

MicroRNA-137-loaded lipid nanoparticles regulate synaptic proteins in the prefrontal cortex

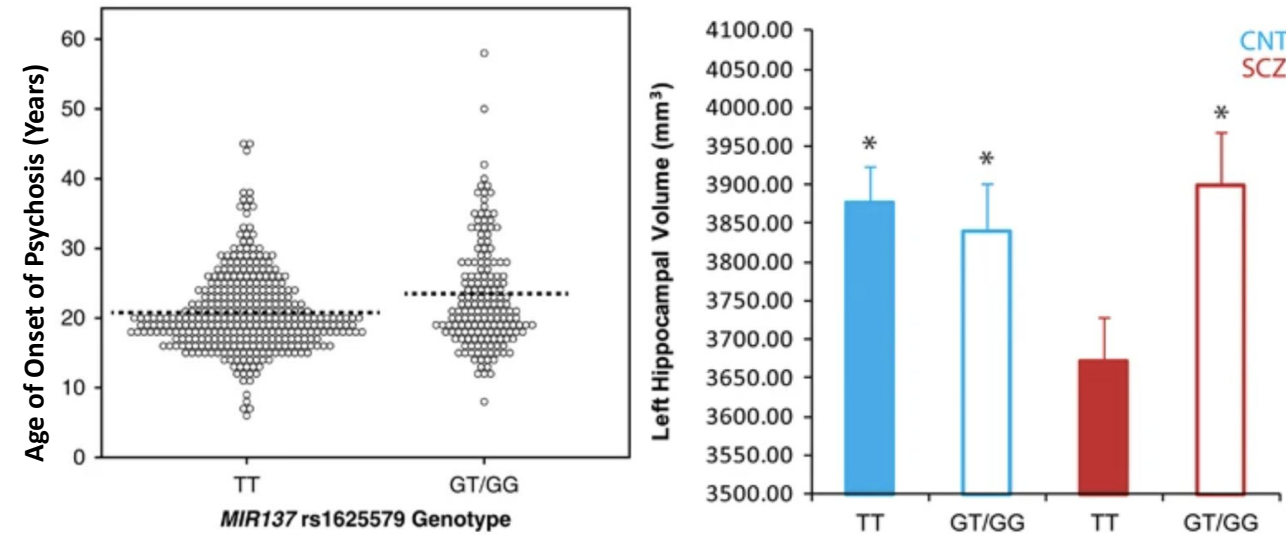
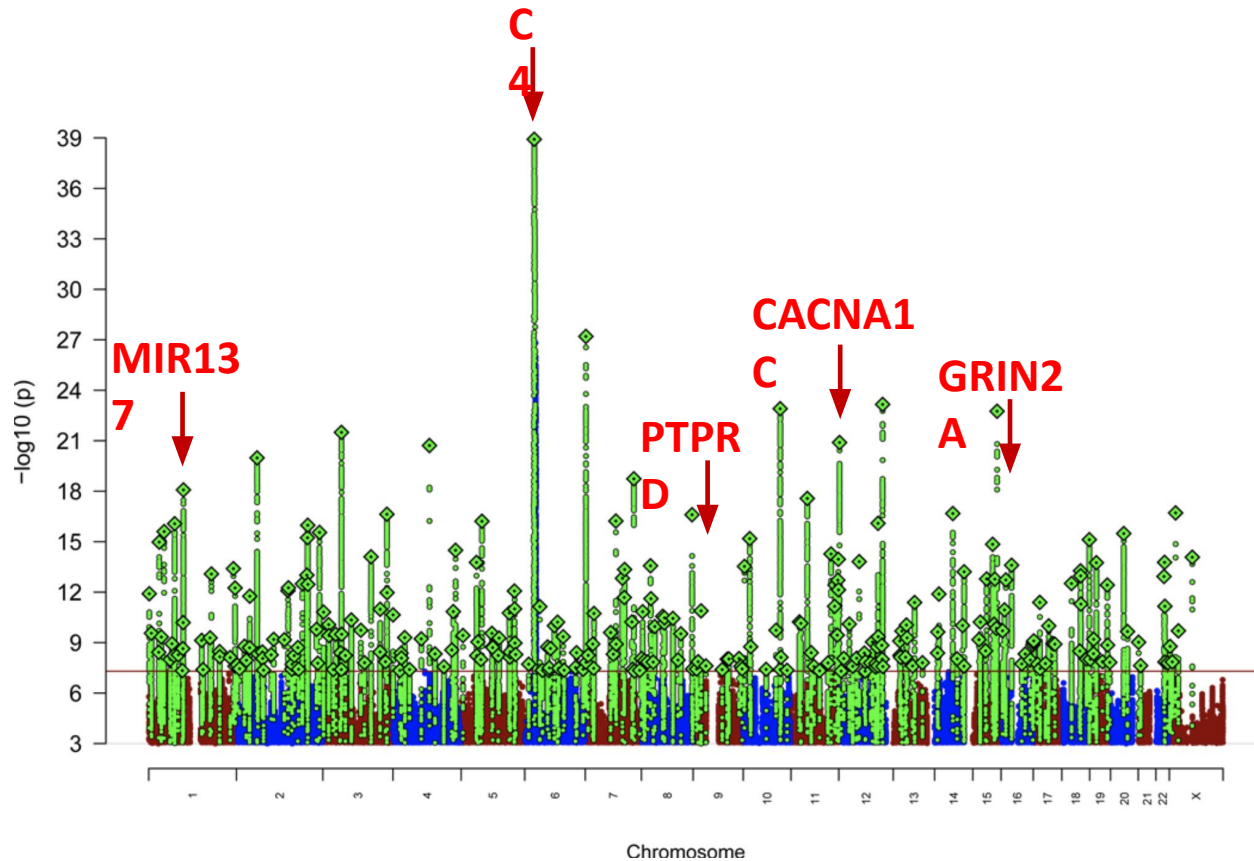
Michelle Palumbo

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Oregon Health & Science University, Portland, OR

CONTROLLED RELEASE SOCIETY
CRS 2023 ANNUAL MEETING & EXPOSITION
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THE FUTURE OF DELIVERY SCIENCE

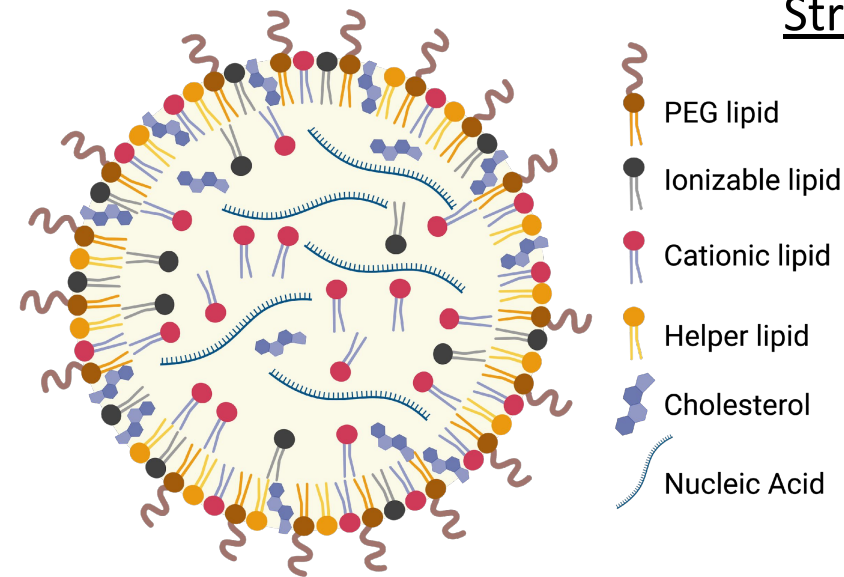
MIR137 and Schizophrenia



miR137

- Enriched in synapses (Kuswanto, 2015)
- Increases during development (Lett, 2013)
- Regulates developmental and synaptic proteins (Sakamoto, 2018)

LNP Characterization and Delivery *in vitro*



Structure

Dynamic light scattering (DLS)

Size (nm)

Polydispersity index (PDI)

Charge (ZP)

Encapsulation efficiency (%)

Transmission electron microscopy (TEM)

