cochlear basal turn, as determined by the $B/A \geq 0.75$, was observed in 48% of the population, leaving the remaining 52% of the population to have an elliptical-shaped basal turn with $B/A < 0.75$. **Figure 2** shows two cochlear samples, with one having an elliptical-shaped basal turn (left) and the other a round-shaped basal turn (right).

I-value- The new cochlear parameter

The I-value that defines the effective straight segment of the basal turn ranged from 6.7 mm to 9.6 mm, with an average of 8.3 mm. Regression analysis between A-, and I-values showed a linear positive correlation with $r = 0.87$, as shown in **Figure 3**. The I-value is smaller than the A-value by an average of 0.77mm.

Cochlear size, as measured by the A-value, is presented for the Russian-speaking population, with 48% having a round-shaped basal turn and the remaining 52% having an elliptical-shaped basal turn. The newly presented cochlear parameter, the I-value, which is the longest distance from the center of the RW entrance to the lateral wall, passing tangentially through the inner ear, can be easily estimated from the A-value. The I-value presented in this study is potentially a useful measure during electrode insertion, as it indicates when the electrode tip reaches the outer wall at the end of the straight portion of the basal turn, to minimize the risk of electrode scalar translocation.

DATA AVAILABILITY:

Data supporting the findings of this study are provided in **Supplementary File 1**.

FIGURE AND TABLE LEGENDS:

Figure 1: Cochlear view. Cochlear view showing the basic cochlear parameters (A-and B-values) along with the effective straight portion of the basal turn (I-value) (**A**). Dissected cochlear sample showing the electrode tip of a peri-modiolar electrode penetrating the spiral ligament at the end of the straight portion of the cochlear basal turn from the scala tympani (ST) and translocating to scala vestibuli (SV) (**B**).

Figure 2: Two samples of the cochlea, one being elliptically shaped on the left and the other being round-shaped on the right.

Figure 3: Cochlear size as measured by the A-value plotted against the straight portion of the basal turn as measured by the I-value.

Supplementary File 1: Data supporting the findings of this study.

DISCUSSION:

The primary aim of this study was to investigate variation in cochlear size (length (A-value) and width (B-value)) and shape in the basal turn of the Russian population. The secondary aim was to investigate the relationship between cochlear basal turn length (A-value) and a new cochlear parameter (I-value) representing the effective straight portion of the basal turn of the cochlea. The cochlear size of the Russian population is reported for the first time in the literature, with an average of 9.03 mm and a range of 8.04–10.03 mm, which is in line with cochlear size in other populations reported in the literature[19]. From this cohort, we found that 48% of the population had round-shaped basal turns, and the remaining 52% had elliptical-shaped basal turns. The effective straight portion of the basal turn (the I-value) is found to be 8.3 mm on average. This matches very well with the 8.5 mm distance of the safety white marker from the electrode tip in the Contour Advance (peri-modiolar) electrode. However, the variation in the I-value, ranging from 6.7 mm to 9.6 mm, explains why a peri-modiolar electrode provides inhomogeneous modiolar hugging fit from case to case[20], a higher rate of scalar deviation, and tip fold-over complications[10].

One reason for reporting the I-value is to relate it to peri-modiolar electrode design; the I-value is not clinically validated as a preoperative marker for electrode selection, particularly for choosing between electrode types. Recent literature indicates that peri-modiolar electrodes have a higher rate of tip fold-over and scalar translocation than straight configuration electrodes[10,11,21]. From the peri-modiolar electrode design point of view, the electrode is inserted with the stylet wire or the polymer sheath into the straight portion of the basal turn for a defined insertion depth before the stylet wire or the polymer sheath is retracted, causing the electrode to curl around the modiolus wall[12]. The defined insertion depth is indicated by coloured markers in the intra-cochlear array part or by the length of the polymer sheath, which are fixed, whereas the length of the straight portion of the basal turn is found to vary between 6.7 mm and 9.6 mm. This can partially explain the higher rate of tip fold-over and scalar translocation associated with the peri-modiolar electrode. In cases where the straight portion of the basal turn is longer than the defined insertion depth marker, the stylet wire or polymer sheath is retracted before the natural curvature of the basal turn begins, causing tip fold-over. On the other hand, in cases where the

straight portion of the basal turn is shorter than the defined insertion depth marker in the electrode, the electrode tip with the stylet wire contacts the spiral ligament of the cochlea, increasing the risk of scalar translocation.

