

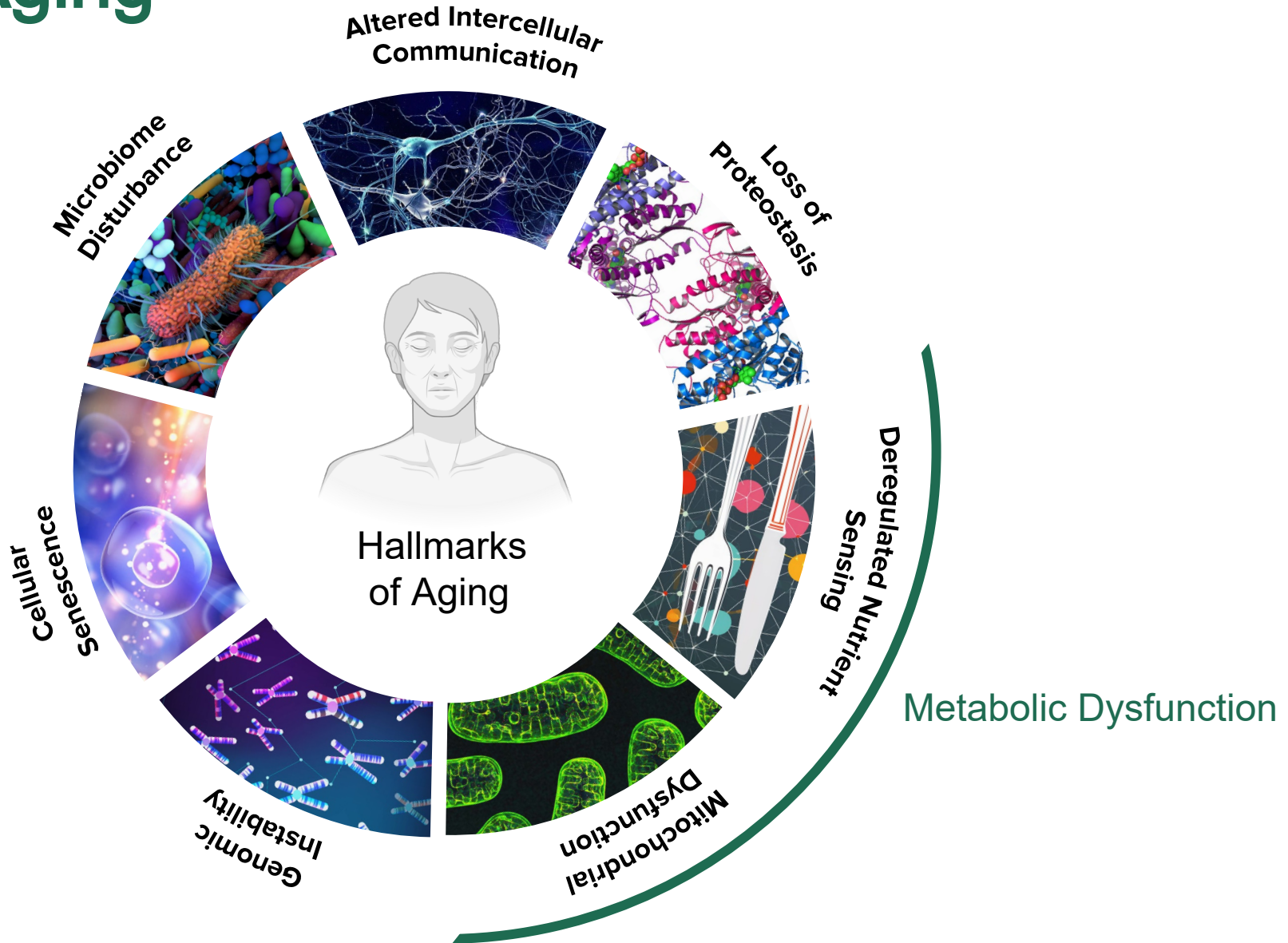
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ALABAMA AT BIRMINGHAM.

Time restricted feeding in older animals

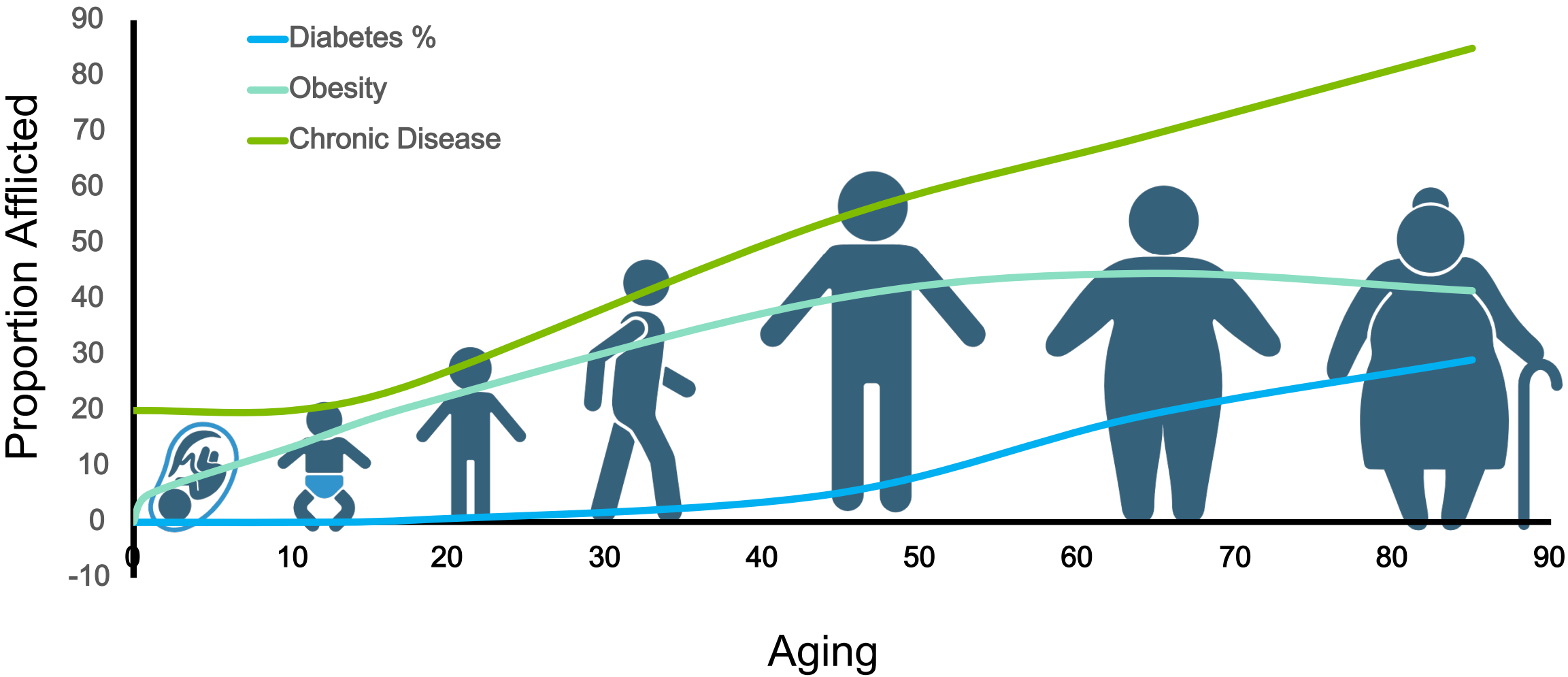
Abbi Hernandez, M.S., Ph.D.

