Response to reviewers:

We greatly appreciate the reviewers’ helpful comments and suggestions. Below, please find our point-by-point responses to these comments and queries, with the editorial and reviewers’ comments appearing in italic typeface and our responses set in Times New Roman typeface.

*Editorial comments:*

*Changes to be made by the author(s) regarding the written manuscript:*

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

We used a professional English editorial service.

*2. Please revise lines 114-117 and 125-127 to avoid previously published text.*

We have revised these lines.

*3. Please provide an email address for each author.*

An email address for each author has been added.

*4. Please expand your Introduction to include the following: A clear statement of the overall goal of this method; Information that can help readers to determine if the method is appropriate for their application.*

We have revised the introduction.

*5. JoVE cannot publish manuscripts containing commercial language… Examples of commercial sounding language in your manuscript are: Cir-Tech Inc., Shizuoka,*

We have revised the relevant text.

*6. Please revise the protocol text to avoid the use of any personal pronouns (e.g., "we", "you", "our" etc.).*

*7. Please revise the protocol to contain only action items that direct the reader to do something (e.g., “Do this,” “Ensure that,” etc.)…*

In accordance with comments 6, 7, and 11, we have entirely revised the protocol text.

*8. Please add more details to your protocol step. There should be enough detail in each step to supplement the actions seen in the video so that viewers can easily replicate the protocol. 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. See examples below:*

*1.1: Obtain MRI on what animals and how? Please specify.*

We have specified what animals were used, but further details are beyond the scope of our protocol.

*1.2.3: Which gas is used to sterilize and how? Please specify.*

We specified which gas was used (Line 92), but further details are beyond the scope of our protocol.

*1.3: Please specify how to sterilize instruments. Please reference Table of Materials for all instrument used.*

We have referred to the Table of Materials and have now specified sterilization methods for each instrument.

*2.1.1: How is ketamine given to the marmoset? Also please specify the age and gender of marmoset used.*

Ketamine was administered by an intramuscular injection. This information has been added. We have also specified the age, sex, and body weight of marmosets used (Line 70-71).

*2.1.2: Please mention how proper anesthetization is confirmed.*

Proper anesthetization is confirmed using body temperature, heart rate, and arterial blood oxygen saturation (SpO2). We have added this information.

*2.1.3: What is used to rinse/remove the cream?*

We have now specified what we used.

*2.1.6: How to disinfect the surgical area?*

We have now specified how to disinfect the surgical area.

*2.2.1: How large is the incision? Please specify the surgical instrument used in this step. Please write all text in the imperative tense.*

We have specified the size of the incision and have revised our description of this step.

*2.2.6: What is used to wash?*

This has now been specified.

*2.3.2: How to keep the animal warm, using a blanket?*

We used a heat pad; however, a blanket is also acceptable. We do not believe that an apparatus needs to be specified in this step.

*2.3.4: What is SPO2?*

SpO2 is arterial blood oxygen saturation (Line 111).

*9. 3.4.2-3.4.4: If the authors plan to film these software steps, they must be more explicitly explained (e.g. button clicks for software actions, numerical values for settings, etc.).*

We do not plan to film these steps.

*10. What happens to the animal after the procedure? Do the electrodes stay in their head?*

Yes, “chronic implantation” means the electrodes stay in their head.

*11. Please combine some of the shorter Protocol steps so that individual steps contain 2-3 actions and maximum of 4 sentences per step.*

In accordance with comments 6, 7, and 11, we have revised the protocol text entirely.

*12. Please include single-line spaces between all paragraphs, headings, steps, etc.*

We have corrected this.

*13. After you have made all the recommended changes to your protocol (listed above), please highlight 2.75 pages or less of the Protocol (including headings and spacing) that identifies the essential steps of the protocol for the video, i.e., the steps that should be visualized to tell the most cohesive story of the Protocol.*

*14. Please highlight complete sentences (not parts of sentences). Please ensure that the highlighted part of the step includes at least one action that is written in imperative tense. Please do not highlight any steps describing anesthetization and euthanasia.*

*15. Please include all relevant details that are required to perform the step in the highlighting. For example: If step 2.5 is highlighted for filming and the details of how to perform the step are given in steps 2.5.1 and 2.5.2, then the sub-steps where the details are provided must be highlighted.*

In accordance with comments 13–15, we have highlighted the protocol for this video.

*16. Table 1: Please change “mins” to “min” for the time unit.*

We have revised “mins” to “min.”

*17. Figure 2: Please avoid handwriting. The labels may be difficult to read for some readers.*

We avoided handwriting labels in Figure 2.

*18. References: Please do not abbreviate journal titles.*

This has been corrected.