Dhanasingh et al. reported a new cochlear parameter, the S-value, in 2021, which is the straight-line distance from RW to the lower end of the B-value as measured in the cochlear view[13]. The S-value does not tangentially pass from the RW entrance to the lateral wall, making it shorter than the I-value introduced in the current work. Pai et al reported in 2024 that the level of the facial nerve in the posterior tympanotomy to the RW has an impact on the rate of electrode scalar translocation, mainly with peri-modiolar electrode[21]. A slightly elevated facial nerve at the RW level could result in the electrode contacting the basilar membrane, leading to electrode scalar translocation. Knowing the length of the straight portion of the basal turn from the round window entrance, as measured by both S- and I-values, and the level of the facial nerve to the RW, are useful measures to be cautious when inserting any electrode, in general, and a peri-modiolar electrode in particular. From the current study findings, the I-value does not need to be measured manually but can be estimated from the A-value using the equation:
I value = A value – 1.3.

Limitations of the current work include the lack of clinical validation of the I-value's impact on surgical outcome, particularly when using peri-modiolar electrodes. Moreover, the new cochlea parameter measured is from a very specific population and needs to be studied across different populations to determine whether the I-value is 0.7–0.8 mm shorter than the A-value, as reported in this study.

Conclusion

For the first time in the literature, cochlear size, as measured by the length of the cochlear basal turn (A-value), is presented for the Russian population. The A-value ranged between 8.04 mm and 10.03 mm with a mean value of 9.03 mm. A round-shaped cochlear basal turn is seen in 48% of the population, leaving the remaining 52% of the population with an elliptical-shaped cochlear basal turn. The new cochlea parameter, the I-value that represents the effective straight segment of the cochlea's basal turn, is shorter than the A-value by an average of 0.77 mm.

ACKNOWLEDGMENTS:

The authors acknowledge Prof. Peter Roland from Southwestern University, Texas, USA, for providing the image used in **Figure 1**.

DISCLOSURES:

No funding was specifically provided for this study. Affiliation number 2 corresponds to the R&D department of a cochlear implant manufacturer.

AUTHOR CONTRIBUTION:

SS, VK, KS, and AD conceived the study. ES performed cochlear parameter measurements under the supervision of AD. AD and SS wrote the manuscript.