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Hallmarks of Aging



Metabolic diseases with age

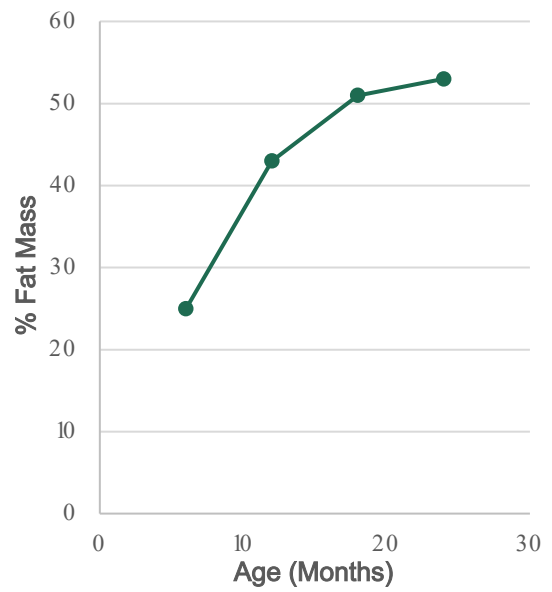
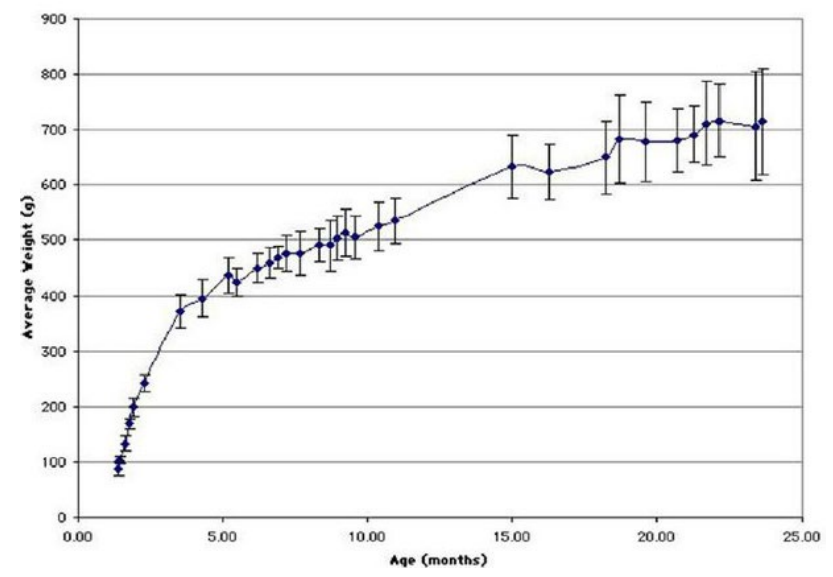
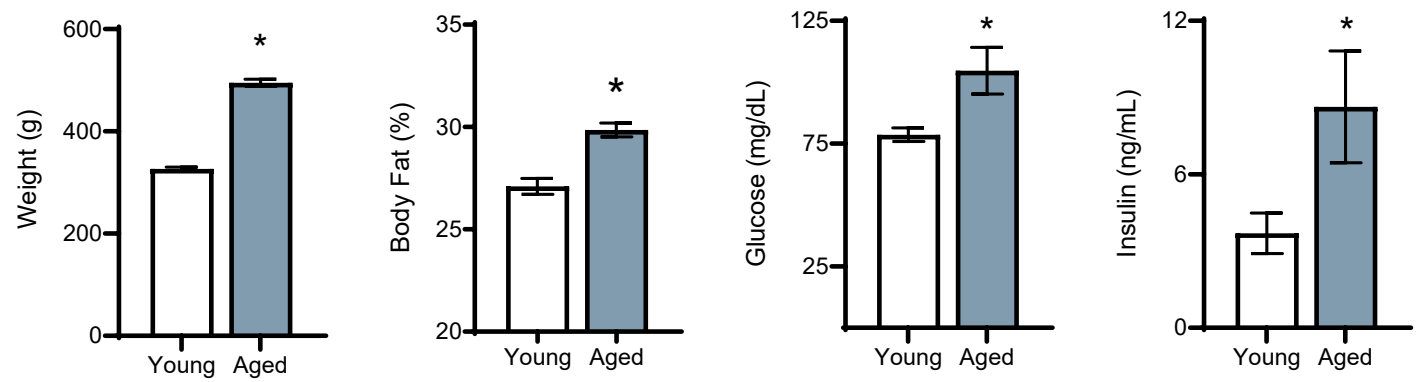


