

# Implantación asistida por robot de un microelectrodo en el lóbulo occipital como prótesis visual: potenciales y aspectos técnicos

*Alessandra Rocca<sup>1,2</sup>, Artem Kuptsov<sup>1</sup>, Victor Fernandez Cornejo<sup>1</sup>, Javier Abarca-Olivas<sup>1</sup>, Pablo Gonzalez-Lopez<sup>1</sup>, Eduardo Fernandez<sup>3</sup>, Cristina Soto Sanchez<sup>3</sup>, Cristina Gomez<sup>1</sup>, Juan Nieto-Navarro<sup>1</sup>*

*<sup>1</sup> Hospital General Universitario Dr. Balmis Alicante*

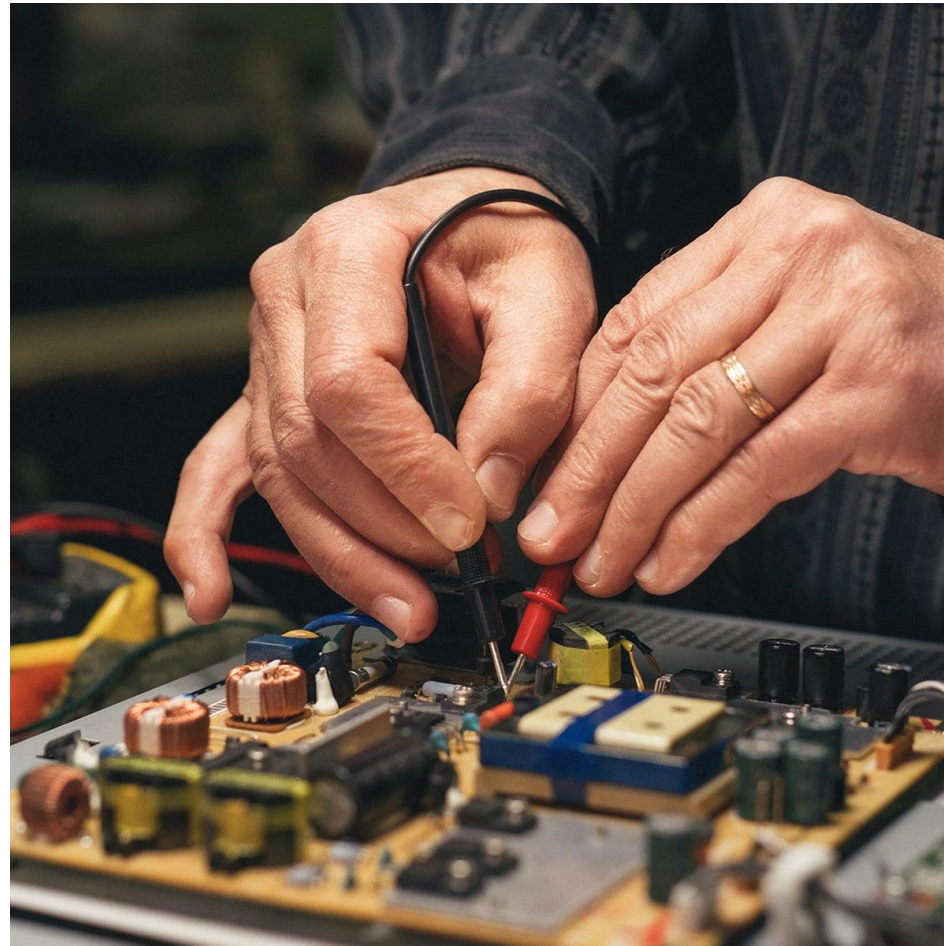
*<sup>2</sup> University of Milan-Bicocca*

*<sup>3</sup> Universitas Miguel Hernandez Elche*

# Dealing with blindness



**But if we could fix it?**



# CORTIVIS project



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## Development of a Cortical Visual Neuroprosthesis for the Blind (CORTIVIS)

The safety and scientific validity of this study is the responsibility of the study sponsor and investigators. Listing a study does not mean it has been evaluated by the U.S. Federal Government. [Know the risks and potential benefits](#) of clinical studies and talk to your health care provider before participating. Read our [disclaimer](#) for details.

