HAN PEDIATRIC OBESITY LAB

Introduction
• Pediatric obesity is a major concern in the US
• Mutations in the MC4R gene are strongly associated with obesity in patients

Objective
• Determine if the drugs loxapine or atomoxetine could be potential medications for patients with mutations in the MC4R gene

Methods: For both medications, a cohort of wild-type and MC4R knockout mice were given a treatment in three phases: vehicle, drug, and washout. Mice were kept in CLAMS (comprehensive lab animal monitoring system), which monitored activity, metabolism, and food intake, with MRI data collected periodically.

Work Profile: Using R, the CLAMS data was visualized in graphs and statistical analysis was conducted, primarily ANOVAs of linear models created based on genotype, treatment, and phase, were conducted.

Results
MC4R knockout mice showed decreased metabolism during the drug phase. For loxapine, genotype and treatment phase were shown to be potentially significant predictors for activity and calorimetry.

Graph comparing energy expenditure between Wild-Type and MC4R knockout mice given loxapine treatment.

Conclusion and Future Research
Further statistical analysis is needed to determine the significance of our results, but the medications, particularly loxapine, show promise as a novel obesity medication in the future.

TSAO NEUROLOGY LAB

Introduction
• Phantom limb pain is common in amputees but relatively little is known of its genetic origins or associations

Objective
• Analyze gene expression data from amputated flies to gain more insight into amputee or limb trauma and phantom limb pain in humans

Methods: A front leg was cut off a cohort of flies, with another cohort experiencing sham surgeries. Climbing assays and mRNA microarrays were performed one hour and five days after the surgery.

Work profile: We sorted through the mRNA data, finding genes that were significantly differentially regulated, and functionally annotated and grouped them using DAVID and STRING. Human and mammalian homologues were found, and literature searches were done to further investigate genes of interest. We also contributed to the drafting of a human amputee mRNA expression study.

Results
We found significant upregulation of immunity related genes within the brain in response to periphery limb trauma, as well as a large amount of human orthologs within the genes of interest.

Conclusion and Future Research
Based on our current analysis, our most interesting conclusion is the neurological immune response to periphery limb trauma. We would like to do some further analysis with DAVID and a deeper literature search to verify the connection in mammals and model organisms. This study may be used to motivate later investigations in mice or other model organisms, to potentially determine an application to human amputees.

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