Aged rats are metabolically impaired

F344 x Brown Norway F1



Young: 4 months
Aged: 21 months



Lin et. al., 2021
Sengupta, 2013

Daily Fasting

Warrior
Diet

Eat-Stop-Eat

One Meal a Day
(OMAD)

Circadian Eating

16:8

Intermittent Fasting

Time Restricted Feeding

Time Restricted Eating

Feeding
Window

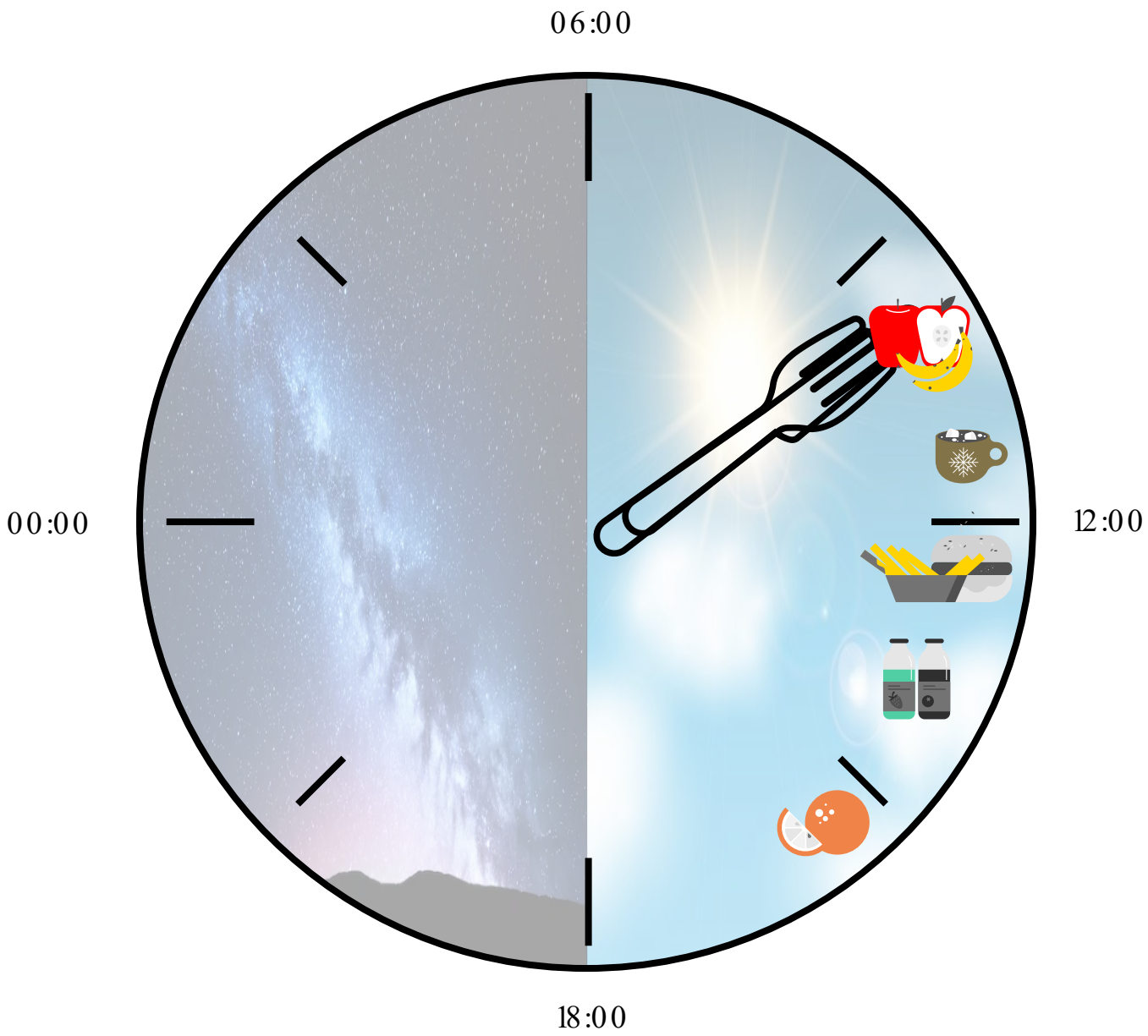
Alternate

Day Fasting















Whole Day
Fasting

Feeding Window Diet

Spontaneous meal
skipping



Favorable Effects

-   Body weight
-   Appetite/energy intake
-   Fat oxidation/metabolic flexibility
-   Glycemia/insulin resistance*
-   Blood pressure**
-   Heart rate***
-   Oxidative stress

Animal models of TRF – why?

- Animal models provide 100% adherence, strictly controlled diets, etc
- Animal models have a shorter lifespan
- Collection and analysis of tissues

Mechanism of action?