ClinicalTrials.gov Identifier: NCT02983370

[Recruitment Status](#) ⓘ : Recruiting

[First Posted](#) ⓘ : December 6, 2016

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### Sponsor:

Universidad Miguel Hernandez de Elche

### Collaborator:

Hospital IMED Elche

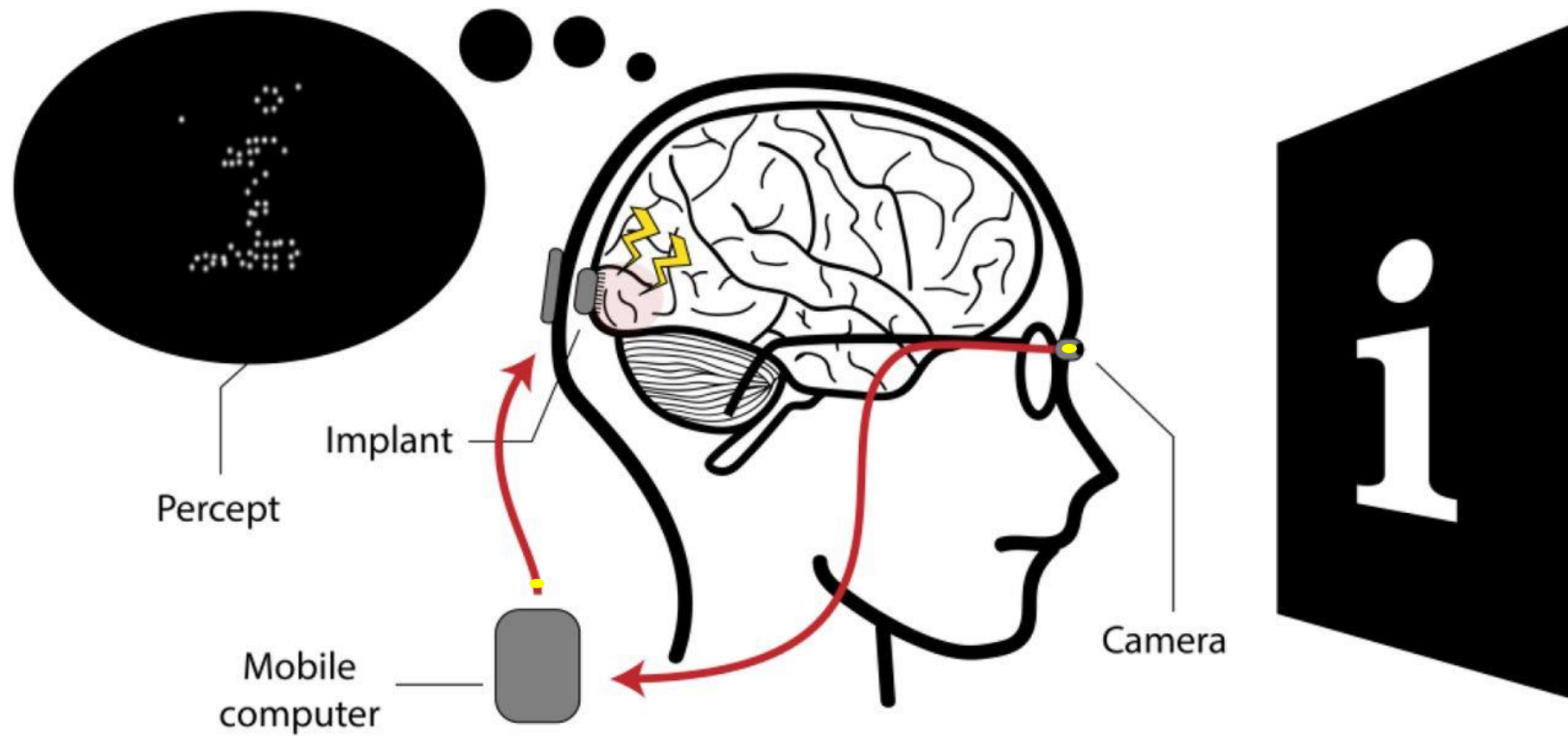
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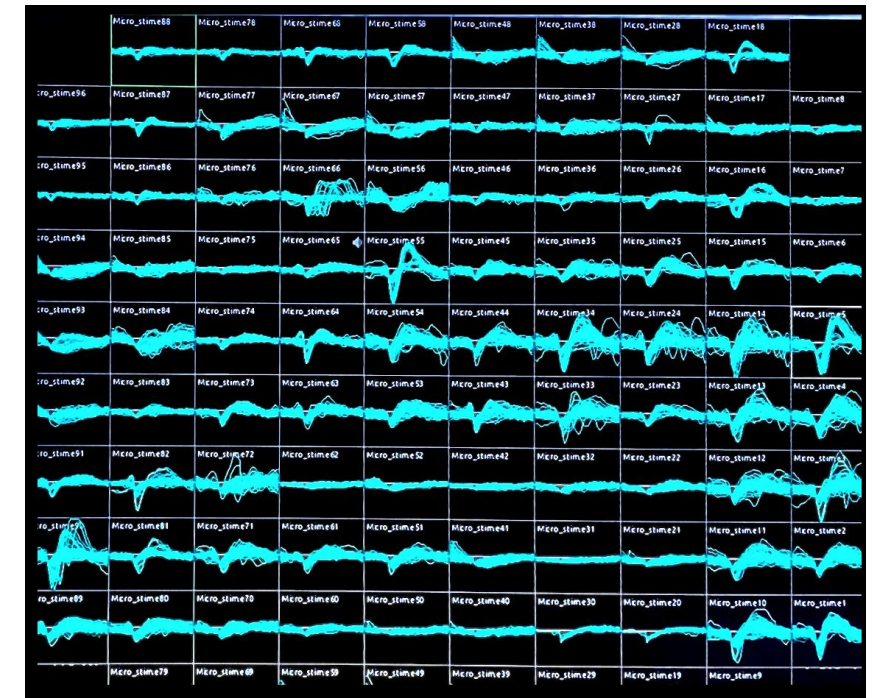
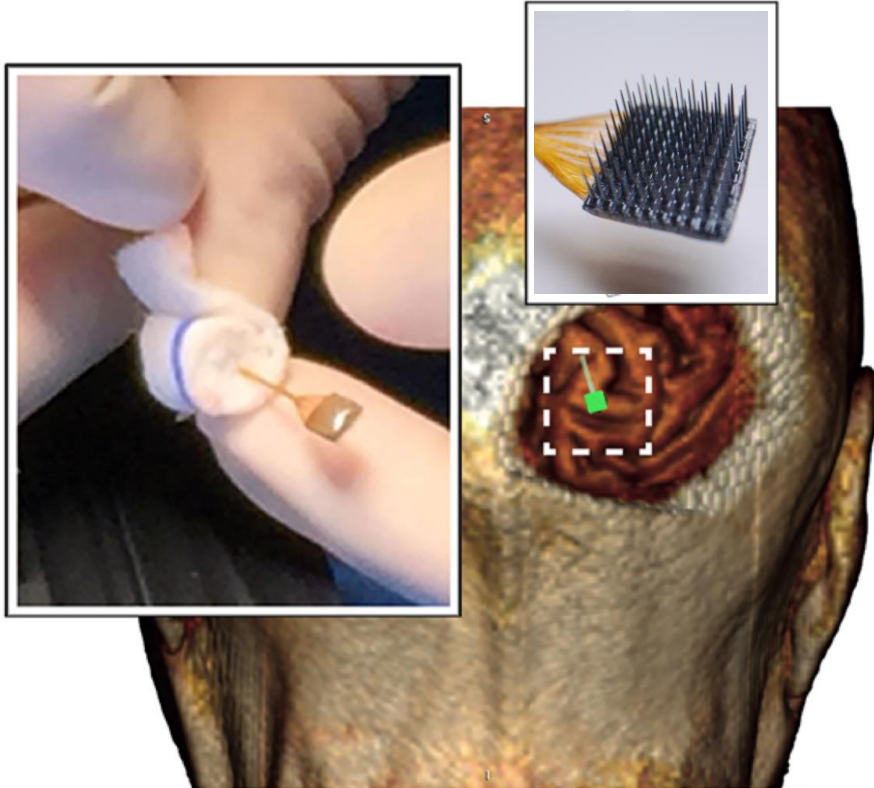