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Figure 1

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Figure 2

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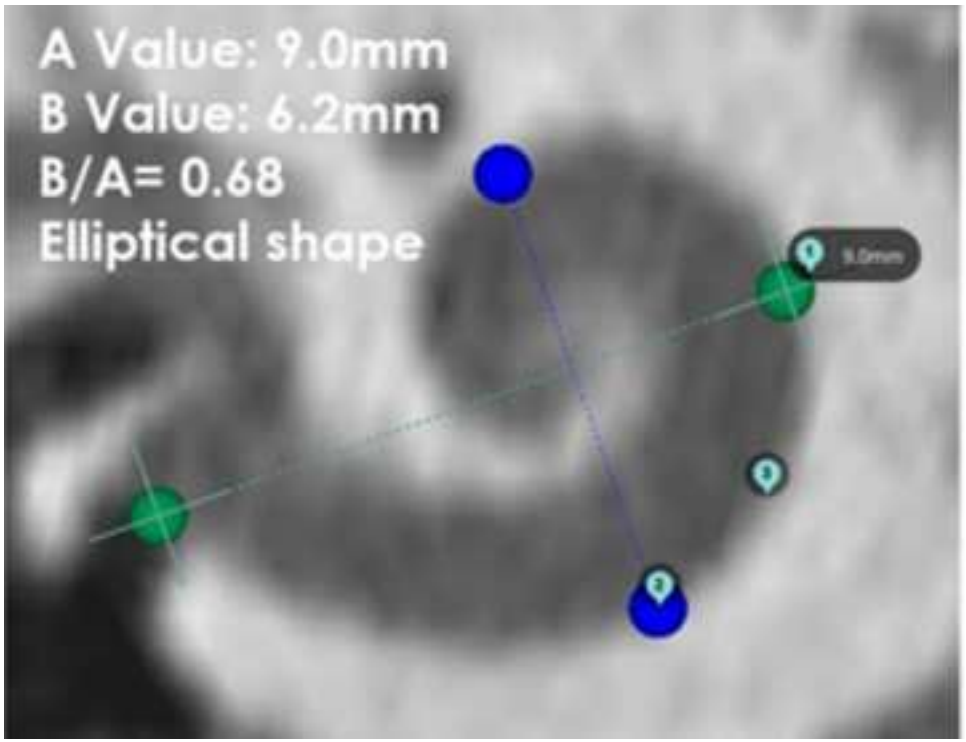

