

Mycobacterium vaccae immunization mitigates metabolic disease, hippocampal neuroinflammation, and behavioral changes in chronically stressed mice

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Introduction

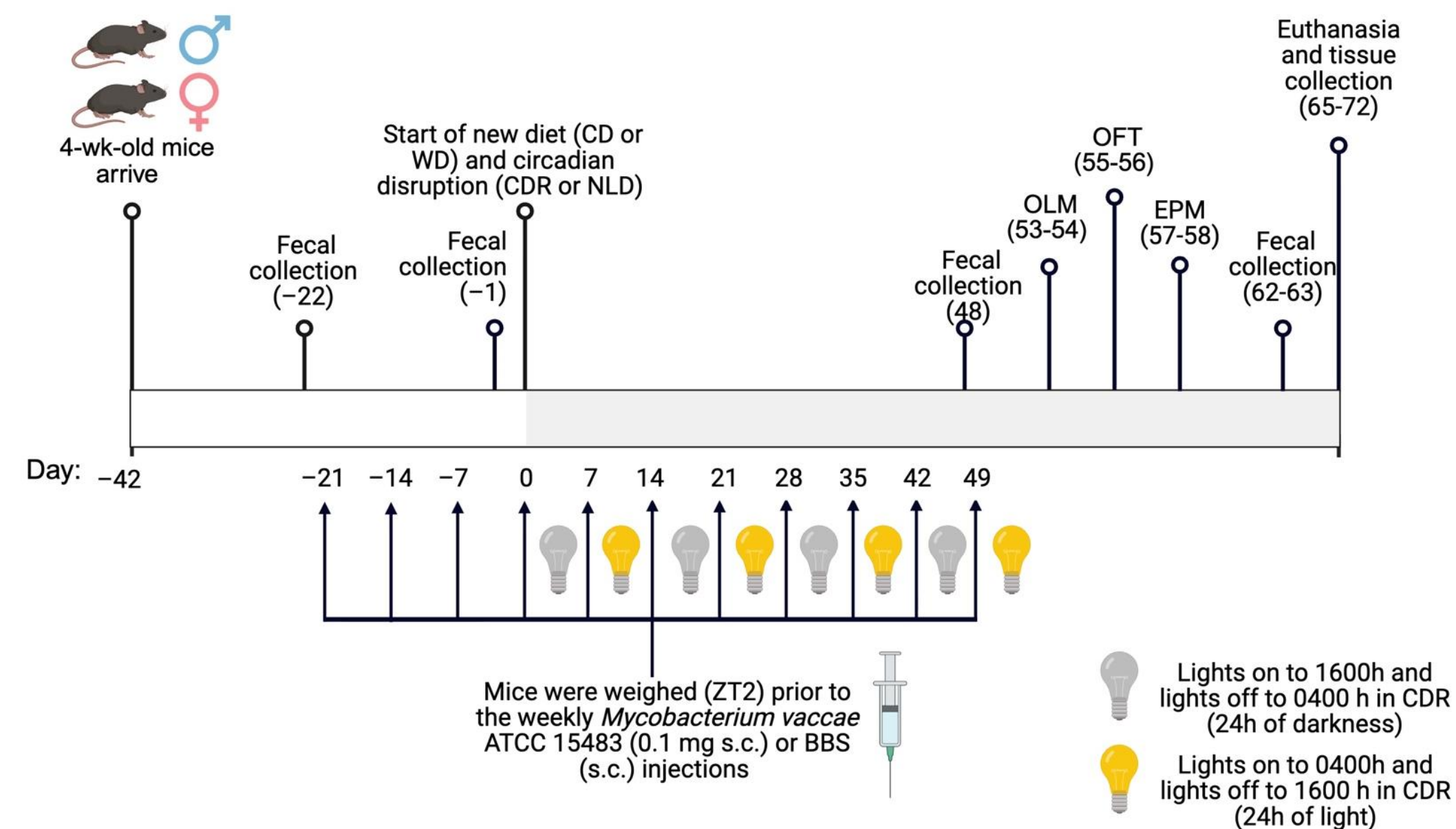
➤ Shift work is common in healthcare, law enforcement, and other professions requiring 24-hour operations and is associated with circadian disruption and increased consumption of high-fat, high-sugar foods¹. Circadian disruption (CDR) and a Western-style diet (WD) are known risk factors for systemic inflammation, metabolic syndrome, type II diabetes, cardiovascular disease, and stress-related psychiatric disorders²⁻⁸. In this study, we examined whether immunization with *Mycobacterium vaccae* ATCC 15483, a bacterium with anti-inflammatory and stress resilience-promoting properties, could protect against metabolic, behavioral, and neuroinflammatory changes induced by circadian disruption and WD consumption.

