Here is a picture of the Monster Board that WESEF will order for you. The black Monster board will be waiting for us when we arrive at ISWEEEP/ISEF.

This PowerPoint is designed to be printed on 44 inch wide paper. If you need a template for 36 inch wide paper please use the other PPT. The slides below are 44 inches wide x 56 inches long (the longest a PowerPoint slide can be).

Each of the black rectangles represents a part of the poster. The first one has the largest box (35 inches wide by 56 inches high) that will become the middle panel. The next slide has two rectangles side by side (each are 17 inches wide by 56 inches high). Those will become the side panels. The last slide has one rectangle (35 inches wide by 15 inches high) that will become the title. You may want to print your title piece on a slide with one of your classmates so that you can save paper.

If you need for me to print your poster then you should design it using the rectangles as the absolute borders. Then save it as a PowerPoint with the file name “Last Name – ISEF (or ISWEEEP) poster” Then also save it as a PDF with the same file name and send both versions via email attachment (yorktownhusker@gmail.com).
**Experimental Design**

**Research Question:** What effect does Tau knockout have on RBP metabolism in stress granules?

\( H_0 \): Tau knockout will have no effect on RBP metabolism as compared with WT cells.

\( H_1 \): Tau Knockout will lead to altered RBP metabolism as compared with WT cells.

1. **Sacrifice mice at P0/P1 and plate primary cortex neurons to mature**
2. **Use known cell stressors DBeQ, NaAsO\(_2\), to induce stress granules**
3. **Complete ICC protocol and stain cells with fluorophores DAPI, TL DLC, EGFP, DY-590, and Alexa Fluor 647**
4. **Image WT and Tau KO cells with treatments of 0, 2, 4, and 8 \( \mu \)M DBeQ cells using Zeiss microscope**
5. **Analyze cells and image sets**

**Results**

This figure demonstrates eIF3 inclusion in WT and Tau KO neurons with treatments of 0, 4, and 8 \( \mu \)M DBeQ. They were taken through the EGFP channel and demonstrate a lack of stress granule inclusion for KO cells.

This figure demonstrates eIF3 inclusion in WT and Tau KO neurons with treatments of 0, 4, and 8 \( \mu \)M DBeQ. They were taken through the DAPI channel, which stains nuclei. This showcases that the cells observed through the EGFP were valid.

This figure demonstrates PABP inclusion in WT and Tau KO neurons with treatments of 0, 2, 4, and 8 \( \mu \)M DBeQ. They were taken through the DAPI channel and reveal the nuclei of the cells that were observed for PABP inclusion.
Introduction

Tau Protein

- Hyperphosphorylated extracellular Tau associating with stress granules is TIA-1-dependent (Browne et al. 2014)
- Propagation of misfolded Tau pathology is cell-to-cell (Ishii et al. 2021)

RNA-binding Proteins

- 800 proteins that operate in nucleus and cytoplasm
  - Nuclear
  - Cytoplasmic (Vandeweyde et al. 2014)
- Linked to neurodegenerative disease
- Active in stress granule pathway (Veiseh et al. 2012)

Stress Granules

- Rapid sequestration of non-translating mRNAs and RNA binding proteins to decrease mRNA damage during cellular stress (Jetten et al. 2013)
- SGs accumulate from RBP aggregation through glycine-rich domain (Veiseh et al. 2012)
- RNA transcripts targeted to SGs based on type of stress (i.e. heat shock, oxidative stress)
- Normal RBP function does not occur in pathological stress granules (Jetten et al. 2013)

Review of Literature

Tau Regulates the TIA1-binding Proteome in the Brain

Internalized Tau Alters Stress Granule Dynamics and Sensitizes Cells to Stress

Sodium Arsenite Induces Stress Granules Co-positive for TIA1 and PABP

Gap in Knowledge

- Tau is intimately tied to SG dynamics and RBPs
- Tau can be mediated by the TIA-1 binding
- Most research has been aimed at altering RBPs and not Tau
- TIA-1 has been overexpressed and knocked out and its effects on Tau have been observed
- Knocking out Tau has not been observed in effect

Discussion

Conclusion

Potential Improvements

- Points to an extremely important role for Tau in stress granule composition, formation, and processes
- Tau is instrumental in every aspect of stress granules

Future Research

- Flits into the wider scope of Tau and SG research
- This research looks at the impact of the reversible aggregation of the SG pathway in the context of tauopathies and neurodegeneration
- Reversible aggregation may become an important target in the future
- More research is needed into individual RBPs and their interaction with stress granules

Bibliography
Stress Granule Composition in Wild-Type and Knockout Primary Cortex Neurons