Tetracycline Promotes Obesity in D. Melanogaster via Mitotoxicity
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Introduction
• While science has know for decades that antibiotics promote growth and obesity in livestock, there is increasing concern that antibiotics promote obesity in humans.
• Mechanistic explanations of this antibiotic growth effect are poorly understood but have previously focused solely on the gut microbiome as the link between antibiotics and obesity.
• Antibiotics are also known to directly affect mitochondria. The link between antibiotics, mitochondria, and obesity has been poorly investigated. The literature suggests tetracycline can affect mitochondrial abundance through reducing mitochondrial copy number or increasing production of reactive oxygen species (ROS). Either potential mechanism could decrease mitochondrial function, resulting in triglyceride accumulation.

Methodology
Treat Adult Flies for Five Days
Collect Females, Flash Freeze, and Decapitate
Homogenize Pools of 5 Bodies in PBST
Fraction Homogenate for Assays
Protein (Bradford assay)
Triglycerides (Sigma TG assay)
MtDNA abundance (qPCR)
ROS (Cell Biolabs kit)
mRNA sequencing

Tetracycline Reduces Mitochondria
Five day treatment of adult flies with 0.25 mg/mL tetracycline reduces mitochondrial copy number as determined by qPCR.

Paraquat Investigates Oxidative Stress
To verify that tetracycline promotes obesity via a non-oxidative mechanism, we assessed flies treated with 1mM paraquat, a known oxidant. We found that paraquat reduces triglycerides and increases ROS production. A comparison of paraquat and tetracycline treated flies reveals that tetracycline works via a non-oxidative mechanism.

Conclusions
• Tetracycline selectively lowers mitochondrial copy number without increasing ROS production.
• Lowered mitochondrial copy number results in decreased energy production and increased triglyceride accumulation.
• By reducing mitochondrial copy number, tetracycline treatment appears to be diverting acetyl-CoA from the electron transport chain in the mitochondria to fatty acid production.
• Our findings support the hypothesis that tetracycline promotes obesity via a mitochondrial mechanism.

Future Work + Acknowledgements
• Control for microbiome effects using germ-free flies.
• Investigate gene expression changes in response to tetracycline treatment.

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