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PRESS RELEASE（2018/11/20）

Bright multicolor labeling of neuronal circuit in transparent brains

The research group led by Prof. Takeshi Imai, including Richi Sakaguchi, and Dr. Marcus Leiwe from the Graduate School of Medical Sciences, Kyushu University reported an improved method to label numerous neurons in different colors, which facilitates studies in neuronal wiring.

Our brains are made up of densely packed neuronal circuits that consist of numerous neurons. To be able to see all the different neurons, some scientists have developed a multicolor labeling system that labels individual neurons with different fluorescent colors. However, the brightness of the previous multicolor labelling methods has been insufficient. In this study Prof. Imai's team developed a multicolor labelling method named Tetbow with a significantly improved brightness. They labelled neurons with Tetbow, and then made the brain sample "transparent" using the SeeDB2 solution developed previously by the same group. In this way, they could successfully visualize the wiring patterns of numerous neurons at a large scale in 3D. For example, they visualized the complicated dendrite wiring of mitral cells in the mouse olfactory bulb, and they also successfully traced axons along a distance of several millimeters in the brain. This new tool may facilitate studies in neuronal wiring, including circuit-based understanding of neuronal functions, development, and neuropsychiatric diseases.

This study was supported by Brain/MINDS project of AMED and JSPS KAKENHI (JP17H06261, JP16H06456, JP16K14568, JP15H05572, JP15K14336, JP17K14946). A part of this study was performed in RIKEN. This work was published online in an open-access journal, eLife, on Nov 20, 2018.

For more information about this research, see Bright multicolor labeling of neuronal circuits with fluorescent proteins and chemical tags.
Sakaguchi, Leiwe, and Imai
eLife
DOI: https://doi.org/10.7554/eLife.40350

Comments from authors:
Enjoy the beauty of neuronal circuits visualized with Tetbow!

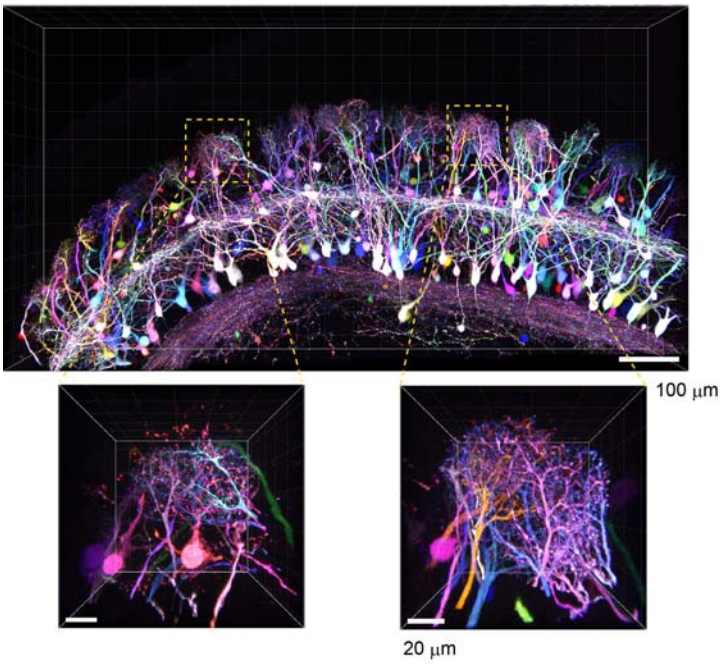

Figure 1
Tetbow visualized complicated wiring patterns of mitral cell dendrites in the mouse olfactory bulb.

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Additional images:

Figure 2. Cerebral cortex

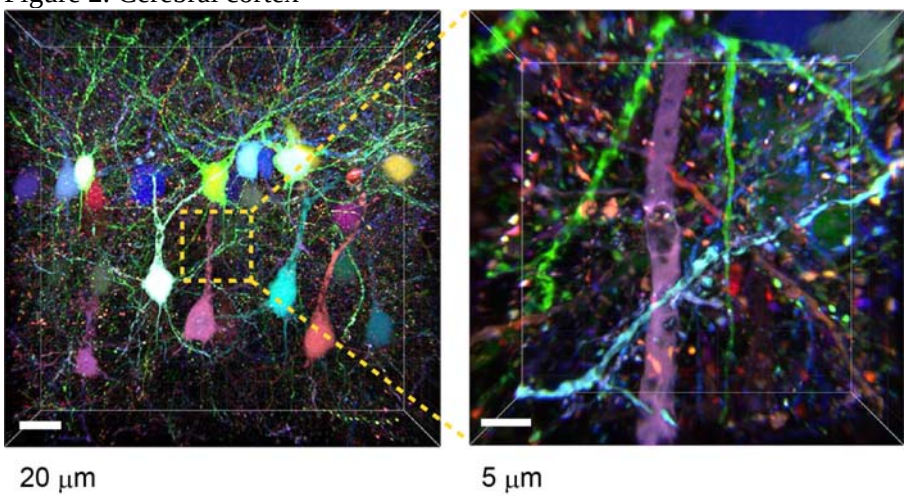


Figure 3. High magnification images of the cerebral cortex.

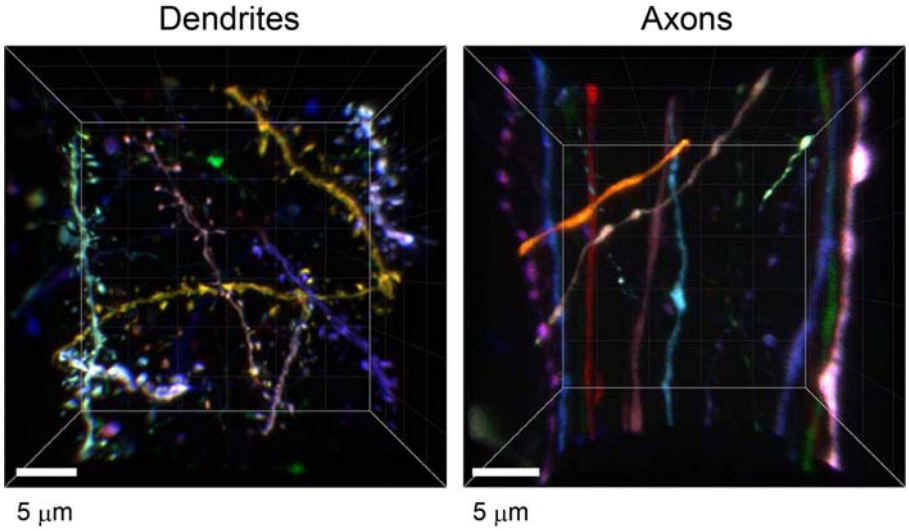
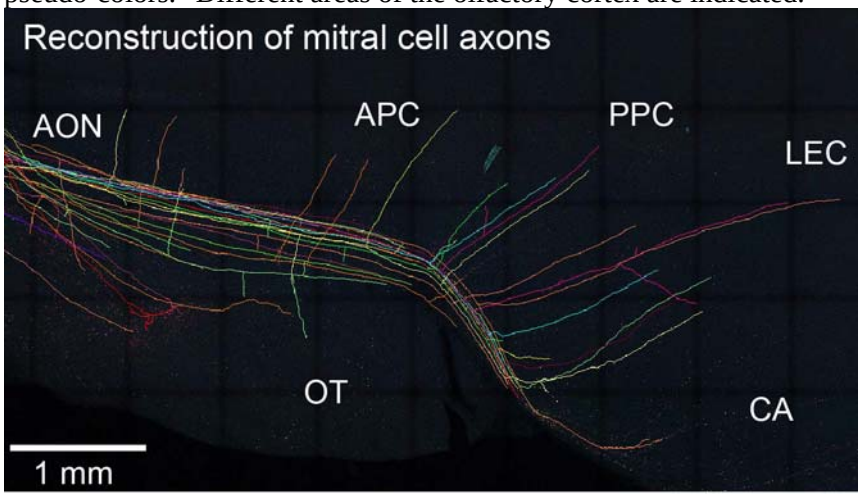


Figure 4. Axons of mitral cells. We traced axons along several millimeters. Traced axons are shown in pseudo-colors. Different areas of the olfactory cortex are indicated.



Link to YouTube movies:
[Movie 1] Dendrite wiring of mitral cells visualized with Tetbow
[Movie 2] Axon Projections of Mitral Cells visualized with Tetbow

[Movie 3] Cortical circuits visualized with Tetbow
[Movie 4] Close-up views of dendrites and dendritic spines visualized with Tetbow
[Movie 1-4] Playlist
https://www.youtube.com/playlist?list=PLVhByfY_xuBILSXlDmonncO1oFGUhf6d_