*Reviewers’ comments:*

*Reviewer#1:*

*Major Concerns:*

*The paper is really short, and needs to be improved in terms of outlining a motivation for establishing a protocol for epidural EcoG in the marmoset. It lacks statistics (I have listed a few suggestions in my detailed comments below)*

We revised the introduction and discussion sections to explain our motivation for establishing a protocol for epidural ECoG in the marmoset. We have also added some statistics.

*Minor Concerns:*

*Needs a careful English revision*

We have used a professional English editorial service.

*Specific points:*

*1.2.2 Is "acryl" acrylic? I would like to see some expansion of the explanation of why there is a risk of blood inflow, where, and in which circumstances. The sentence as it stands is unclear (in terms of someone "visualising" what to do, and why this is important).*

We changed the description in Line 90-91 to “Seal gaps of connector by acrylic glue to prevent the inflow of liquid during surgery.”

*1.2.3 How do you gas sterilise (how long, using what, etc.)*

We used ethylene oxide gas. We have added this information (Line 92).

*2. NOTE: The animals are not "required to abstain", the food is withdrawn.*

This has been corrected.

*2.1.1 ketamine is not a muscle relaxant, but an anaesthetic. Perhaps "anesthetize" or "heavily sedate" (this depends on the species and dose), but not "immobilize".*

We changed “immobilize” to “induce anesthesia.”

*2.2.1 Temporal muscle (note: muscles) are removed from skull. Do you mean removed from skull (i.e. do you cut them off) or "detached from the skull" (i.e. just separated, but left intact). In general, this paragraph needs some English revisions.*

We changed “removed from skull” to “detached from the skull.”

*2.2.3 is very hard to visualise without a video, or a series of photos. This seems to be an important step but I can't comment.*

*2.2.4 do you mean "orbitofrontal"?*

Yes, this has been corrected.

*2.2.6 I am not sure what is meant by "remove bone tips". This seems like an English error, but I can't suggest an alternative without seeing the video.*

We meant make the edge of the craniotomy area smooth by “removing bone tips.” However, we realize the same things is mentioned later, thus, we have removed the phrase “remove bone tips.”

*2.2.9 unclear what this sentence means: "If a cause of the bending is small size of the brain compared with ECoG array, cut some of electrodes". Consider re-phrasing for clarity.*

We re-phrased this to read: “If the bending was caused by the relatively small size of the brain, cut off some of the electrodes.”

*2.2.11 "episkull" is not a word (mixes Greek and English). Epicranial, or simply "on the cranial surface".*

The term “episkull” has been revised to “on the cranial surface.” (Line 170)

*3.3 It would be useful to know some statistics. Out of how many experiments done, how many animals experience complications requiring further surgery.*

We have implanted the array into 6 animals, and 3 of the animals required further surgery. We have now included these statistics.

*Discussion:*

*- The table with surgery time would benefit from some statistics. For n surgeries, what is the average time to reach these steps, and the SD. Maybe consider time zero being "start preparations".*

We added the number of surgeries (lines 70-71). We did not change the table because this is just an example plan of a surgery. We have now stated that the table is a recommended time course.

*- "We successfully recorded neuronal signals with good quality at least for 4 months" - again, some statistics required.*

We have added details.

*- Has some comparison been made between epidural and subdural array implantations, and if not what are the advantages and disadvantages? The second approach seems to be required in order for arrays to cover the midline (cingulate) cortex, or cortex within a sulcus.*

We have added the following description. “ECoG arrays are typically implanted in the subdural space in humans and macaques. However, less-invasive epidural implantations are more suited to marmosets, because they are delicate animal. The thin dura matter of marmosets allowed us to monitor high-frequency brain signals, even if the ECoG array was implanted on the dura. One of the disadvantages of epidural implantation is the difficulty of accessing the midline cortex and the cortex within a sulcus. Approach of these cortices require incision of the dura matter.”

*General points:*

*- This paper is a bit slim in terms of references. We are shown brain maps in the figures but the legends are minimal. The cortical map shown in the figures seems to be the Woodward 3-d version of the Paxinos cytoarchitectural map (the areas seem to follow the Paxinos scheme). This should be stated.*

The atlas used in the manuscript is the Woodward 3D version based on the Hashikawa atlas (Hashikawa et al. 2015), which is a MRI-cytoarchitectural map. The annotation of this atlas indeed follows that of the Paxinos cytoarchitectural map, as the reviewer noted. We have added these statements and the reference in the legend of Figure 3.

*- An introduction covering more of the motivation for studying the marmoset would make this paper more appealing to a wider audience. For example, it is unclear form the text that the visual, somatosensory, dorsolateral prefrontal, orbitofrontal, etc. cortical areas of this species have been mapped, and what is known about them that makes this species useful. What we get is a blanket statement and 4 references, which seem to be selected randomly. For example, 2 of the 4 references are to auditory papers, including one (number 7), which hardly talks about marmosets at all.*

We have revised the statement about advantages of marmosets in the introduction section and references (Line 56-63).

