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research highlights

IN BRIEF

NEURODEGENERATIVE DISEASE

A new imaging marker for MS

Fleischer, V., Gonzalez-Escamilla, G. et al. *PNAS* **118**, e2025000118 (2021)

The choroid plexus (CP) – a thin structure that lines the cerebral ventricles and forms a barrier between the blood and the cerebrospinal fluid – is essential for CNS homeostasis. Increasing studies have implicated CP in diseases, including multiple sclerosis (MS), a chronic condition characterized by immune cell infiltration, demyelination and neuroaxonal degeneration.

Using high-resolution MRI, researchers showed that CP was enlarged in two cohorts of patients with MS and in two experimental mouse models (the cuprizone mouse model and the experimental autoimmune encephalomyelitis) compared with healthy controls. In both species, CP volumes correlated with functional impairments, demonstrating that enlarged CP is a promising interspecies marker for monitoring neuroinflammation and disease pathology in MS *ALB*

https://doi.org/10.1038/s41684-021-00880-2

VIROLOGY

Monitoring SARS-CoV-2 infection with reporter viruses

Ye, C. et al. *PNAS* **118**, e2111593118 (2021)

Investigators at Texas Biomed generated recombinant SARS-CoV-2 expressing a fluorescent or bioluminescent reporter that allowed them to track the virus in a mouse model of SARS-CoV-2 infection.

Previous reporter-expressing SARS-CoV-2 – genetically engineered by substituting the viral open reading frame 7a protein with a reporter gene – showed insufficient expression level of reporter genes. Here, Ye and colleagues cloned the reporter genes upstream of the SARS-CoV-2 nucleocapsid gene, without deleting any viral gene. The higher signal obtained using this strategy resulted in efficient detection of viral infection in the lungs of infected K18 human angiotensin converting enzyme 2 (hACE2) transgenic mice using an in vivo imaging system. *ALB*

https://doi.org/10.1038/s41684-021-00882-0

CIRCADIAN RHYTHMS

Rhythmic RNA expression in astrocytes

You, S. et al. *PLoS Genet*. **17**, e1009790 (2021)

Accumulating evidence indicates that astrocytes cooperate with neurons in the brain to mediate circadian control of many processes, but few studies have characterized the 'astrocytic circadian clock'.

Investigators from Tufts University School of Medicine employed a Translating Ribosome Affinity Purification (TRAP) method to isolate ribosome-associated RNAs in the astrocytes of adult *Drosophila* brains collected in four-hour intervals during the first 48 hours of constant darkness after entrainment to a regular 12 hr:12 hr light-dark schedule. RNAs were processed for sequencing and analysis identified 293 'cycling genes', most with mammalian orthologs. A series of RNAi-based screens also showed that several astrocytic genes were required for normal sleep patterns. *ALB*

https://doi.org/10.1038/s41684-021-00881-1

NEUROSCIENCE

Off-target effects of optogenetics

Andrei, A.R. et al. *eLife* **10**, e66400 (2021)

Optogenetic tools are valuable for manipulating neurons with high spatial and temporal precision and investigating the link between neuronal circuits and behavior. Optogenetics is a commonplace in rodents and has been adapted to be used in nonhuman primates (NHPs), but challenges remain to expand the use of optogenetic techniques in NHP-based neuroscience research.

In a new study, researchers show that optogenetically inactivating neurons in the superficial layers of the monkey primary visual cortex (V1) induces suppression at the light-targeted site, but also results in complex activity changes in neurons outside the targeted inactivation zone. These off-target effects should be considered when interpreting behavioral results in NHP experiments with optogenetic suppression. *ALB*

https://doi.org/10.1038/s41684-021-00883-z