Shape

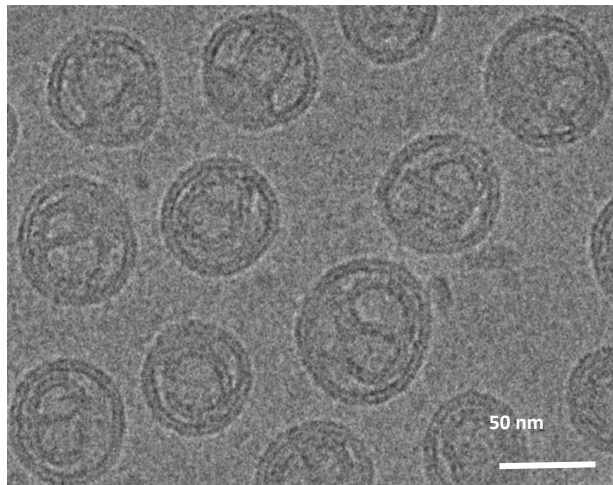
Heterogeneity



Dr. Gaurav Sahay



Dr. Milan Gautam

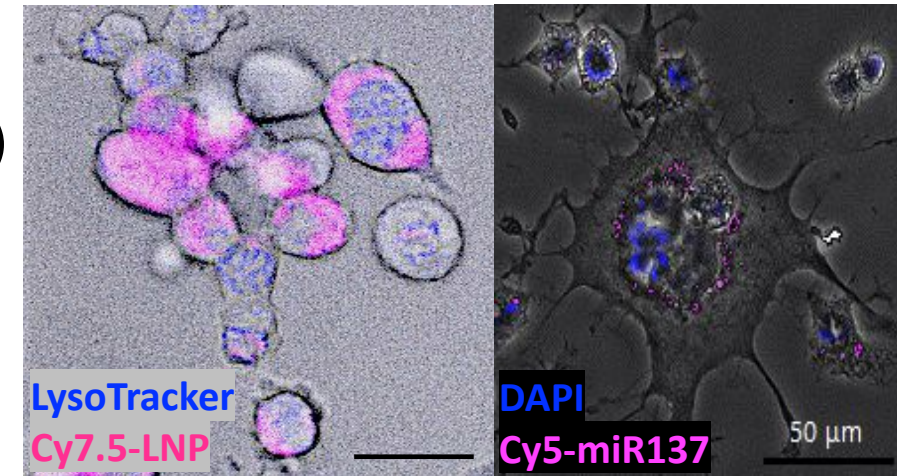


Function

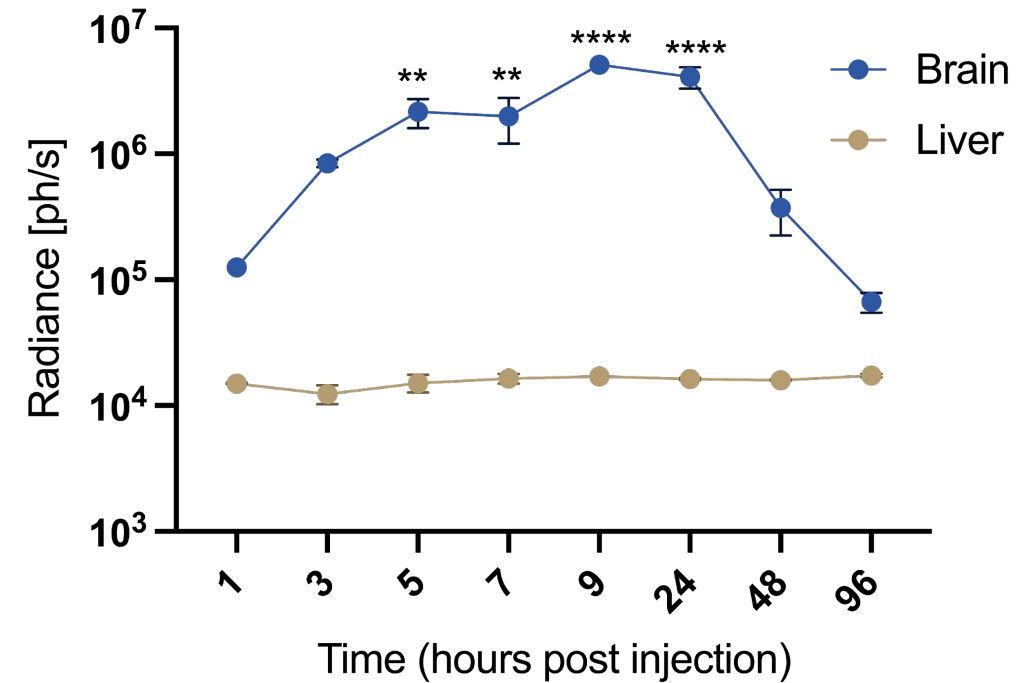
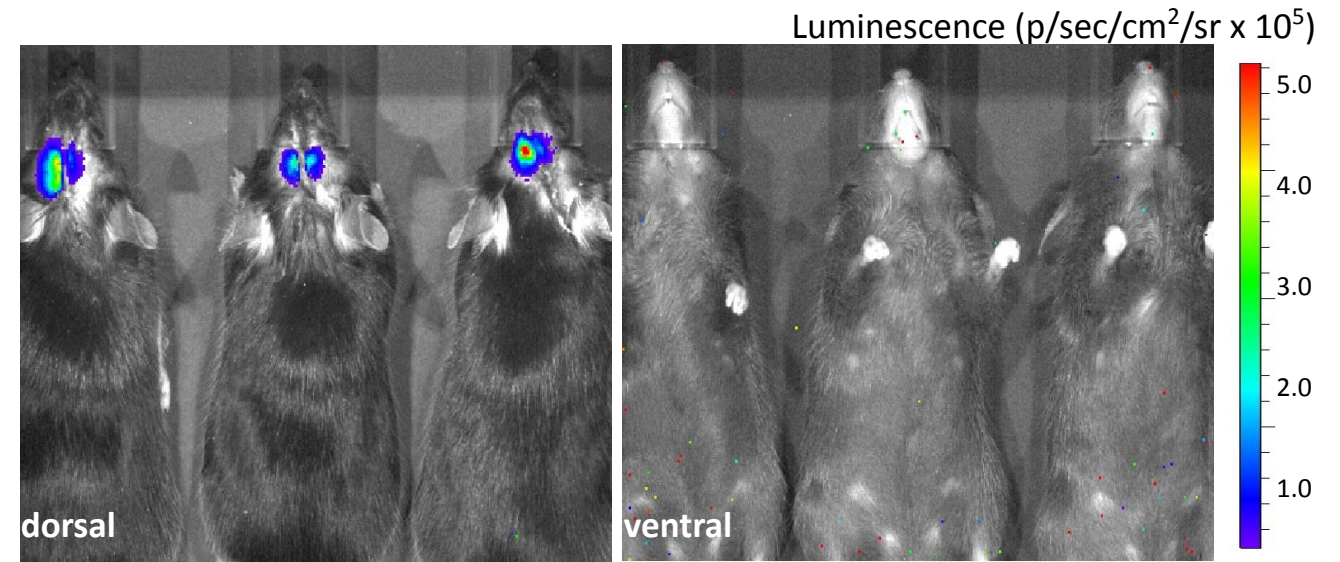
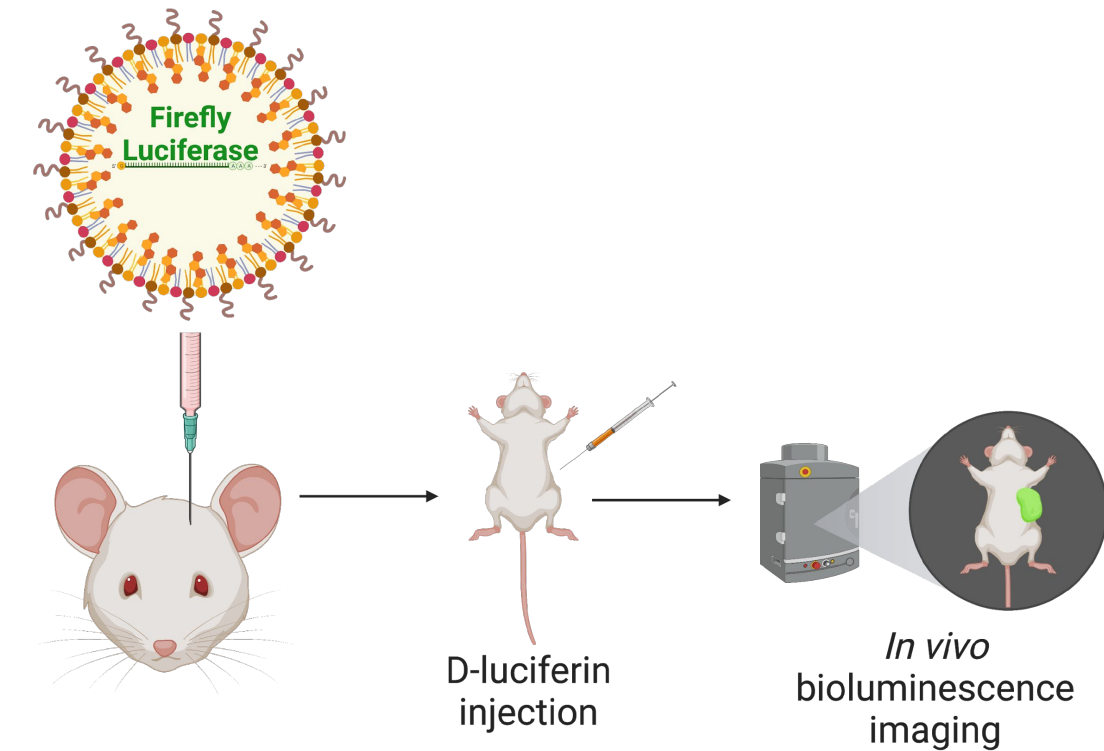
LNP endocytosis

MiRNA cargo release (RT-qPCR)