Most common types of TRF in lab settings

Intermittent Fasting

Periodic Fasting

One Meal a Day (OMAD)

16:8

Light/dark

Alternate Day Fasting

Prolonged Fasting (48+ hours)

Fasting-Mimicking Diet

1 week

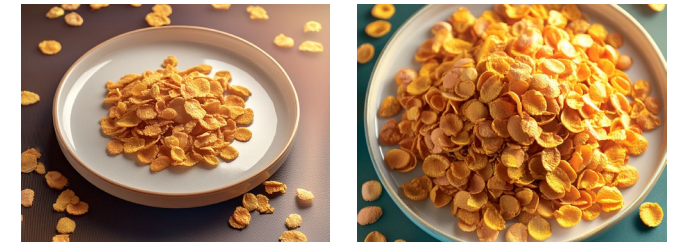
4 weeks

Life long



| 8

Compare dietary composition



Compare caloric content

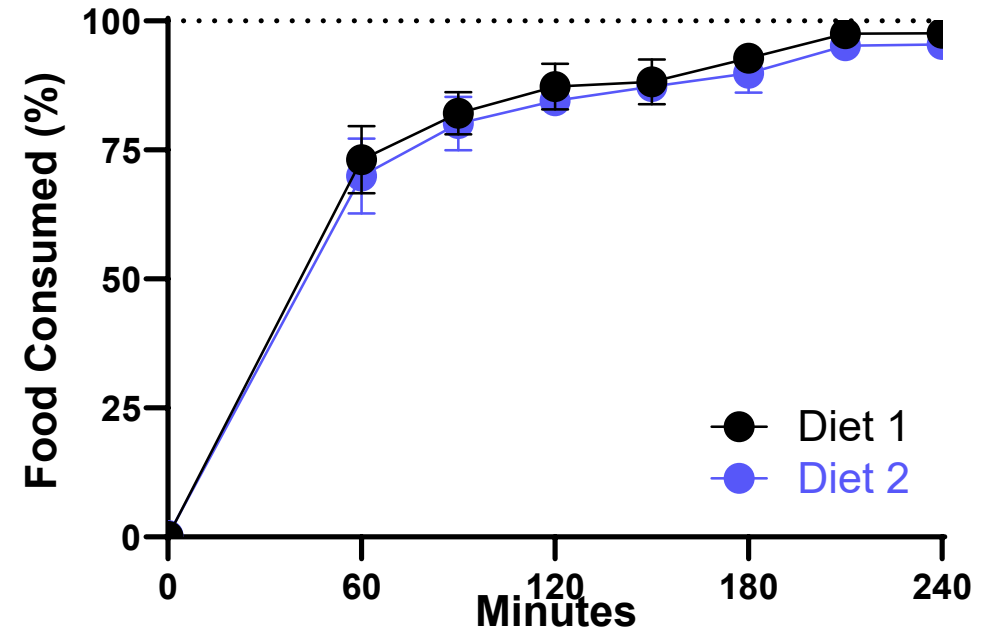


Combine with adjuvant therapies

Diet implementation in rodents

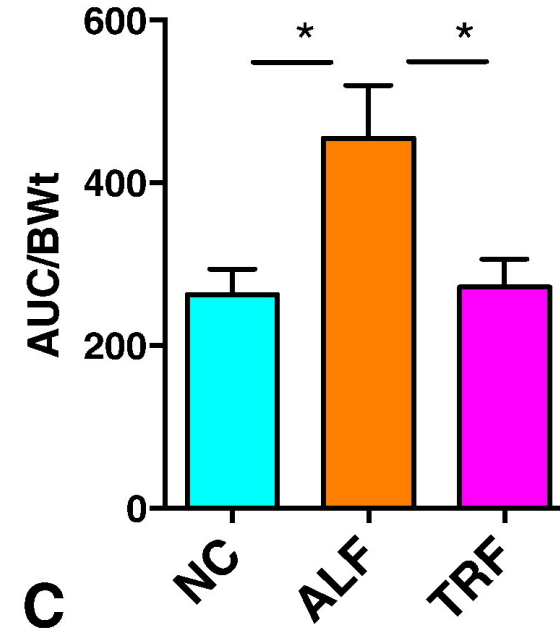
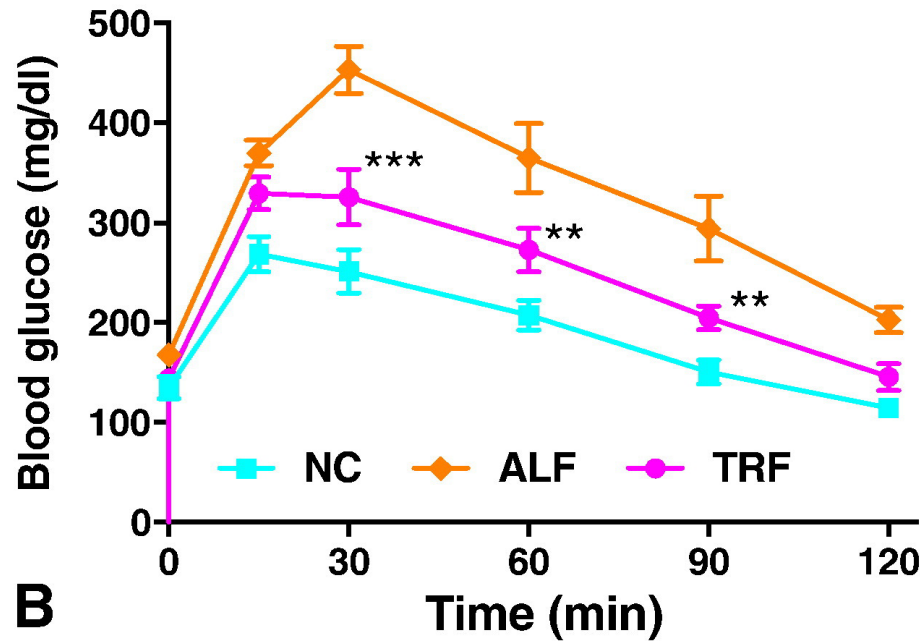


Rats are served calorically equivalent servings once daily.