# Visual prosthesis



# Microelectrode array



# Volunteers





# Volunteers





# Volunteers



# Volunteers



# The role of neurosurgeon

JNS

TECHNICAL NOTE



## Robot-assisted implantation of a microelectrode array in the occipital lobe as a visual prosthesis: technical note

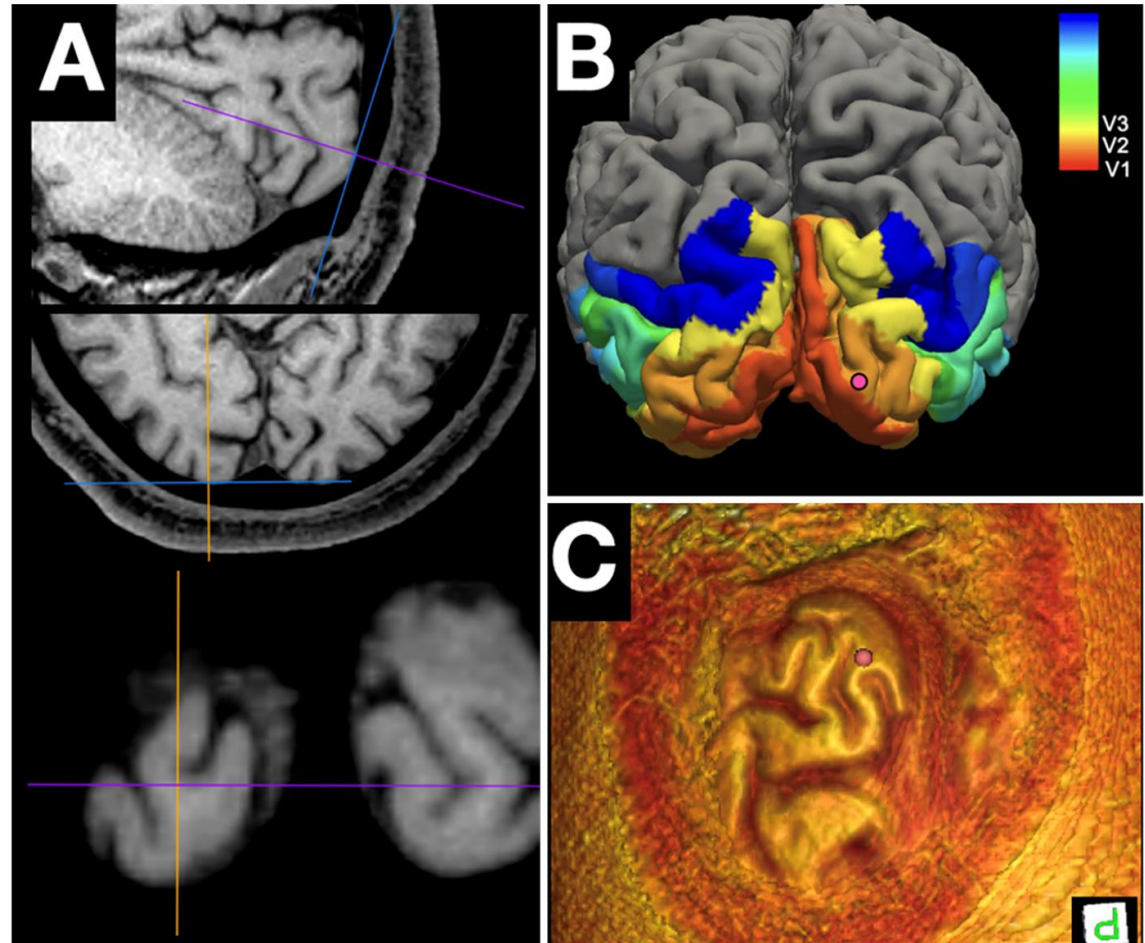
**Alessandra Rocca, MD,<sup>1,2</sup> Christian Lehner, MD,<sup>1,3</sup> Emmanuel Wafula-Wekesa, MBChB,<sup>1,4</sup> Enrique Luna, MD,<sup>6</sup> Víctor Fernández-Cornejo, MD, PhD,<sup>1</sup> Javier Abarca-Olivas, MD, PhD,<sup>1</sup> Cristina Soto-Sánchez, MD, PhD,<sup>5</sup> Eduardo Fernández-Jover, MD, PhD,<sup>5</sup> and Pablo González-López, MD, PhD<sup>1</sup>**