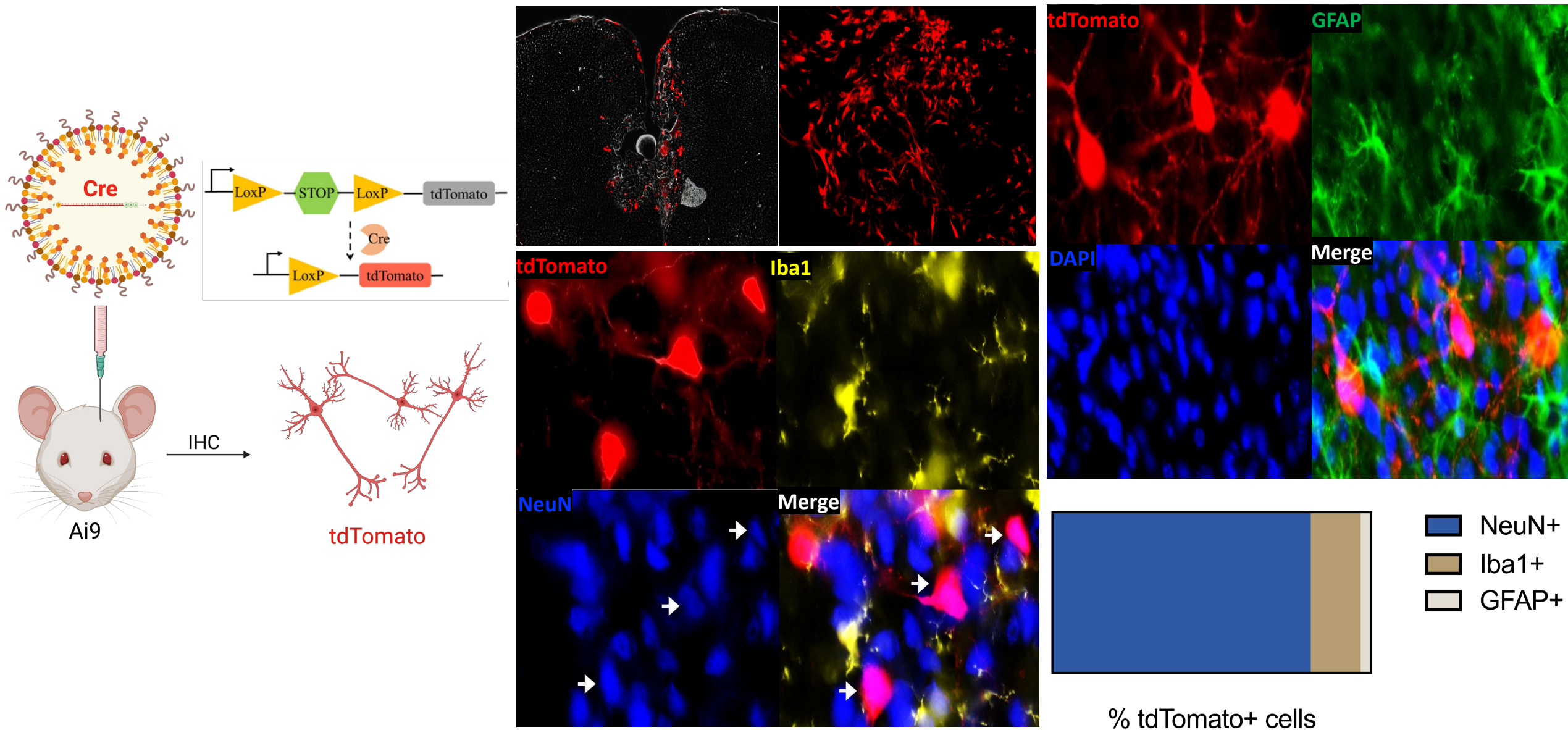
Target protein inhibition (WB)



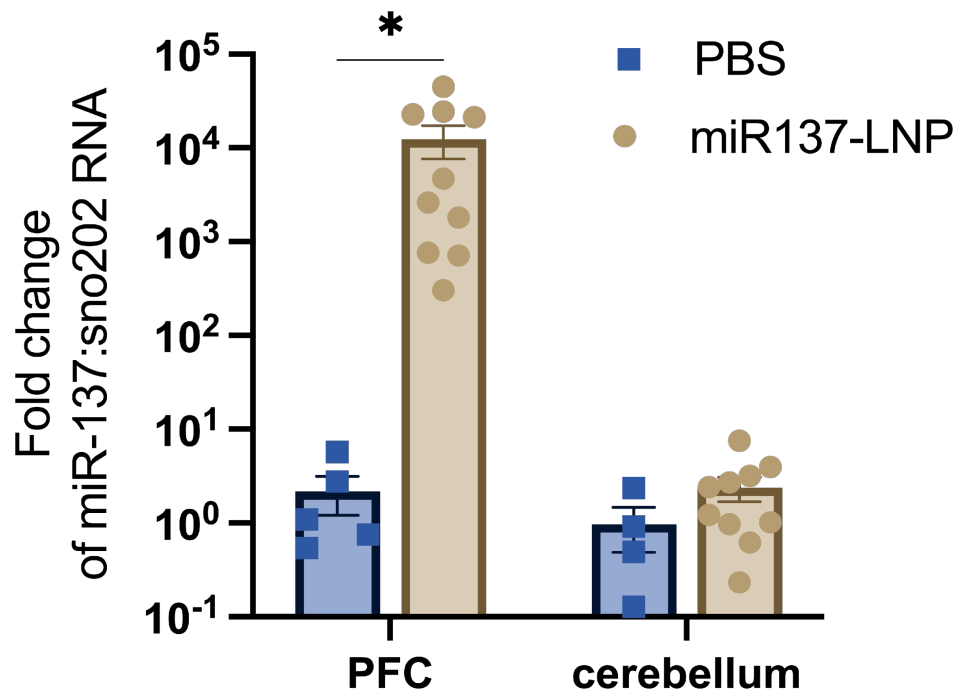
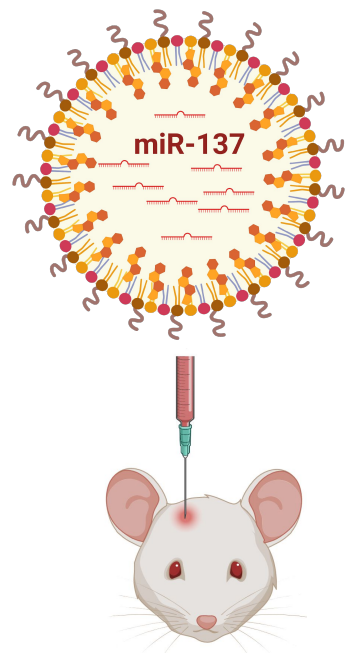
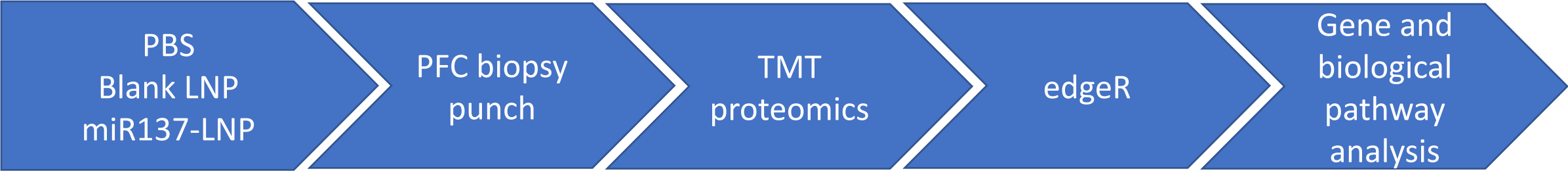
Delivering LNPs *in vivo*