Key Findings From the Field

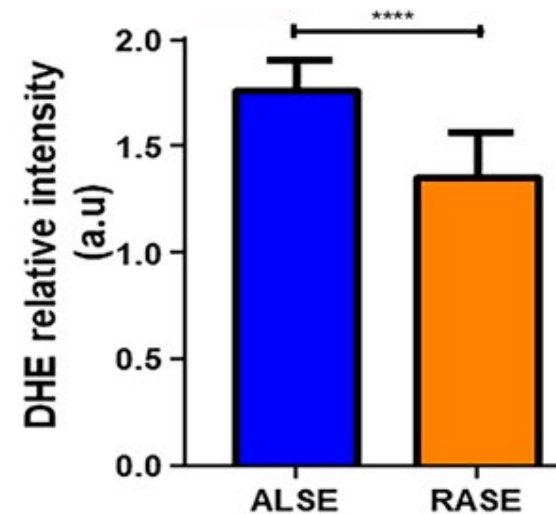
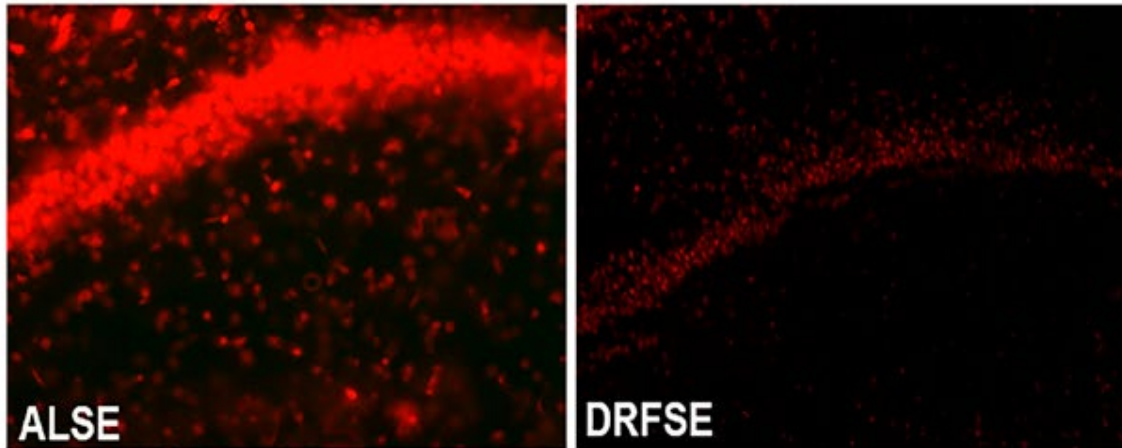
- Longevity (mice, rats, worms)
- Improved insulin sensitivity/hyperinsulinemia (mice, rats, flies)



Chung et al., 2016

Key Findings From the Field

- Longevity (mice, rats, worms)
- Improved insulin sensitivity/hyperinsulinemia (mice, rats, flies)
 - Visceral fat loss (with lean mass preservation) (mice, rats, flies, worms)
- Reduce oxidative stress/improve mitochondrial function (mice, rats, flies, worms)



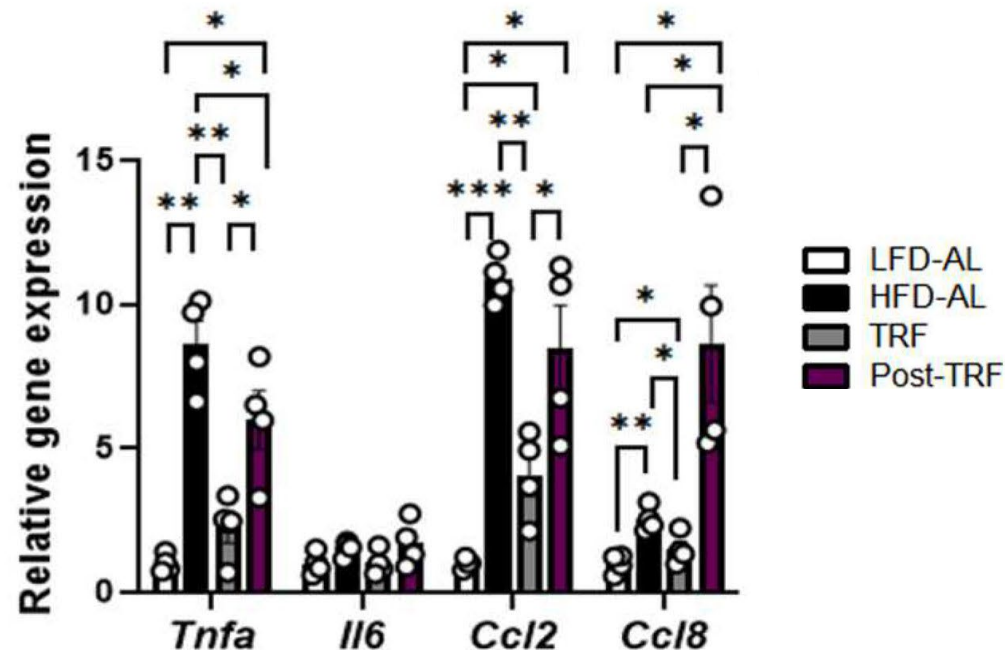
Reduction in reactive oxygen species (superoxide anion, hydrogen peroxide, and hydroxyl radical) in seizure model when TRF relative to AL

Mercado-Gómez et al., 2023

Key Findings From the Field

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- Inflammation (mice, rats, worms, flies)