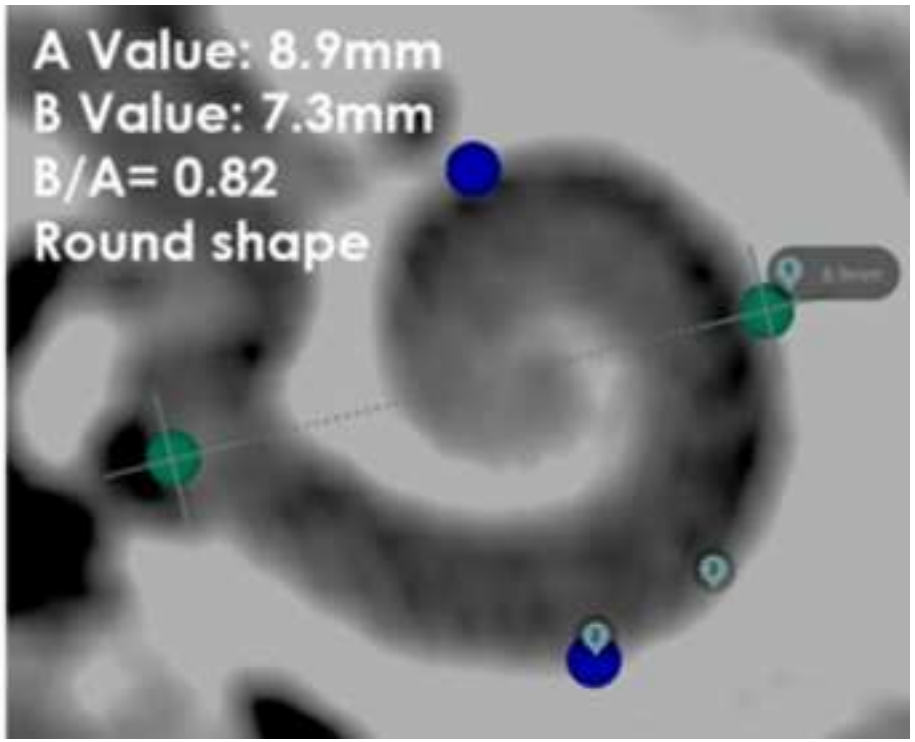

Figure 3

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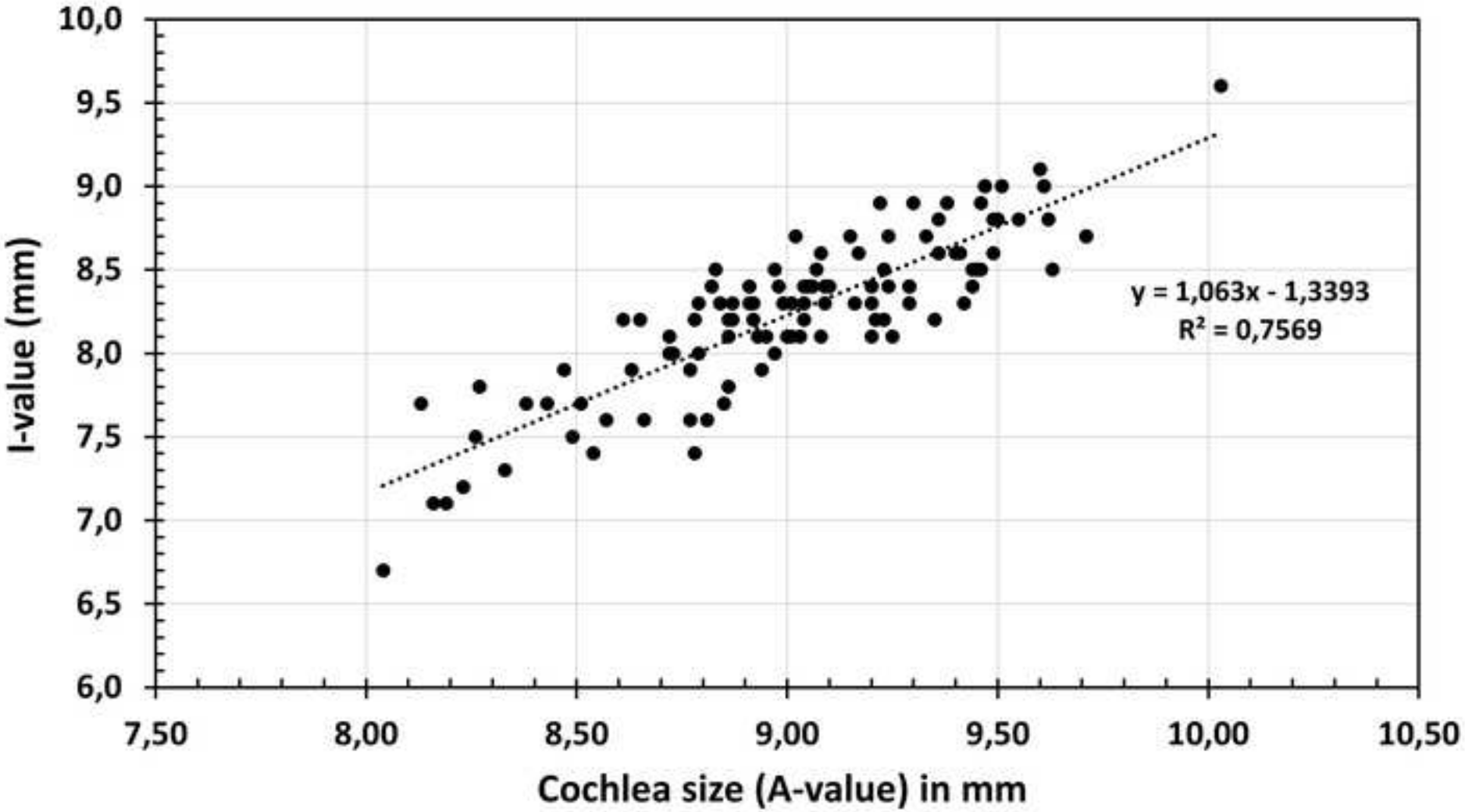

Table of Materials

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Name of Material/Equipment	Company
64-slice CT scanner (Aquilion)	Toshiba
Desktop computer workstation	N/A
Microsoft Excel (Microsoft 365)	Microsoft
OTOPLAN (version 4.0)	Cascination AG

Catalog Number	Comments/Description
N/A	64-detector helical CT system used for temporal bone imaging
N/A	Used for running OTOPLAN and image analysis
N/A	Used for statistical analysis (regression analysis; Version 2512 Build 16.0.19530.20226)
SWOTO01	CE-marked DICOM viewer used for cochlear measurements (A-, B-, and I-values)

Rebuttal letter

Dear Editorial office,

On behalf of all the authors of this manuscript, I would like to thank you and the reviewers for your valuable time taking care of, reviewing this manuscript along with providing constructive comments. We did our best to accommodate most of the suggestions. In the below section, we have mentioned our responses to all those comments and suggestions.