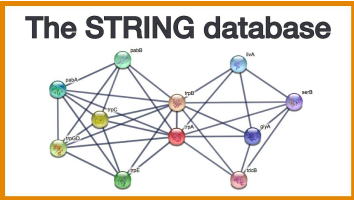
Delivering LNPs *in vivo*



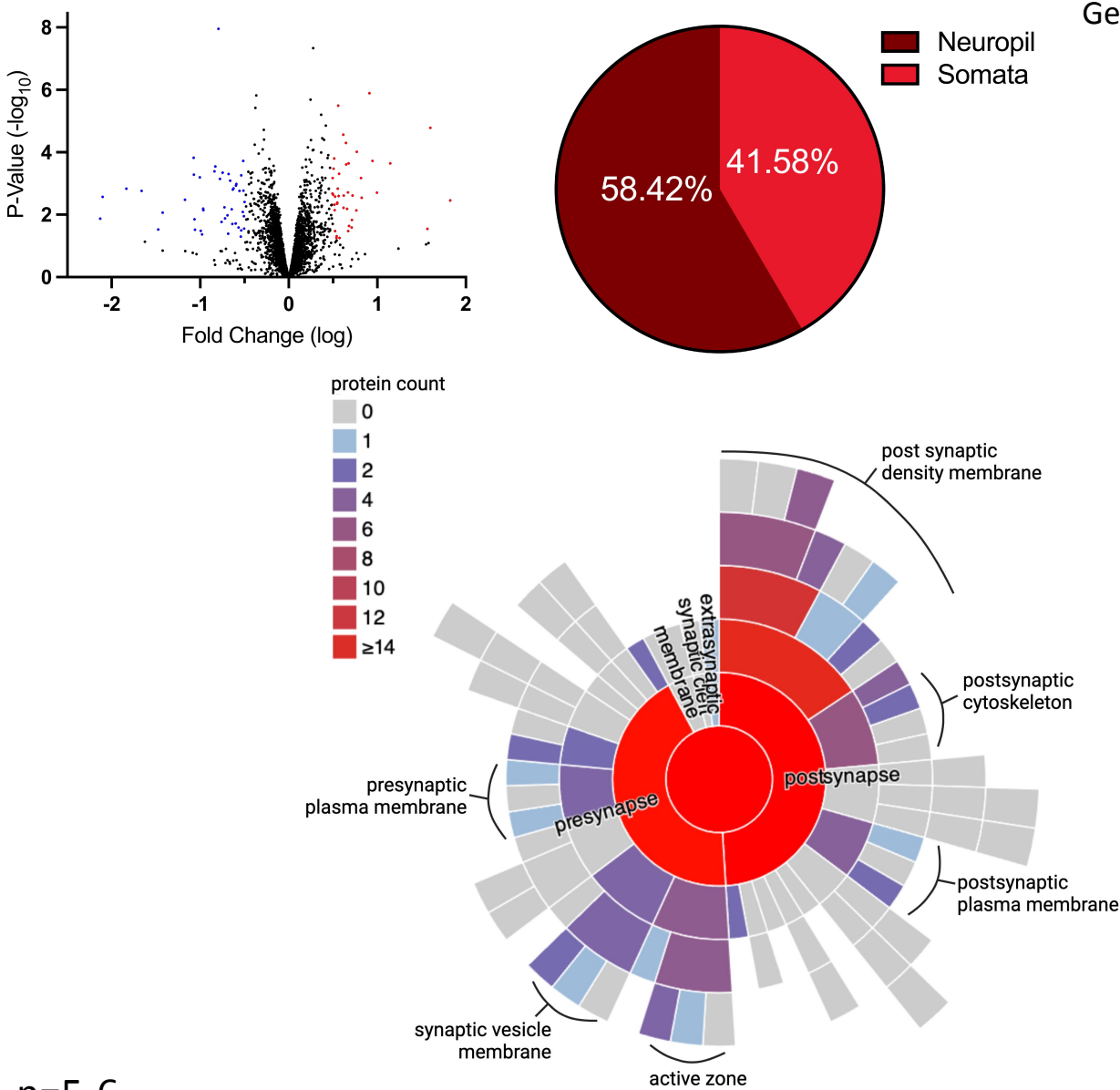
Proteomics



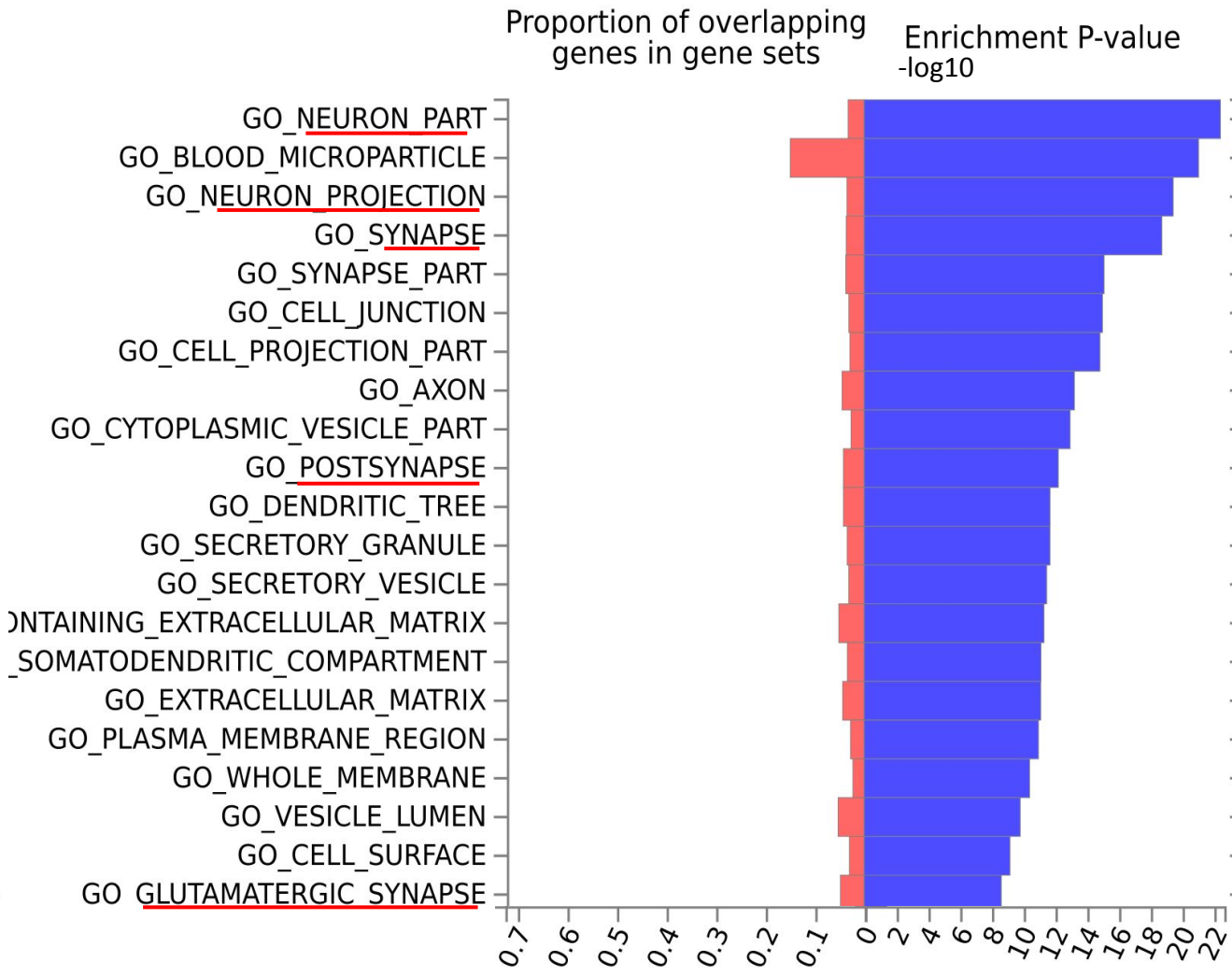
4,807
quantified proteins



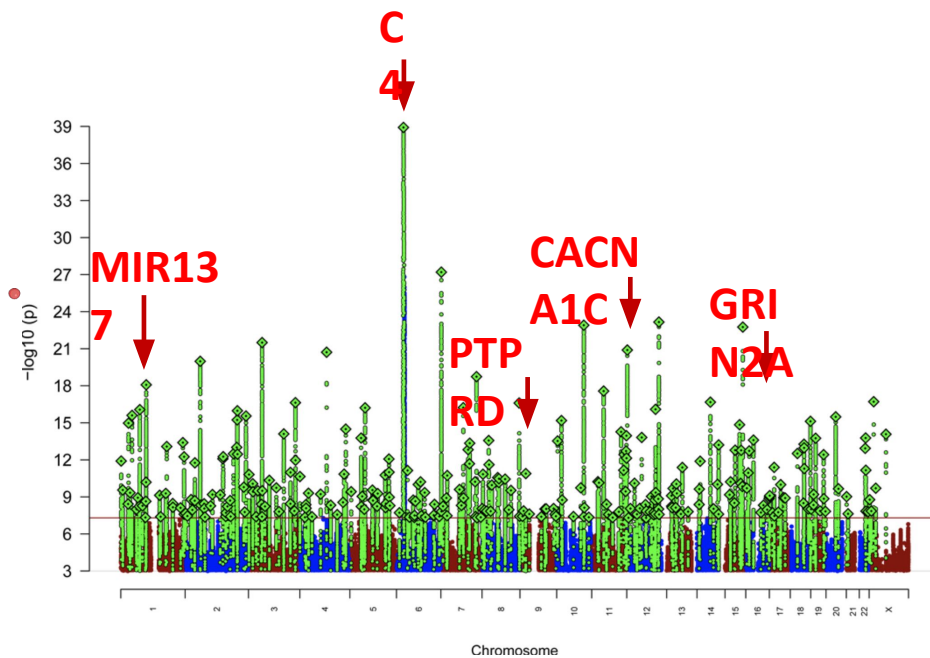
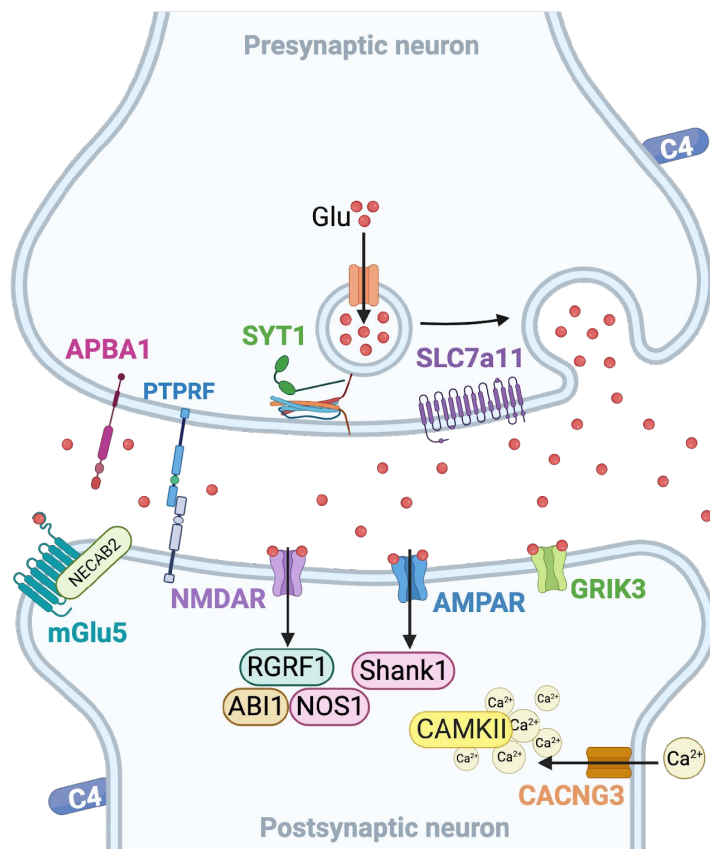
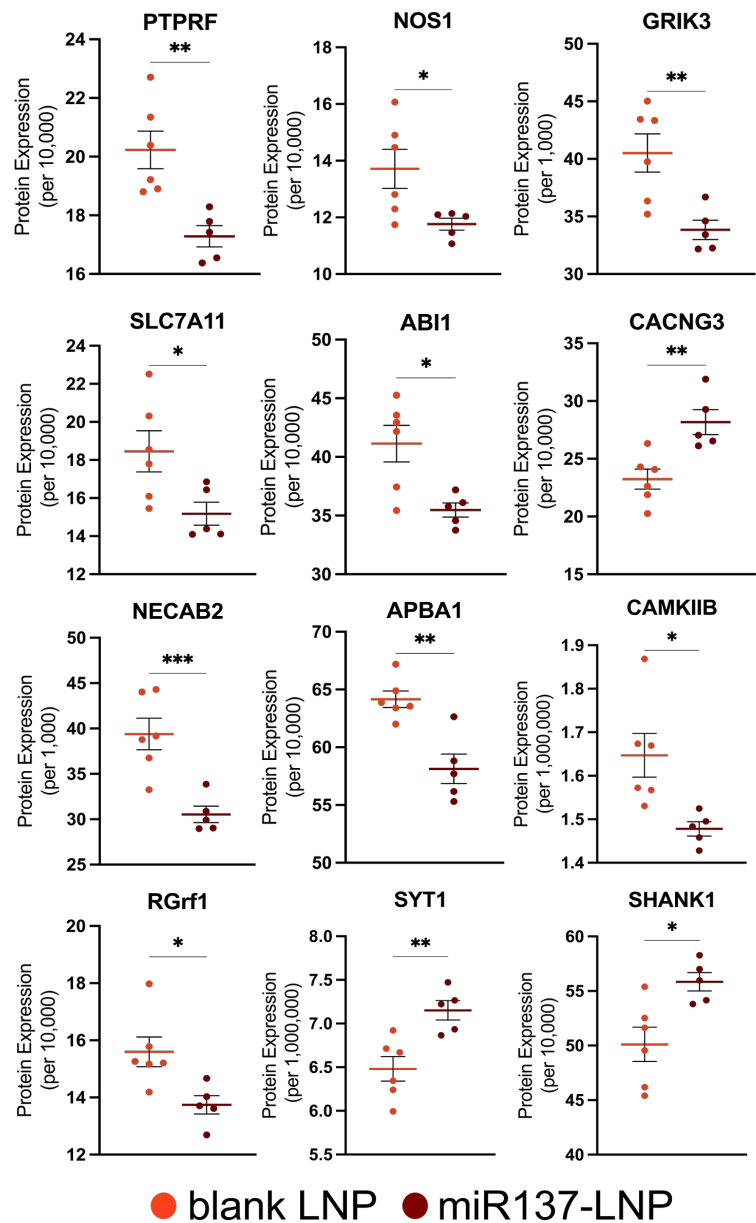
miR137-LNP Proteomics