<sup>1</sup>Department of Neurosurgery, Alicante General University Hospital, Alicante Institute of Health and Biomedical Research (ISABIAL), Alicante, Spain; <sup>2</sup>Department of Medicine and Surgery, University of Milan Bicocca, Milan, Italy; <sup>3</sup>Department of Neurosurgery, Medical University Graz, Austria; <sup>4</sup>Department of Neurosurgery, Tenwek Hospital, Bomet, Kenya; <sup>5</sup>Instituto de Bioingeniería, University Miguel Hernández, CIBER-BBN, Elche, Alicante, Spain; and <sup>6</sup>Department of Neurosurgery, Elche General University Hospital, Alicante, Spain



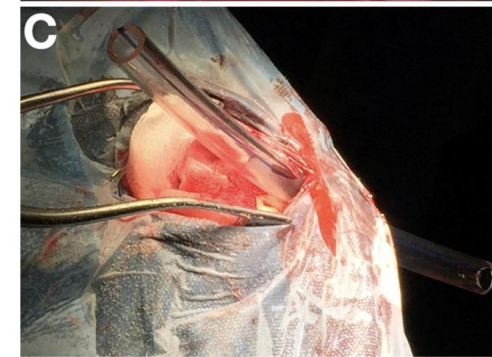
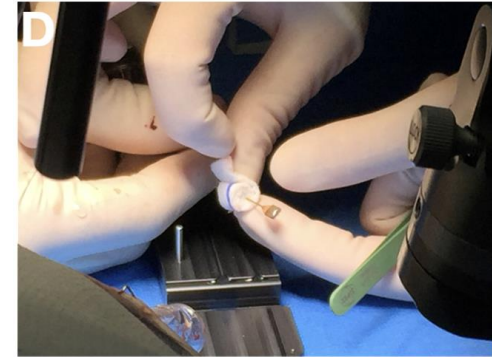
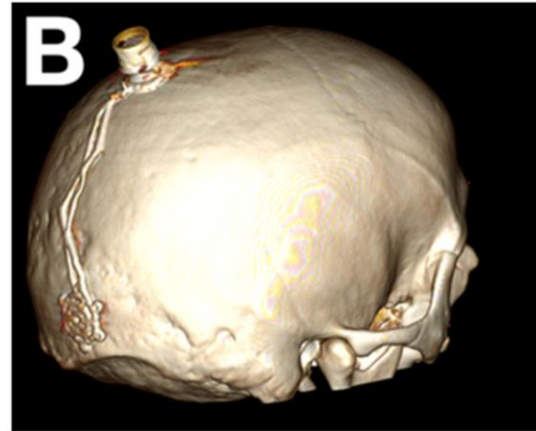
# Critical aspects...and solutions

- Preoperative planning
- Electrode handling and cable position
- Intraoperative accuracy
- Wound management