We sincerely hope that our work will be accepted for publication in your journal.

Best regards

Editorial comments

Please take this opportunity to thoroughly proofread the manuscript to ensure that there are no spelling or grammar issues.

Response: Thank you

2. Please include a dedicated Summary section (10–50 words) that briefly and clearly states the goal of the protocol.

Response: We have added the summary section in the revised manuscript.

3. Please ensure that the statements of the Introduction/Discussion sections are supported with adequate citations.

Response: We have now added adequate citations for statements and claims made in the introduction and discussion sections.

4. Please refrain from using any commercial term in the manuscript text. Include all commercial terms in the Table of Materials.

Response: Done

5. Please ensure that all text in the protocol section is written in the imperative tense as if telling someone how to do the technique (e.g., “Do this,” “Ensure that,” etc.). Avoid usage of phrases such as “could be,” “should be,” and “would be” throughout the Protocol. Any text that cannot be written in the imperative tense (e.g., provide extraneous details, optional steps, or recommendations) may be added as a “NOTE.” However, “NOTE”s should be concise.

Response: Since we did not submit this manuscript under the regular JOVE type article, we did our best to consider this comment. Dr Sourik Mondal mentioned that now JOVE accepts manuscripts not under protocol/experimental step based study but as regular scientific study.

6. In the protocol section, please ensure you answer the “how” question, i.e., how is the step performed? Alternatively, add references to published material specifying

how to perform the protocol action. There should be enough detail in each step to supplement the actions so that readers can easily replicate the protocol.

Response: In the revised manuscript, under the methods section, we have now elaborated how all the cochlea parameters were measured.

7. The following revisions are necessary in the Protocol section to meet journal standards:
(a) Clearly separate and label procedural subheadings.
While “Materials,” “Methods,” and subsection titles are present, they do not function as discrete procedural blocks with executable steps.
(b) Ensure each step explains how to perform the action.
Key actions (e.g., CT image analysis, orientation in OTOPLAN®, measurement of A-, B-, and C-values) are described conceptually but lack operational detail sufficient for direct execution.
(c) Provide full procedural completeness for reproducibility.
Critical details are missing, including:
• Exact criteria for CT scan inclusion/exclusion beyond “normal anatomy.”

Response: We have now added the image resolution (slice thickness) under the materials section.
• Detailed workflow for identifying landmarks (round window entrance, lateral wall, tangential inner wall).
• Explicit instructions for performing measurements within the software.
(d) Expand reagent/material and equipment detail.
The protocol does not specify imaging parameters (e.g., CT resolution, slice thickness), workstation requirements, or detailed software setup beyond naming OTOPLAN®.

Response: OTOPLAN is a well-established tool in the CI field. In this study, it is a desktop computer-based workstation.

(e) Add explicit software interaction steps.
OTOPLAN® usage lacks menu paths, tool names, button selections, or step-by-step guidance. Software-driven protocols must include actionable navigation instructions and confirm version usage consistently.

Response: As mentioned above, this work is not falling under protocol based/experiment-based study.

(f) Improve clarity and narrative flow.
The protocol reads as a condensed methods description rather than a start-to-finish procedure; steps jump from data acquisition to analysis without a clearly defined procedural sequence.
(g) Ensure protocol has a clear beginning and definitive end.
The section stops after describing regression analysis without a formal concluding step (e.g., data output, validation, or completion criteria).
(h) Confirm and standardize unit formatting.