Gene Ontology (GO) Cellular Compartment



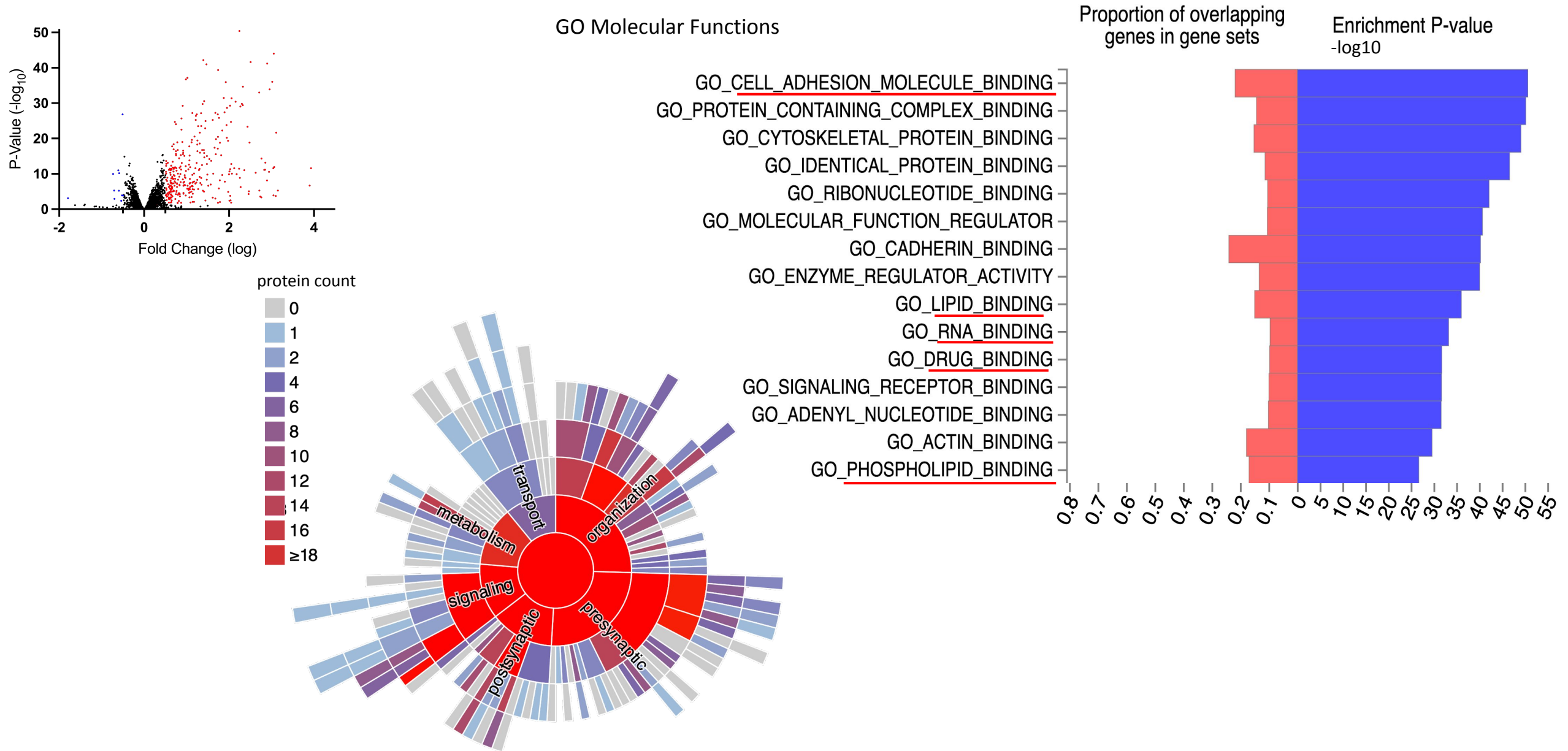
miR137-LNP Proteomics



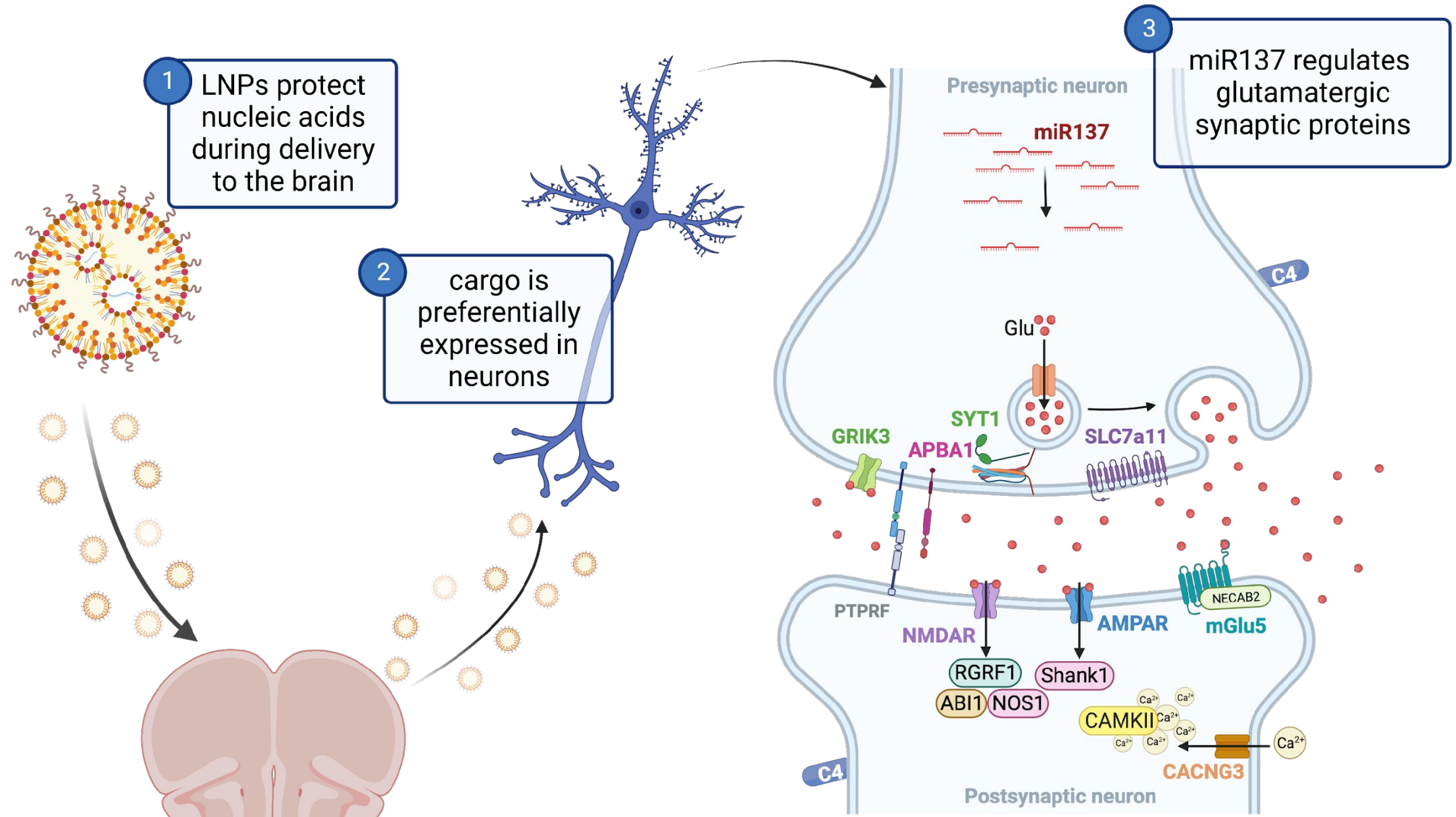
n=5-6; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Palumbo et al. *Molecular Therapy* 2023, in revision

