IN BRIEF

NEUROSCIENCE

Optogenetics in the marmoset brain

Ebina, T. et al. *PNAS* **116,** 22844–22850 (2019)

Optogenetics is now widely used for investigating the neural underpinnings of behavior. However, optogenetic stimulation has yet failed to induce or modulate any limb movements in nonhuman primates. A new study published in *PNAS* describes an improved method of optogenetic cortical stimulation in marmosets using adeno-associated viruses with a tetracycline-inducible gene expression system carrying CaMKII promoter and a Channelrhodopsin-2 variant with fast kinetics. Forelimb movements could be induced when Channelrhodopsin-2-expressing neurons in the motor cortex were illuminated by blue laser light through a cranial window. This method could be used to gain a better understanding of the motor circuits that are involved in learning or affected after brain injury. *ALB*

https://doi.org/10.1038/s41684-019-0451-2

PHARMACOTHERAPY

Local drug delivery to brain tumor

Lee, J. et al. *Nat. Commun.* **10**, 5205 (2019)

Intravenous chemotherapies are often unsuccessful in patients with brain tumors because the blood–brain barrier prevents efficient drug delivery. Devices that can be implanted in the brain to deliver drugs after tumor resection are under investigation and have shown promising results. A study now describes a flexible and biodegradable drug-loaded patch integrated with wireless electronics that provides spatial and temporal control of drug delivery to the brain. Using the human xenograft glioblastoma model in nude mice, the investigators showed that tumor recurrence and survival were respectively decreased and increased in mice treated with the doxorubicin-loaded patch after tumor resection compared with control groups. In vivo therapeutic efficacy was also confirmed in a glioblastoma canine model, supporting the potential application of this device in patients. *ALB*

https://doi.org/10.1038/s41684-019-0453-0

TRANSCRIPTOMICS

Atlas of the fly larval brain

Brunet Avalos, C. et al. *Elife* **8**, pii: e50354 (2019)

The brain is composed of different cell types that drive many complex behaviors. The simplicity of the *Drosophila* larva makes it an ideal candidate to explore the different brain-cell types and understand their functions. Using a single-cell RNA sequencing approach, a new study established a molecular cell atlas of the first instar larval brain and identified five major cell groups—neural progenitors, differentiated neurons, glia, undifferentiated neurons and non-neural cells. Three major classes of neural progenitor cells (neuroblasts, optic lobe precursors and mushroom body neuroblasts) were also identified. This transcriptomic analysis extends the list of marker genes previously described for each brain-cell type, making the atlas a useful tool for future developmental or functional studies. *ALB*

https://doi.org/10.1038/s41684-019-0452-1

REGENERATIVE MEDICINE

Generating lungs

Mori, M. et al. *Nat. Med.* **25**, 1691–1698 (2019)

Lung transplantation is the only option to treat chronic obstructive pulmonary disease, but many patients cannot receive this treatment due to a shortage of suitable donor organs. Several studies have attempted to generate lungs from pluripotent stem cells (PSCs), but these have been hampered by the difficulty to recreate the structural and functional complexity of the lung in vitro. Using a blastocyste complementation approach, a team of investigators from Columbia University Irving Medical Center, New York was able to rescue lung formation in genetically defective recipient mouse embryos that cannot develop functional lungs by transplanting wild-type PSCs previously cultured in specific conditions. Further work will determine if these results can be translated into larger animal models. *ALB*

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