Decreased cytokine expression in adipocytes post TRF

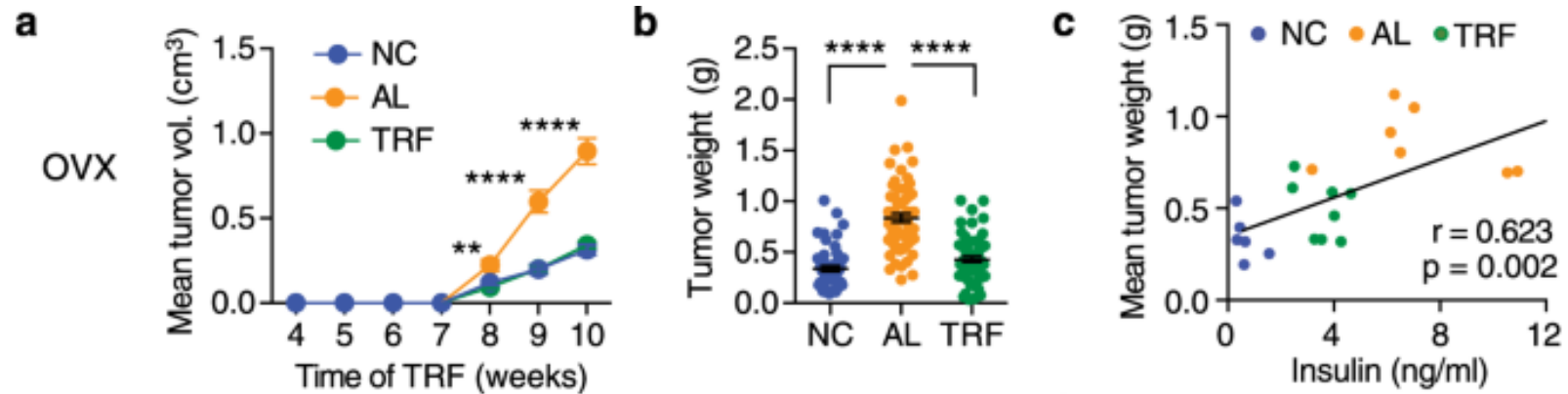


Yun et al., 2023

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- Inflammation (mice, rats, worms, flies)
- Decreased cancer risk (mice)

Smaller tumor presentation in obese, post-menopausal mice on TRF



Key Findings From the Field

- Longevity (mice, rats, worms)
- Improved insulin sensitivity/hyperinsulinemia (mice, rats, flies)
 - Visceral fat loss (with lean mass preservation) (mice, rats, flies, worms)
- Reduce oxidative stress/improve mitochondrial function (mice, rats, flies, worms)
- Inflammation (mice, rats, worms, flies)
- Decreased cancer risk (mice)
- Improves cognitive performance (mice, rats, flies)
 - Prevents age-related declines in cognitive function

Age-related cognitive decline

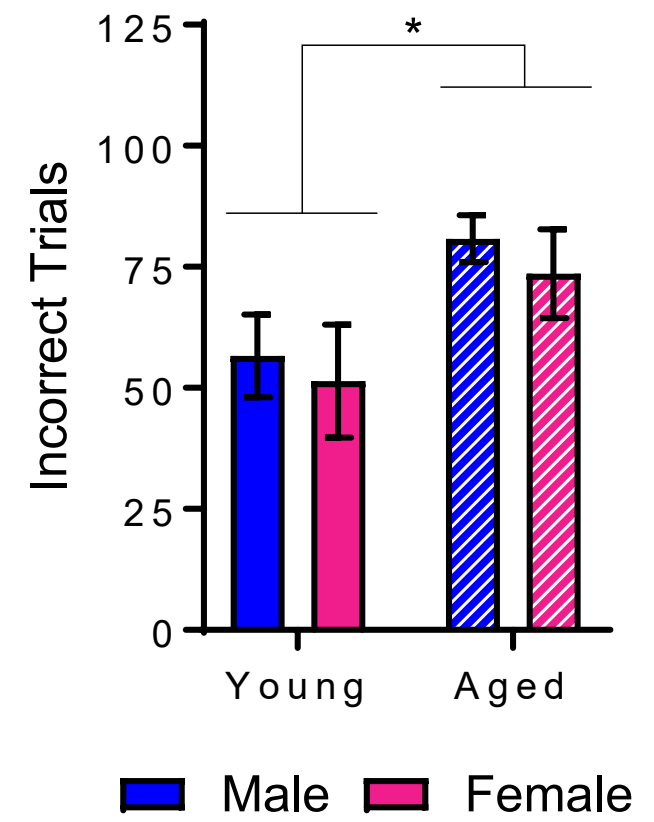
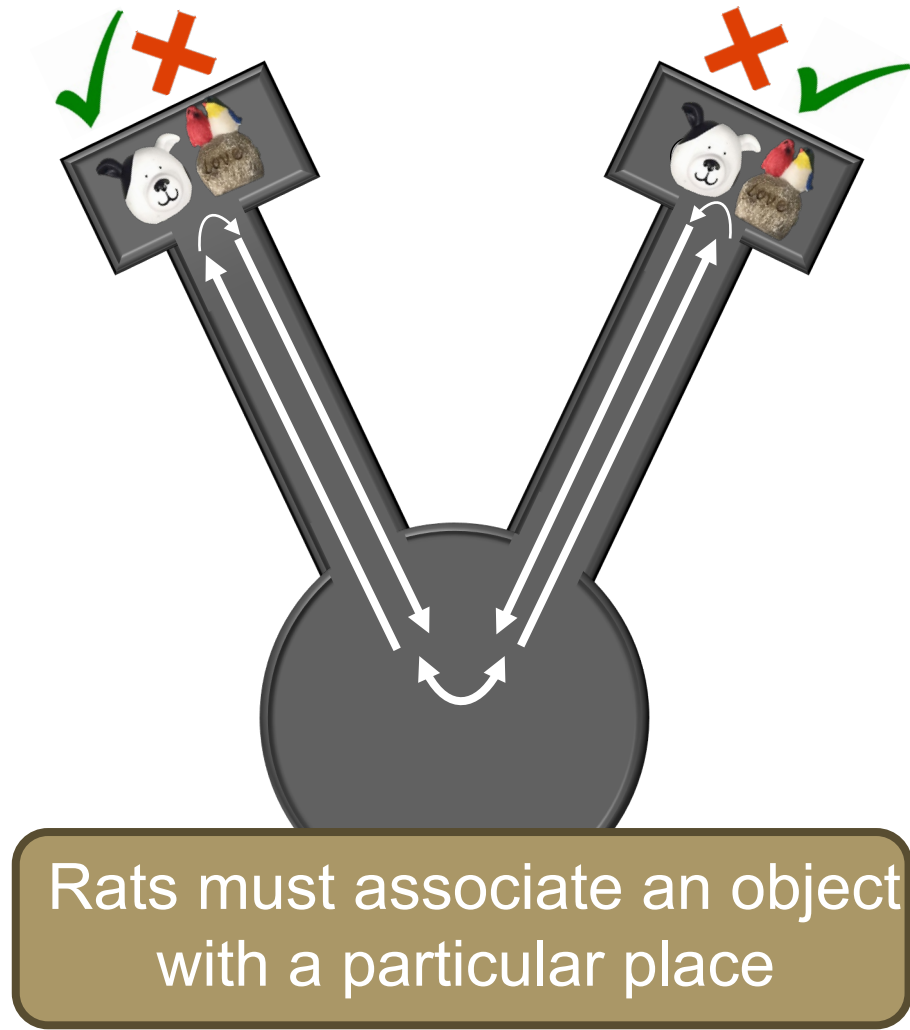
Group