Blank LNP Proteomics



Conclusions and Future Directions



Acknowledgements

Lab

- **Dr. Aaron Janowsky**
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- Bill Schutzer

Collaborators

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- **Dr. Milan Gautam**
- Dr. Daniel Marks
- Dr. Rajesh Miranda
- OHSU Proteomics Core



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KNIGHT
CANCER
Institute

VA



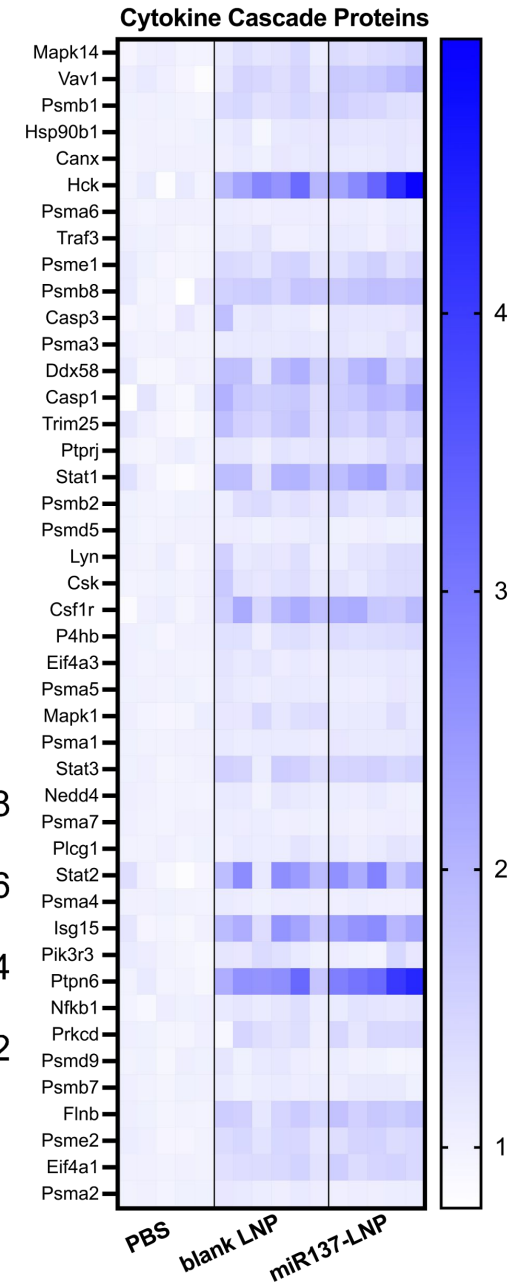
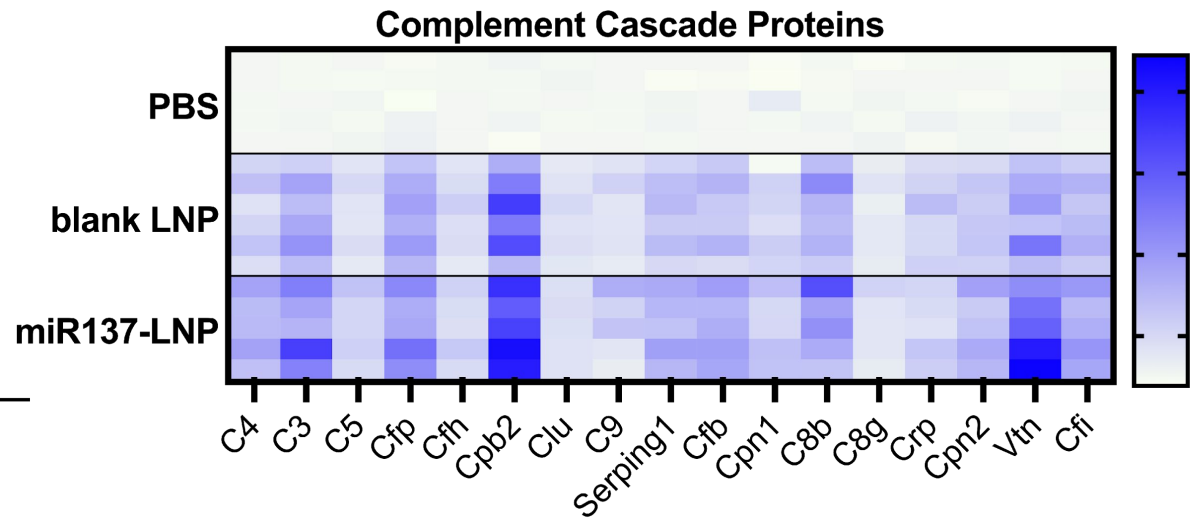
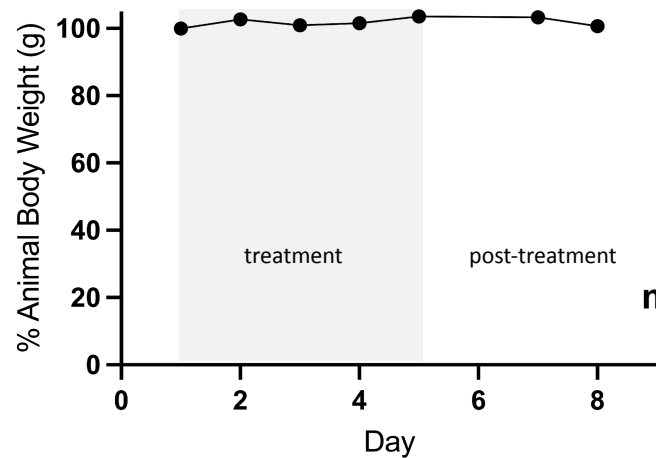
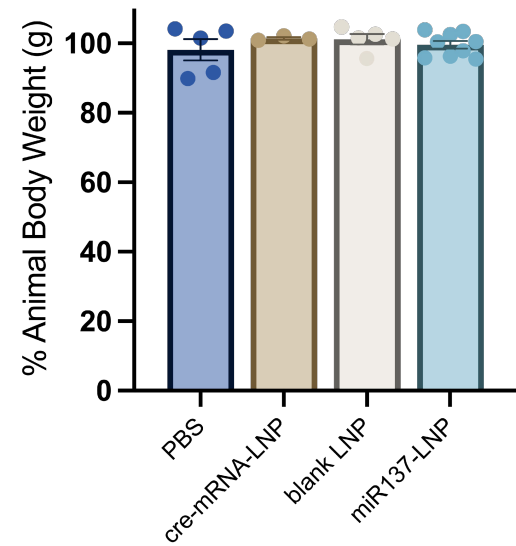
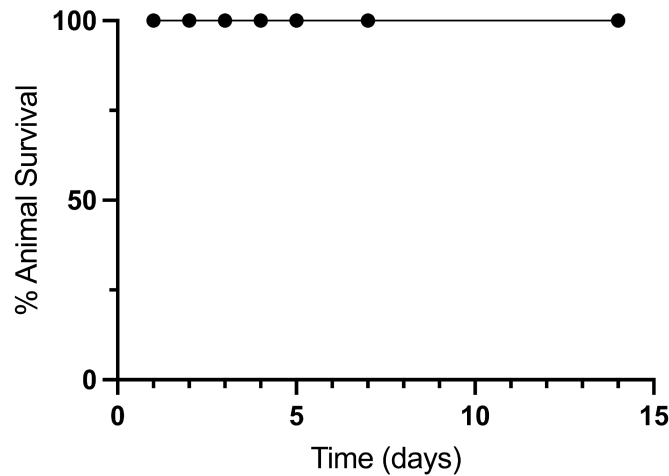
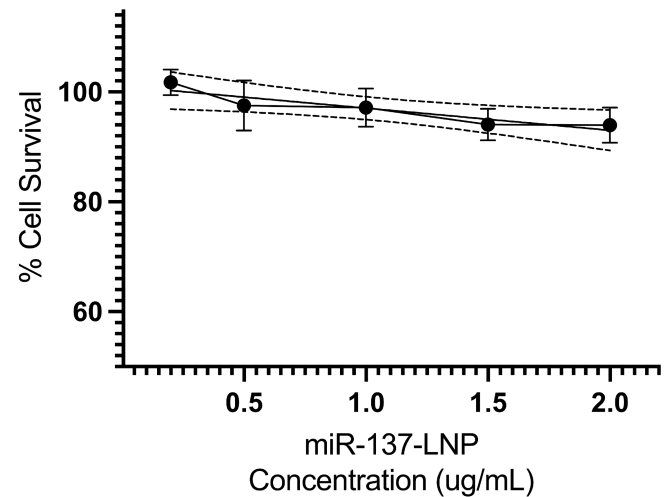
U.S. Department of Veterans Affairs