Although generally correct, units should be reviewed to ensure consistent spacing between numbers and units throughout (e.g., “8.5 mm,” “6.7 mm”).
(i) Add intermediate checkpoints or expected outcomes.
No visual or procedural checkpoints are described (e.g., successful cochlear orientation, confirmation of correct landmark placement), which are essential for reproducibility.
8. We need the raw data. Please upload the raw data to any public repository and provide us the link or provide the raw data as a Supplementary file.

Response: We have provided a link to download the raw data.

9. Please ensure that all claims are supported with adequate data/figures.
10. Were the figures reused from any previous publication? If yes, please obtain explicit copyright permission to reuse any figures/tables from a previous publication. Explicit permission can be expressed in the form of a letter from the editor or a link to the editorial policy that allows re-prints. Please upload this information as a .doc or .docx file to your Editorial Manager account.
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Vue, Z. et al. Stories from Hmong in STEMM. Trends Genet. 39 (8), 587–592 (2023).

Response: All references are now reformatted following your instructions.

14. Please ensure that the Table of Materials includes all the supplies (reagents, chemicals, instruments, equipment, software, etc.) used in the study.
Response: Not applicable.

The editor has formatted the manuscript to match the Journal's style. Please retain it and use the attached version for revision. Please address the Reviewer’s comments, the Editorial comments and the specific comments marked in the manuscript. Also, please don't delete the Editor’s comments; instead, provide a very brief reply to each comment regarding your actions.

Reviewer 1:

1. Line 41-44: The two sentences related to aim of the paper are too long and confusing. Please simplify.

Response: The two aims of this paper are now rephrased and simplified.

2. Line 80-83: Please cite the relavant publication next to each factors not at the end.

Response: Relevant citations for each factors are now added. Please refer to page 2, lines 60-62.

3. Line 105: Please cite publications regarding A-, and B- values.

Response: Escudé, B., James, C., Deguine, O., Cochard, N., Eter, E., Fraysse, B. The size of the cochlea and predictions of insertion depth angles for cochlear implant electrodes. Audiol Neurootol. 11 (2006) Suppl 1:27-33.

4. Figure 1 requires scale

Response: The new figure 1 carries the scalar bar.

5. Figure 1 : Start with (A) and then description not other way around

Response: Thank you for this comment. Changed accordingly.

6. Line 258-259 : Rather than writing half population and remaining half popution please be specific with percentage numbers.

Response: Changed accordingly in both abstract section and in result section.

7. A separate conclusion is required.

Response: A separate conclusion is now added.

Reviewer 2.

L88ff: The statement "Electrode scalar deviation (ESD) … with higher rate of ESD associated with pre-curved peri-modiolar electrode compared to the straight lateral wall electrode" is a general claim that requires proper literature support. I suggest citing:
Jwair, S., Prins, A., Wegner, I., Stokroos, R. J., Versnel, H., & Thomeer, H. G. X. M. (2021). Scalar Translocation Comparison Between Lateral Wall and Perimodiolar Cochlear Implant Arrays - A Meta-Analysis. The Laryngoscope, 131(6), 1358-1368. https://doi.org/10.1002/lary.29224

Response: Citation 10 in the revised manuscript shows the addition as suggested by the reviewer.

L104-106: The authors should consider citing the following recent article, which demonstrated that patient-specific anatomical markers derived from preoperative Otoplan-based planning can inform the selection of the most appropriate electrode length in routine clinical practice:
Bircher B., Aebischer P., Wimmer W., Mantokoudis G., Schraivogel S., Caversaccio M., Weder S. A clinical shift toward personalized cochlear implantation: Using preoperative planning to optimize insertion depth. Am J Otolaryngol Head Neck Med Surg. 2026;47(1):104777. doi:10.1016/j.amjoto.2025.104777.
https://doi.org/10.1016/j.amjoto.2025.104777

Response: Thank you for this suggestion. However, the aim of this work is not on the selection of electrode based on cochlea parameters measured. Therefore we request the reviewer to accept our response of not adding this citation.