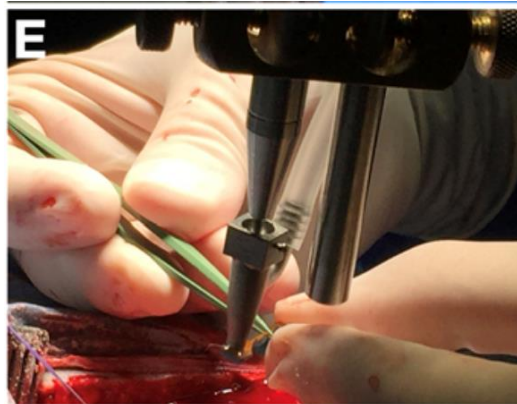
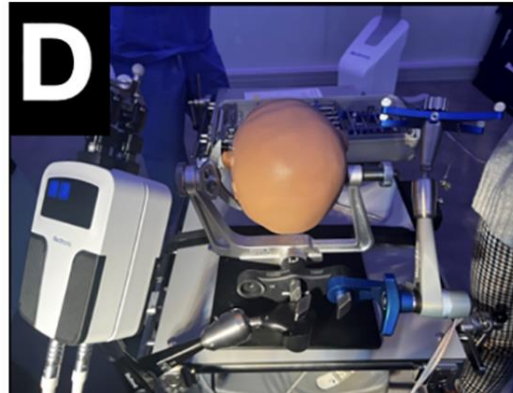
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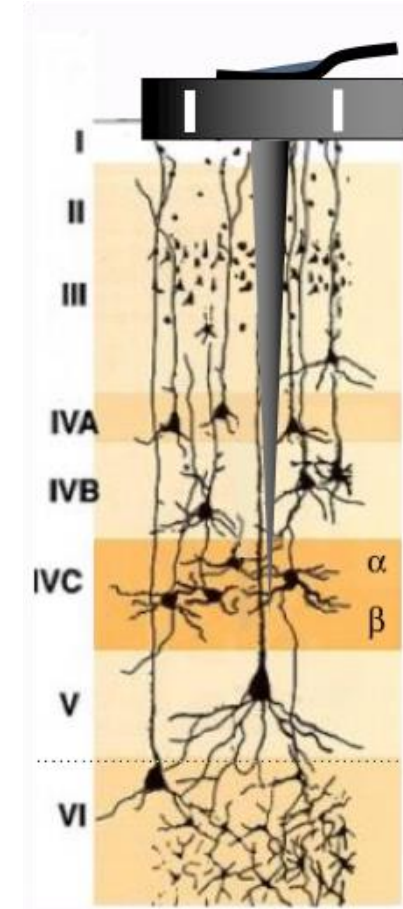
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# Critical aspects...and solutions

- Preoperative planning
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# Critical aspects...and solutions

- Preoperative planning



Small incisions

- Electrode handling and cable position



Frequent wound check

- Intraoperative accuracy

- **Wound management**



Prevention

# Volunteers

**TABLE 1. Clinical features, complications, and functional results of 3 blind volunteers**

| Variable                    | Volunteer 1                                                                                                                                                                                          | Volunteer 2                                                                                                                                                | Volunteer 3                                                                                                             |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Age (yrs)/sex               | 57/F                                                                                                                                                                                                 | 58/M                                                                                                                                                       | 61/M                                                                                                                    |
| Cause of blindness          | Irreversible bilat optic neuritis secondary to systemic infection                                                                                                                                    | Irreversible idiopathic acute bilat optic neuritis                                                                                                         | Acute bilat ischemic optic neuropathy after pituitary adenoma surgery                                                   |
| Duration of blindness (yrs) | 16                                                                                                                                                                                                   | 2                                                                                                                                                          | 5                                                                                                                       |
| Implant date                | October 2018                                                                                                                                                                                         | June 2022                                                                                                                                                  | January 2023                                                                                                            |
| Length of study             | 6 mos                                                                                                                                                                                                | 6 mos                                                                                                                                                      | 6 mos                                                                                                                   |
| Type of surgical procedure  | Neuronavigation-guided craniotomy                                                                                                                                                                    | Neuronavigation-guided craniotomy                                                                                                                          | Robot-assisted burr hole                                                                                                |
| No. of active poles         | 78/96                                                                                                                                                                                                | 57/96                                                                                                                                                      | 93/96                                                                                                                   |
| Complications               | Spontaneous phosphenes (flashing lights) w/ no obvious trigger & negative EEG; displacement of connector caused by granulation tissue, which was removed & the connector reattached to parietal bone | Spontaneous phosphenes w/ no obvious trigger & negative EEG, lasted for whole experimental stage but did not affect the different exercises                | 10-day period of mild visual hallucinations                                                                             |
| Functional achievements     | All steps successfully completed; able to discriminate colors, shapes, & letters                                                                                                                     | All steps successfully completed; able to discriminate btwn animals & humans entering room; able to establish boundaries btwn different colors on a screen | All steps successfully completed; able to walk through a city-like scenario; able to enter a room & find a given object |



# Conclusions

- Microelectrode array technology has ushered in a new era of brain-computer interface
- Visual prosthesis is a field with lot of potentials to improve life of blind people
- Cortical visual implantation requires attention to details from preoperative planning to wound management
- Study progression and scientific results pass through a good surgery