Veterans Health Administration
VA Portland Health Care System

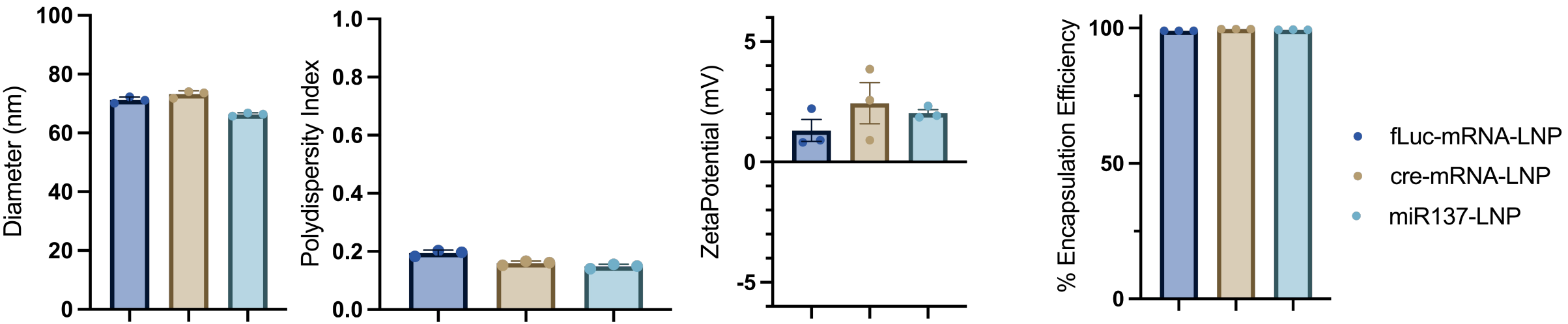


bioRender

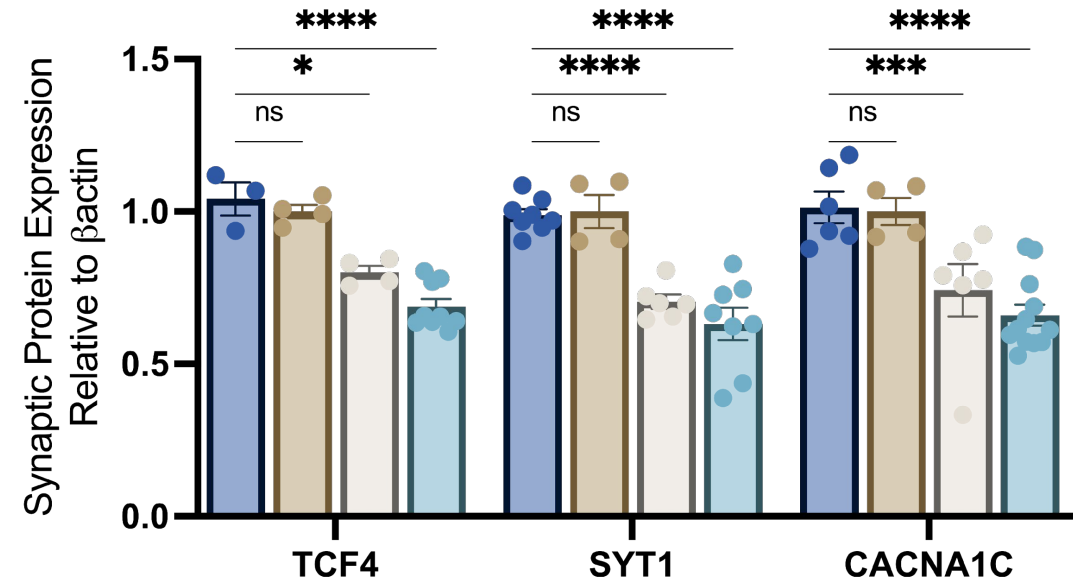
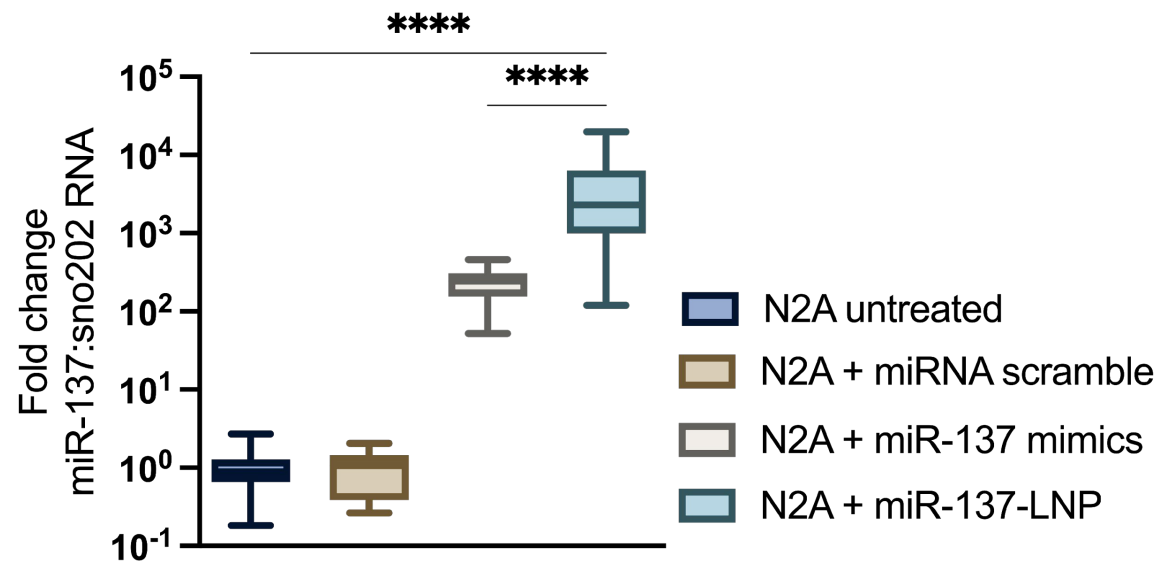
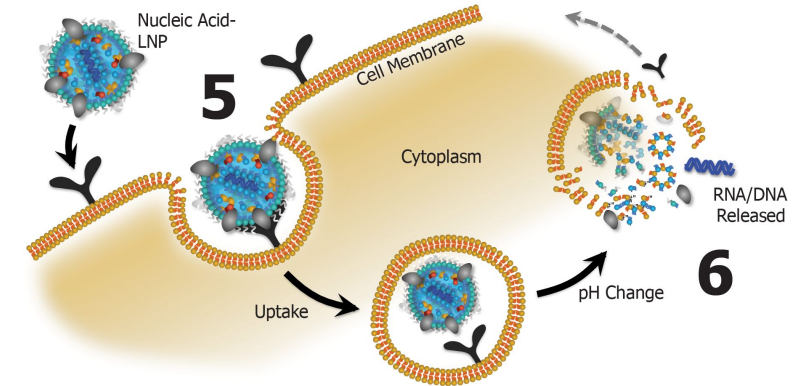
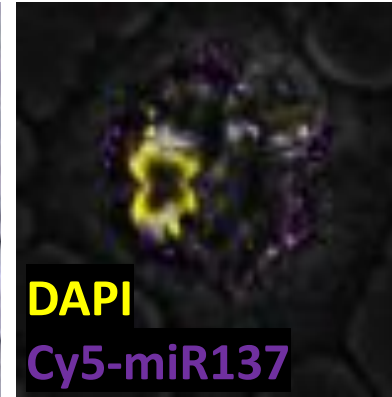
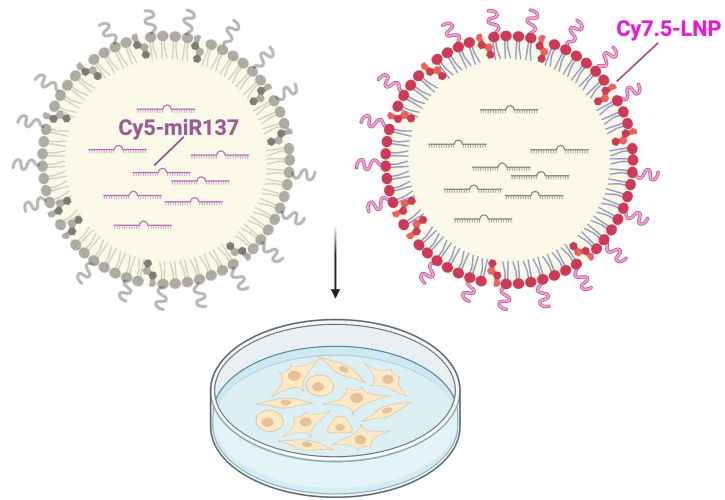
LNP Immune Response and Toxicity