*- The discussion could also make a stronger case for the relevance of this procedure by mentioning specific issues in the literature, which could be solved by application of this method.*

We have added the relevance of this procedure in the discussion section (line 299-302).

*There are minor English errors throughout, which should be attended to before publication. For example (among others)*

*- "array consists of two sheet with 32…" (two sheets)* This has been corrected.

*- "monitored by vital signs" (for vital signs)* This has been corrected.

*- "should be totally rinsed on a skin" (off the skin)* This has been corrected.

*- "The both contacts face to skull" (maybe? Both contacts face the skull?)* This has been corrected.

*- "Resister marmoset brain atlas" (register)* This has been corrected.

*- "To success implantations, critical steps in our protocol is the same of the basics of surgical…" (not sure what is meant here)* This has been removed.

*- "Outocrave" is not a word - autoclave. Other spelling errors: spatura, manipurator.* This has been corrected.

*Reviewer#2:*

*Major Concerns:*

*In implantation procedures, authors made a plan for craniotomy and for design of the electrode array as shown in figure 2. However, this information is needed to scan the animal's head.*

An MRI scan is needed before the surgery. We described this in 1.1.

*Minor Concerns:*

*The authors used animal and monkey. The reviewer recommend to use one word for the same subject.*

We have changed the term “monkey” to “animal.”

*Reviewer#3:*

*Line 22 and 30 "… entire lateral surface …" should be "entire dorsal surface."*

Our array covers not only the dorsal surface but also the ventral surface. Thus, we used the term “lateral surface” rather than “dorsal surface.”

*Line 71 to 73, the layout of the ECoG array is not described. To successfully cover a full hemisphere of a marmoset cortex, is it necessary to consider individual differences in brain size? Are the reference and grounding electrodes from the array facing the same side as the ECoG electrodes or not? In my opinion, these information about the design is as important as the detailed procedure for implantation in order to lead the readers having their own success if they try to use this manuscript as a guideline.*

We have added the following explanation regarding the layout of the ECoG array. “To accommodate individual difference of brain size, the ECoG array has a flexible arm. The arm can cover the temporal pole, depending on individual brain shape. Place reference electrodes facing the opposite side to the ECoG electrodes, and the ground electrodes facing the same side.” (Line 85-88).

*Line 77, is the sealing acryl dental acrylic?*

We changed “acryl” to “acrylic glue”.

*Line 128, they mentioned the bone piece will be returned after implanting the array. But until the end of the procedure, I didn't find any other sentence mentioning when and how they keep the bone during the surgery and put the bone piece back.*

We have added the instruction “Put the bone piece back” (Line 173).

*Line 141, they mentioned where the reference electrodes are placed in the other hemisphere, however, in Line 157, the reference electrodes were then facing the skull according to their protocol. It does not make sense. Thus, there is a small contradiction. Please clarify.*

The reference electrodes are placed on the other hemisphere and their contacts face toward the skull. To clarify this, we changed “placed at the contra-lateral…” to “placed in the epidural space at the contra-lateral…” (Line 155).

*Line 156, are the grounding electrodes facing skull with or without being fixed? If with, how did they fix the electrodes onto the skull. I believe they should be fixed, otherwise if there is any loose of contact to grounding, one might get artifact in the recorded data.*

As you have mentioned, the ground electrodes were fixed onto the skull with dental acrylic. We have added this information (Line 169).

*Line 188 to 191, how to remove the blood clot when there is already an ECoG implanted needs to be further illustrated or at least described more in detail. Marmosets are delicate animal. The post-op treatments are especially important. To further illustrate this procedure will help readers to perform better in their own experiments when using the same technique.*

We have added an explanation as to how to remove the blood clot (Line 208-210).

*Line 225 "… and thick block lines indicate …." Base on their figure and also the texts, I believe it should be "black lines."*

We have corrected “block” to “black.”

*In the Discussion section, the limitation of using ECoG array should be mentioned briefly. Because these are surface electrodes, it is difficult to pin down the specific signal source in cortical depth. Also, the current ECoG array, although covering as large as the technic allows, there are still several cortical areas in the medial and ventral sides that may be important in coordinating cognitive behavior but cannot be accessed with the current method.*

We have added a section regarding the limitations of using an ECoG array, and the current method, to the discussion (Line 293-298).

*Figure 2, 3, and 4, the resolution of the figures seems to be low. Please replace with higher quality images, if possible.*

We have replaced the figures with higher resolution versions.

Thank you again for all your comments and suggestions. We hope we have adequately addressed all the points and question raised by the reviewers.