L163: The values of "0.7-0.8 mm" are not directly inferred from the regression line. I suggest that the authors instead report the observed difference between C- and A-values. They could write "C-value was smaller than the A-value. The median difference was xxx mm (IQR or range = yy mm)."

Response: Thank you for this useful suggestion. We have changed this in the revised manuscript.

L174: The authors state that "the C-value… can be estimated easily from the A-value." Does this imply that the C-value does not need to be measured preoperatively but can instead be estimated from the A-value? Please clarify how the C-value is intended to be used in a preoperative planning workflow in the Discussion section.

Response: Again, thank you for this useful suggestion. We have added a sentence towards the end of discussion section in the revised manuscript that the C-value can be estimated from the A-value and no need to measure it separately.

L174ff: I would suggest rephrasing "The C-value presented in this study is a useful..." to "The C-value presented in this study is potentially useful…", as the study does not provide clinical validation demonstrating that accounting for the C-value reduces scalar translocation or other risks.

Response: This is true and accommodated the suggestion provided by the reviewer.

L197: Please specify the CT scan resolution parameters (ranges of slice thickness and pixel spacing), particularly since older CT scans were included and may have lower resolution. As far as I am aware, Otoplan requires a slice thickness lower or equal to 0.65 mm and pixel spacing lower or equal to 0.55 mm for reliable automatic segmentation.

Response: We have now added the image resolution under the materials section. Manual measurement method was followed in this study.

L205ff: The geometric definition of the C-value is described, but the measurement procedure is not sufficiently detailed. To the best of my knowledge, Otoplan does not automatically compute the C-value. Was the C-value measured manually? If so, by whom, how many raters were involved, and was inter- or intra-rater reliability assessed? This information should be added explicitly to the Methods and/or Limitations section.

Response: Excellent comment. The measurement was done by a single author under the supervision of another author. Therefore, there is no inter-or intra-rater reliability assessments made.

In addition, the term "C-value" is problematic, as it has already been used to describe a different cochlear dimension in the following publication:
Khurayzi T, Almuhawas F, Alsanosi A, Abdelsamad Y, Doyle Ú, Dhanasingh A. A novel cochlear measurement that predicts inner-ear malformation. Sci Rep. 2021 Apr 1;11(1):7339. doi: 10.1038/s41598-021-86741-x. PMID: 33795738; PMCID: PMC8016924.
I therefore suggest using a different name for the newly proposed parameter.

Response: We sincerely appreciate this comment. We have now changed the C-value to I-value which is not overlapping with any of the previous reported cochlea parameters.

L254-255: In this sentence, please clarify that the "straight portion of the cochlea basal turn" refers to the newly introduced parameter which you called "C-value". For example, the sentence could be rewritten as:
"A secondary aim was to investigate the relationship between cochlear base length (A-value) and a new cochlear parameter (C-value) representing the effective straight portion of the basal turn of the cochlea."

Response: Suggestion implemented in the revised manuscript.

L271ff: The Discussion emphasizes the relevance of the C-value mainly in relation to peri-modiolar electrodes, while implications for other electrode designs are not addressed. Given that several co-authors are affiliated with a manufacturer producing only straight lateral wall electrodes, this framing may be perceived as implicitly favoring a specific electrode type. The authors should explicitly state that the **C-value is not clinically validated as a preoperative marker for electrode selection**, particularly for choosing between electrode types, to avoid overinterpretation.

Response: Thank you for this kind comment. We have added a sentence as suggested by the reviewer in the revised manuscript.

L279: Missing space between "2021" and "which"

Response: Done.

L288: The phrase "are clinically useful" is too strong given the lack of clinical validation for the newly introduced parameter. Please revise to a more cautious wording.

Response: Removed the word “clinically”
L290ff: There appears to be confusion between the previously published S-value and the newly introduced C-value throughout this paragraph. Please clarify and ensure consistent terminology.

Response: This is true. Things are rephrased with consistent terminology.

Supplementary File 1

Click here to access/download

Supplemental File (Figures, Permissions, etc.)

data for public.xlsx