

----- Forwarded message -----

От: **NEUROSURGERY Publications** <em@editorialmanager.com>

Date: ВТ, 9.01.2024 г. В 18:26

Subject: OPERATIVE NEUROSURGERY MS # ONS-D-23-00977: Editor Decision - [EMID:d1c09c425531670a]

To: Toma Spiriev <spiriev@gmail.com>

EDITORIAL DECISION

Jan 09 2024 11:26AM

RE: ONS-D-23-00977, titled "Immersive Photorealistic Three-Dimensional Neurosurgical Anatomy of the Cerebral Arteries Integrated Into Virtual Reality Study Environment"

Dear Dr Spiriev,

It is a distinct pleasure to inform you that, pending revision to address the reviewers' concerns, your manuscript has been accepted for publication in *Operative Neurosurgery*. The comments from the reviewers are provided below.

Please submit the revised manuscript via Editorial Manager by Feb 08 2024 11:59PM. To include a reminder in your personal calendar, please open the calendar event attached to this email for your convenience. If you are unable to revise within this time, please contact the Editorial Office to request an extension. A request for an extension must be submitted within 30 days of the date of this letter.

All revised manuscripts must include an itemized, point-by-point response to each reviewer, including the reviewer's original comment(s). Specify the changes made to address each of their concerns; include the changes made in the response or indicate their locations in the manuscript. Address each reviewer comment using the reviewer's number. Submit this "Response to Reviewers" as a separate document when uploading the requisite files in the system.

Please be certain to indicate all changes within the revised manuscript with either "Tracked Changes" or underlining. Revised manuscripts using strikethrough text will be returned if submitted. Deleted text should be removed or referenced in the Response to Reviewers file only.

To submit your revision, go to <http://www.editorialmanager.com/ons> and log in as an Author. Click on the menu item "Submissions Needing Revision" to obtain your submission record and begin the revision process.

Prior to resubmitting, please ensure that your revised manuscript meets the following formatting guidelines:

1. **Title Page** must contain: the full first and last names, affiliations, and degrees for each author; the corresponding author's complete contact information (mailing address, email address, telephone and fax numbers); acknowledgements; and a complete disclosure of all authors' financial support, or personal or institutional financial interests in the drugs, materials or devices described in the article.

2. **Abstract** is structured with appropriate headings as outlined in Submission Guidelines.

3. **Discussion section:** The body of the manuscript must be organized according to the reporting guideline checklist by arranging the manuscript with the defined sections and subsections that address each specific issue in the checklist.

Example:

Key results: Summarize key results with reference to study objectives.

Limitations: Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.

Interpretation: Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.

Generalizability: Discuss the generalizability (external validity) of the study results.

4. **References** must be formatted according to the *AMA Manual of Style* (10th Edition).

5. **Figures** must be TIFF or EPS files which meet the minimum resolution requirements outlined in Instructions for Authors; DOC, PPT or other file formats are not accepted. All figures must be designated GRAYSCALE (black and white) or RGB (color).

6. Please provide a **patient flow chart** if applicable.

7. **Tables** must be uploaded as individual DOC files - one table per file. They should not be included in the manuscript document. Ensure each table file includes the table title and any legends.

8. **Supplemental Content:** ensure legends are provided and each file is cited appropriately within the manuscript document.

9. All listed authors **must confirm co-authorship** by responding to an email sent out upon initial submission. If you have not yet confirmed your co-authorship the Production Editor will reach out to you prior to transmitting your manuscript to the Publisher.

*Please note: If the paper contains a Visual Abstract, minor changes will be made to the Visual Abstract to correct any grammatical and/or typographical errors, to ensure the text matches journal formatting style, and to update the bibliographic information for publication. Authors will not have a chance to review or edit the Visual Abstract after article acceptance. If corrections are required, please email us at neurosurgerypubs@cns.org as soon as possible. After publication, changes can only be made through a corrigendum or erratum.

Thank you for contributing this notable addition to academic literature through *Operative Neurosurgery*! We look forward to receiving your revised manuscript.

Sincerely,

Douglas Kondziolka, MD, MSc, FRCSC, FACS

Editor-in-Chief, **Neurosurgery Publications**

Email: neurosurgerypubs@cns.org

Phone: 847.240.2500

<http://www.editorialmanager.com/ons>

%BLINDED_USERNAME%

%BLINDED_PASSWORD%

COMMENTS TO AUTHOR:

Reviewer #1: This is a wonderful contribution and will be useful to many. Instructions for use could be more clear and more dissections with anatomical abnormalities/variants would enhance the contribution.

Reviewer #2: Comments:

The authors utilized advanced imaging software algorithms to generate a 3D virtual reality reconstruction of the brain and its vasculature. The 3D generated models are indeed useful as an educational tool and add to the provided literature.

Minor comments:

* Can the authors clarify how their contribution with mobile-phone photogrammetry differs from the number of other papers that have reported that?