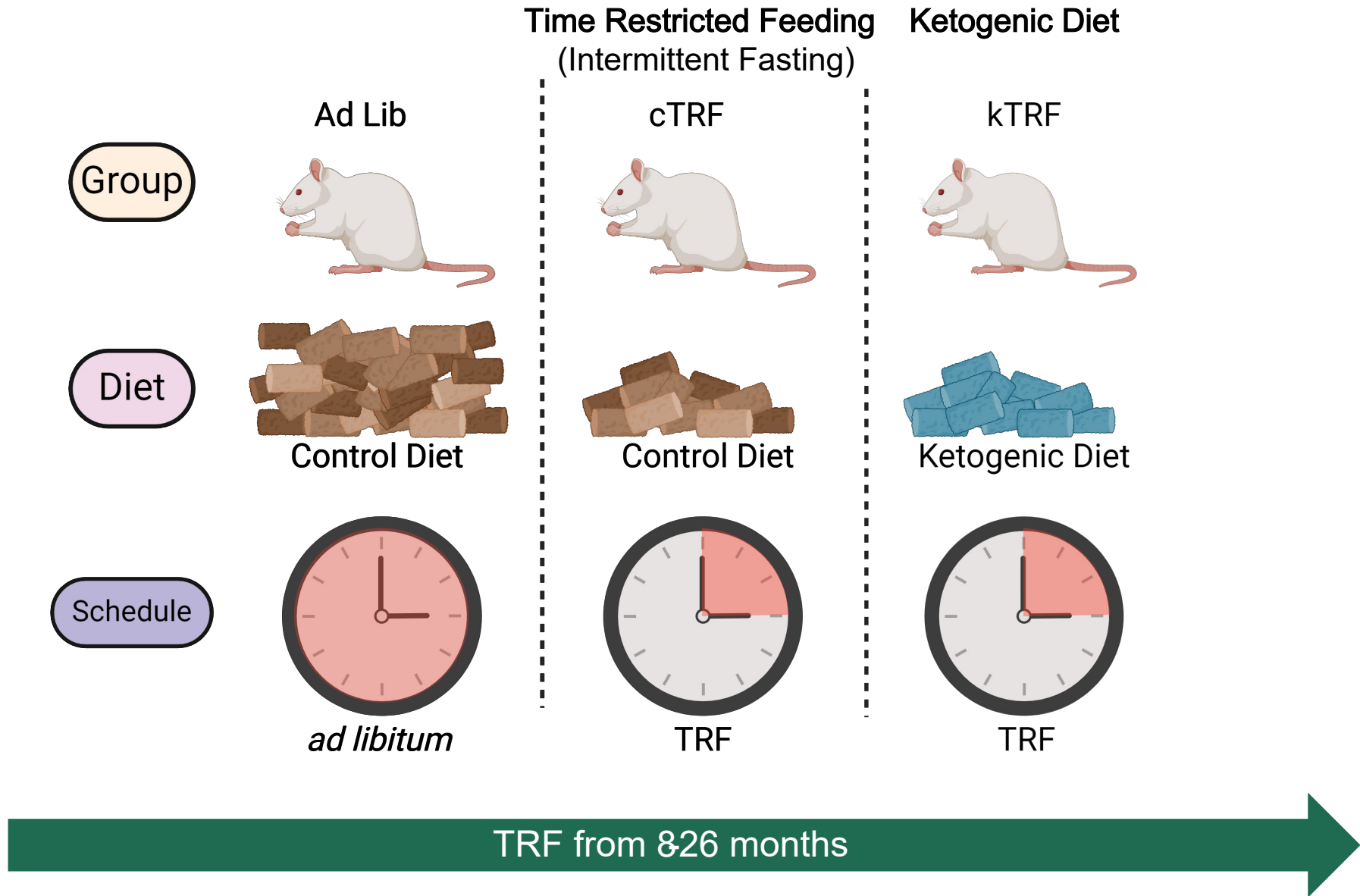
Diet



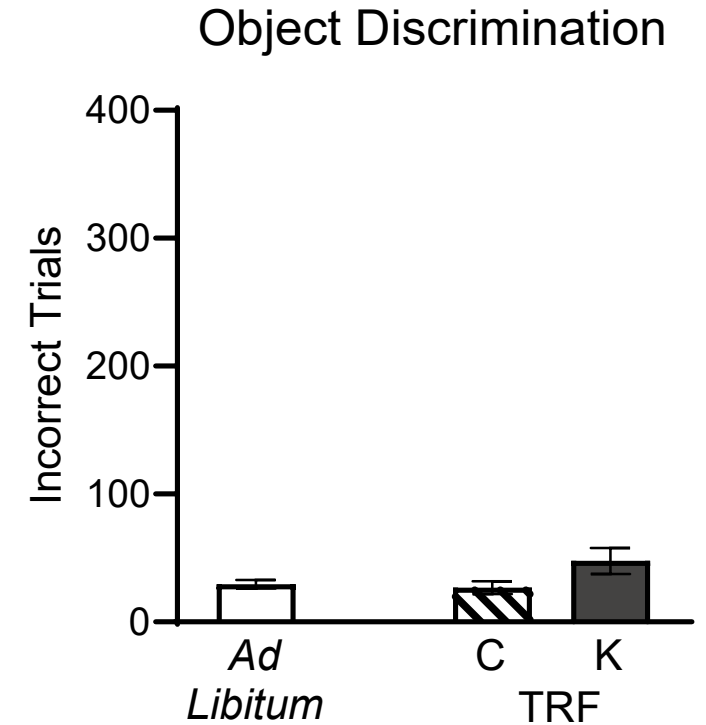
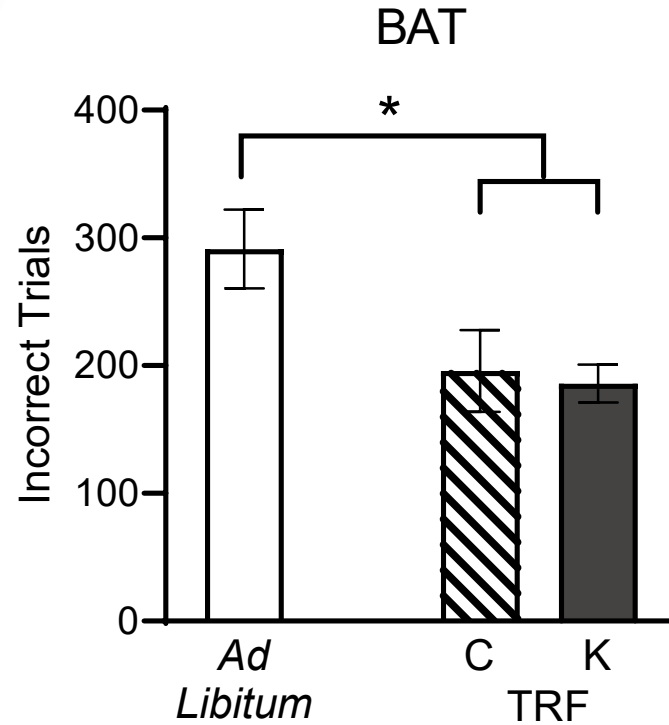
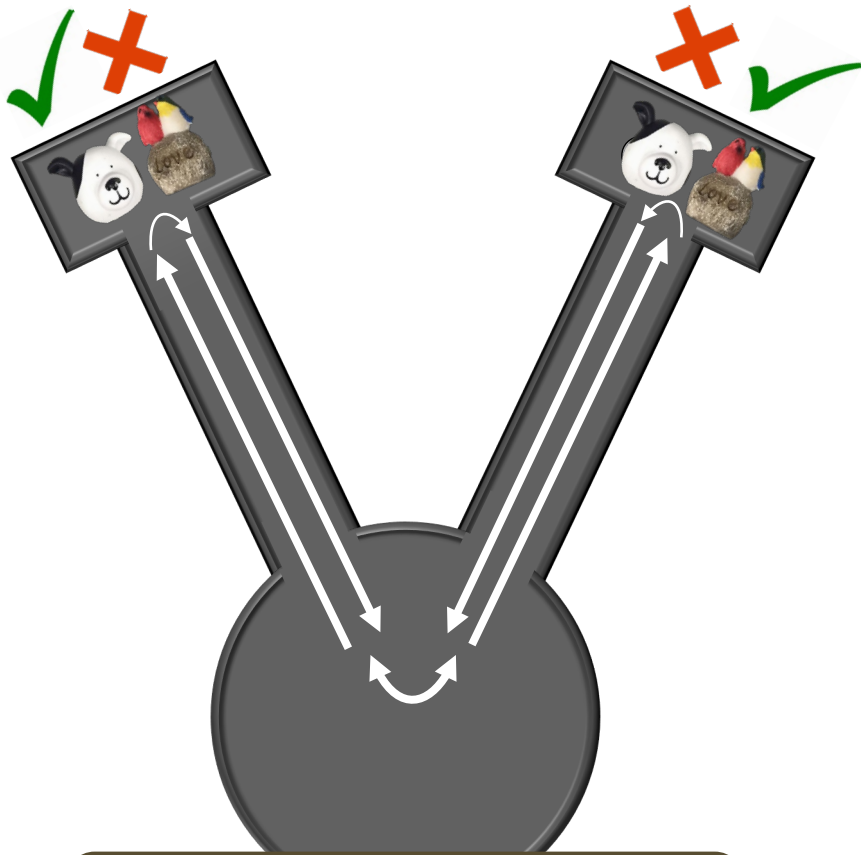
Schedule



Hernandez et al., Behavioral Neuroscience 2020



Object-place paired association impairments are rescued by time restricted feeding



Gaps in the field

- Most work is done in young subjects
 - What are the long-term effects?
 - Time frame – is there a “too late”?
- Personalized medicine (genetic influence, baseline metabolic effects, dietary history)
 - Human diversity is much greater than rodents
- Integration with other eating paradigms?
- Translatability
 - Rodent vs human metabolism, circadian rhythm, etc – do we see these effects in humans?
- **MECHANISMS**

Acknowledgements



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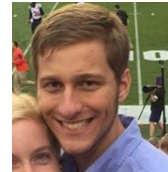
Burke Lab

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Undergraduates

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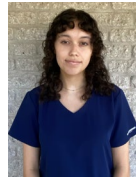
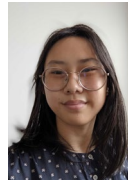
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Priya Chennupati

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