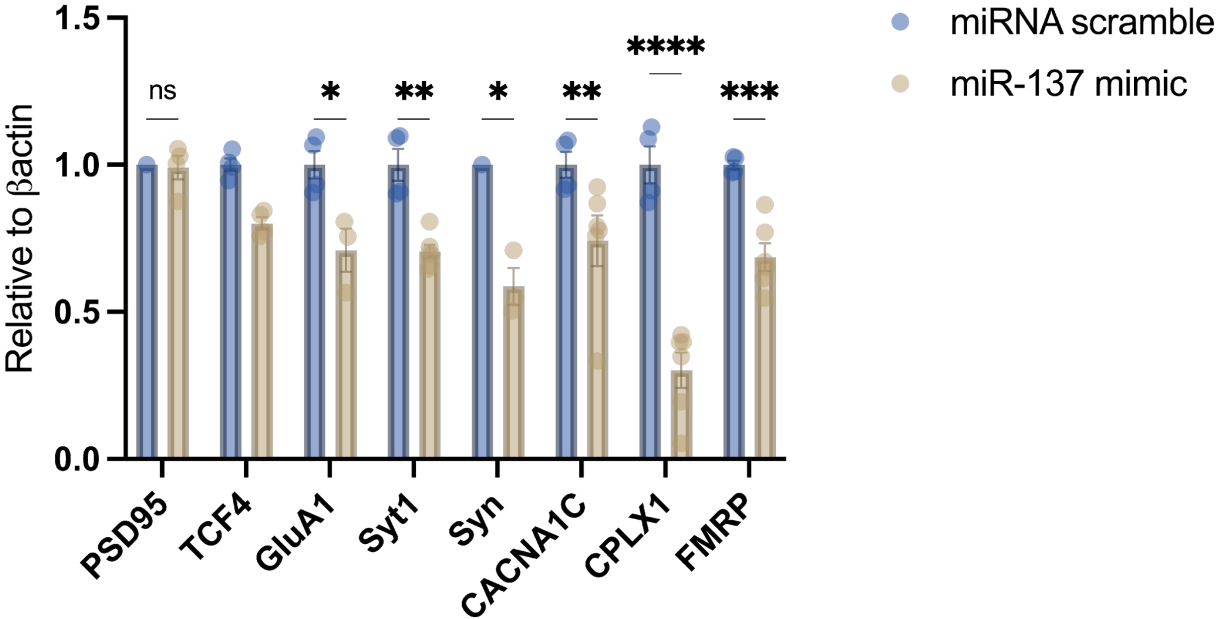
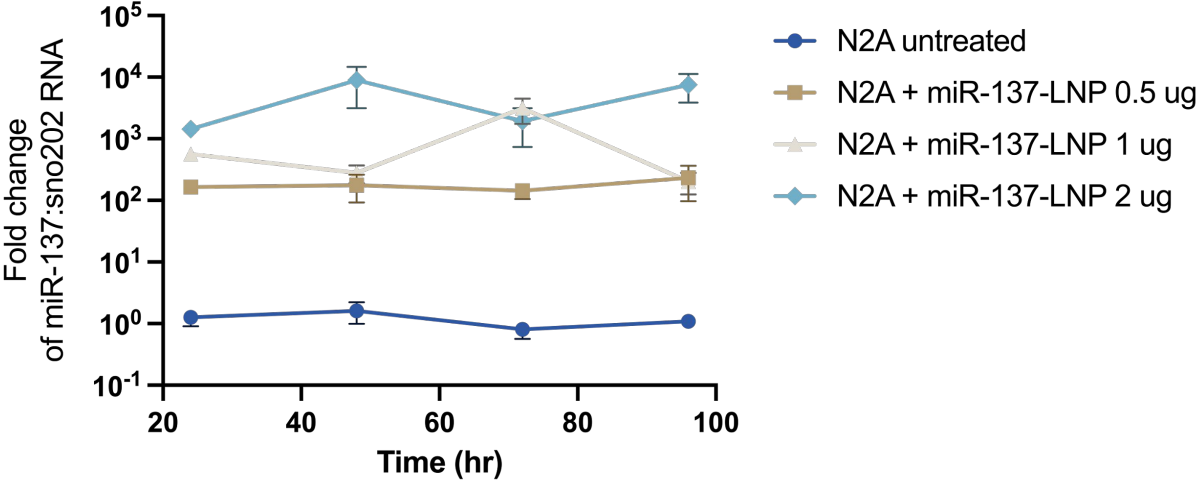
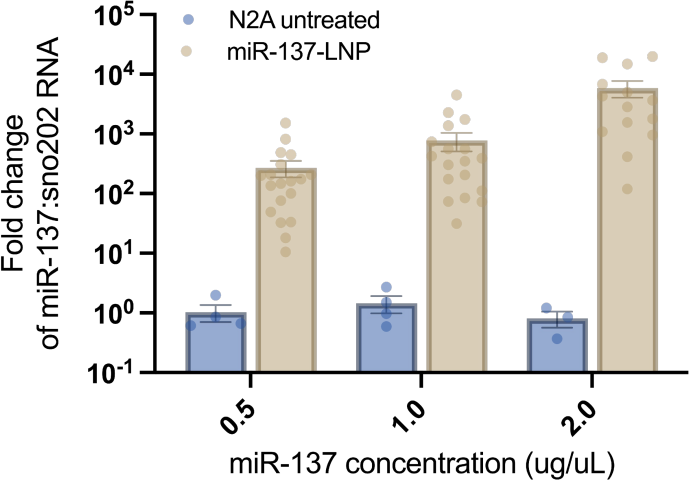
LNP Characterization



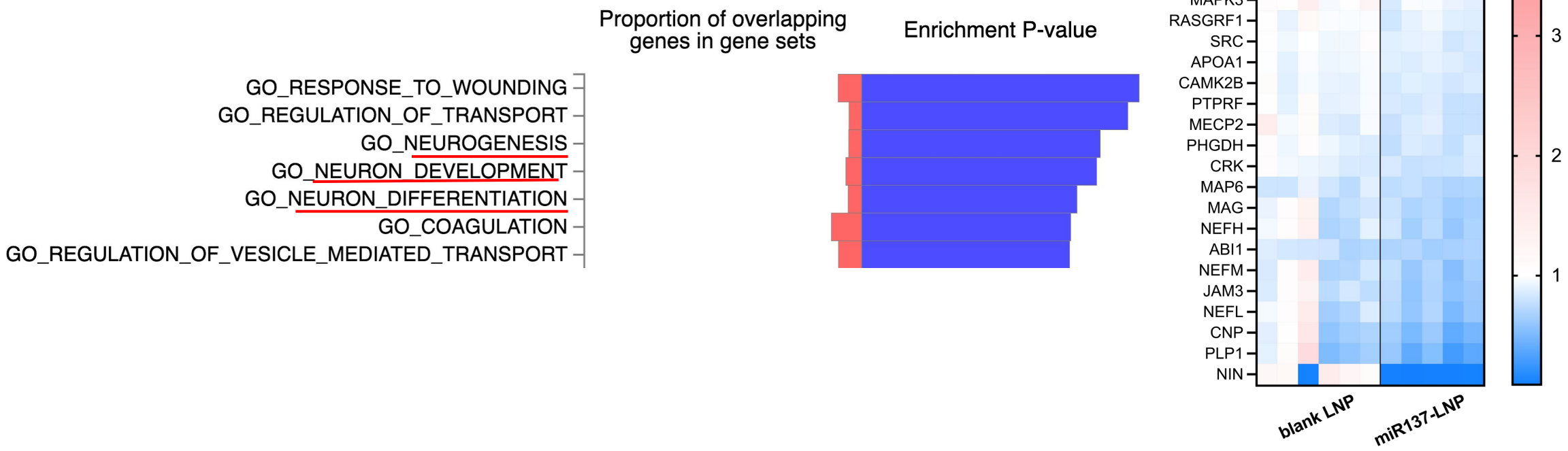
Delivering LNPs *in vitro*



miR137 targets and dose response

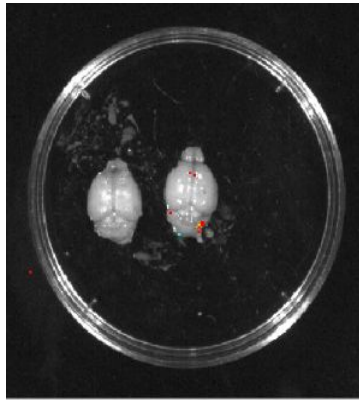
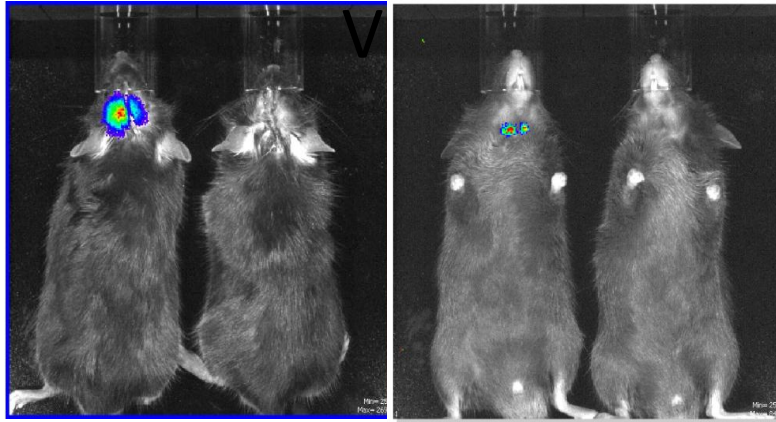


miR137-LNP Development

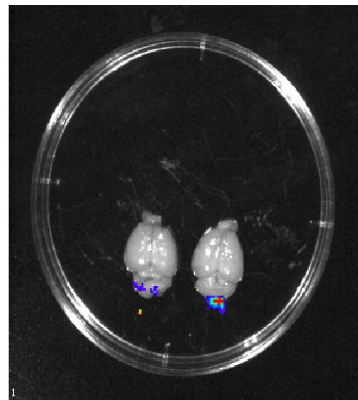
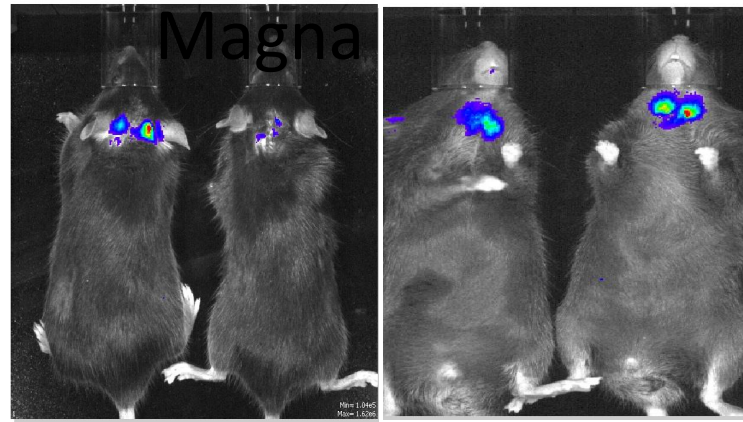


Intrathecal Administration

IC



Cisterna



L5/L