* It appears that other authors have used similar VR approaches, the authors should highlight how their manuscript adds to the present literature, other than purely using a different software.

* The authors report that they have implemented some of the models with neurosurgery and neurology residents,

integrating feedback or some level of performance scores would be nice if possible.

* A flow diagram of the steps involved in generating the models would be helpful

All in all the authors provide a nice freely available 3D models of brain and vasculature anatomy with what appears to be a relatively simple and freely available tools.

OPEN ACCESS

If you would like your submission, if accepted, to be open access, please complete the following steps. Further information is available at <http://links.lww.com/LWW-ES/A48>.

1. A License to Publish (LTP) form must be completed for your submission to be made open access. Please download the form from <http://links.lww.com/LWW-ES/A49>, sign it, and submit the file as part of your revision (using the Attach Files submission step in Editorial Manager).

2. Upon acceptance of your submission, you will receive an Open Access Publication Charge letter from the Journal's Publisher, Wolters Kluwer, and within instructions on how to submit any open access charges. The email will be from no-reply@copyright.com with the subject line 'Please Submit Your Open Access Article Publication Charge(s)'. The cost for publishing an article as open access can be found at <https://wkauthorservices.editage.com/open-access/hybrid.html>

1 **Immersive Photorealistic Three-Dimensional Neurosurgical Anatomy of the Cerebral Arteries** 2 **Integrated Into Virtual Reality Study Environment**

3

4 **Abstract**

5

6 **Background & Objectives:**

7 Neurosurgeons need a profound knowledge of the surgical anatomy of the cerebral arteries to safely
8 treat patients. This is a challenge due to numerous branches, segments and tortuosity of the main
9 blood vessels that supply the brain. The objective of this paper was to create high-quality three-
10 dimensional (3D) anatomical photorealistic models based on dissections of the brain arterial
11 anatomy and to incorporate this data into a virtual reality (VR) environment.

12

13 **Methods**

14 Two formaldehyde fixed heads were used for this study. The vessels were injected with radiopaque
15 material and colored silicone and latex. Prior to the dissections the specimens were scanned by
16 computer tomography (CTA). Stratigraphical anatomical dissection of the neck and brain was
17 performed to present the relevant vascular anatomy. A simplified surface scanning method using a
18 mobile phone-based photogrammetry application was used and the data was incorporated into a VR
19 3D modelling software for post-processing and presentation.

20

21 **Results**

22

23 Fifteen detailed layered photorealistic and two CT angiography-based 3D models were generated.
24 The models allow zooming, panning or rotating the data sets in VR with sufficient photographic
25 detail of to present the structures of interest. Topographical relevant anatomical structures and
26 landmarks were annotated and uploaded for web-viewing and in VR. Despite that the VR
27 application is a dedicated 3D modeling platform it provided all necessary tools to be suitable for
28 self VR study as well as multiplayer scenarios with several participants in one immersive
29 environment.

30

31 **Conclusion**

32

33 Cerebral vascular anatomy presented with photogrammetry surface scanning method allows
34 sufficient detail to present individual vessels course and even small perforating arteries in
35 photorealistic 3D models. These features, including VR visualization, provides new teaching
36 prospects. The whole study was done with simplified algorithms and free or open-source software

37 platforms allowing creation of 3D databases especially useful in cases with limited body donor-
38 based dissection training availability.

39

40 **Keywords:** Photogrammetry, brain vascular anatomy, 3D models, augmented reality, virtual reality

41

42 **Abbreviations:**

43 ACA - anterior cerebral artery

44 A1 – precommunicating segment of anterior cerebral artery

45 A2 - infracallosal segment of anterior cerebral artery

46 A3 - precallosal segment of anterior cerebral artery

47 A4 - supracallosal segment of anterior cerebral artery

48 A5 – postcallosal segment of anterior cerebral artery

49 3D – three dimensional

50 2D – two dimensional

51 AC – anterior commissure

52 ASA - anterior spinal artery

53 AICA - anterior inferior cerebellar artery,

54 AchA - anterior choroidal artery

55 C1 – cervical segment of the internal carotid artery

56 C2 – petrous segment of the internal carotid artery

57 C3 – lacerum segment of the internal carotid artery

58 C4 – cavernous segment of the internal carotid artery

59 C5 – clinoid (presented in yellow) segment of the internal carotid artery

60 C6 – ophthalmic (presented in green) segment of the internal carotid artery

61 C7 – communicating (presented in purple) segment of the internal carotid artery

62 ChP -choroid plexus

63 CMA- callosomarginal artery

64 CN – caudate nucleus

65 CT(A)- computed tomography (angiography)

66 DSA- digital subtraction angiography

67 DSLR -digital single-lens reflex camera

68 ECA – external carotid artery

69 FPA – frontopolar artery

70 GSPN - greater superficial petrosal nerve

71 HA – Heubner’s artery