Research Question

➤ Does immunization with *Mycobacterium vaccae* ATCC 15483 protect against metabolic, neuroinflammatory, behavioral, and gut microbial changes induced by circadian disruption and Western diet consumption?

Methods

(N = 48 male C57BL/6N mice)
(N = 48 female C57BL/6N mice)



Experimental groups:

- ± Western diet
- ± Circadian disruption
- ± *M. vaccae* ATCC 15483 immunization

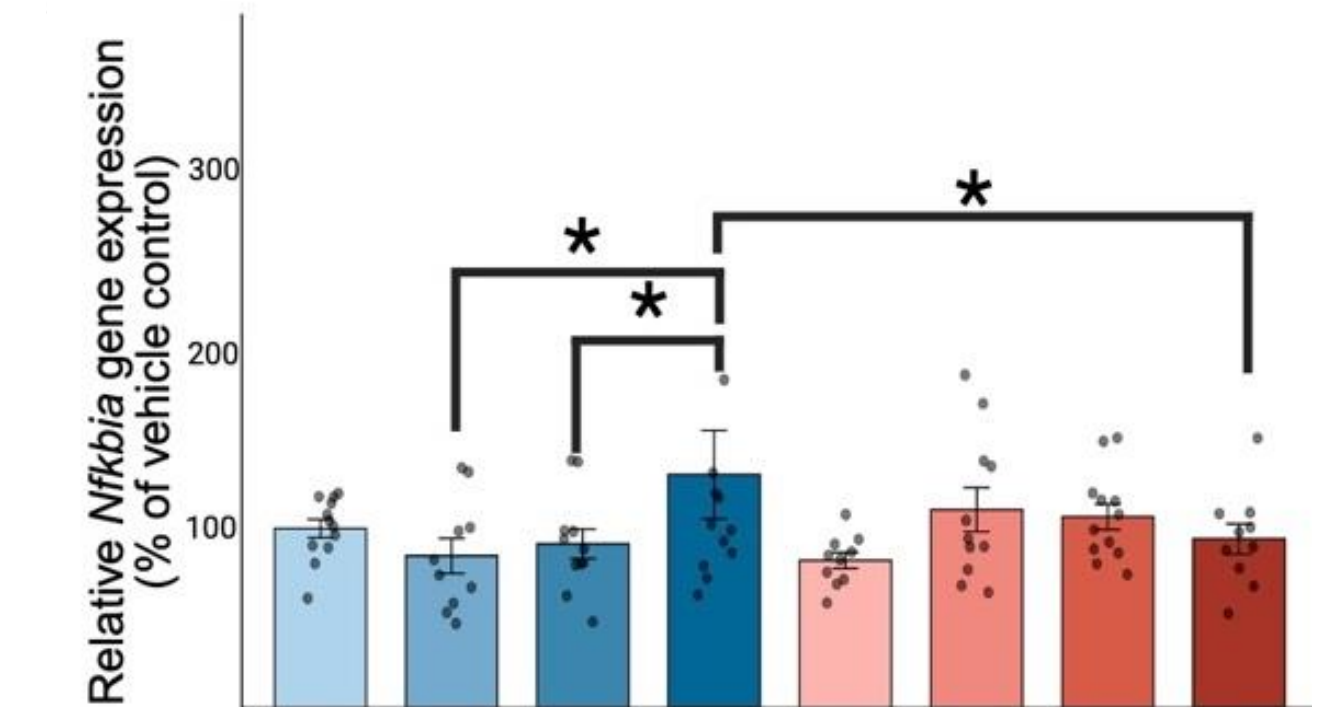
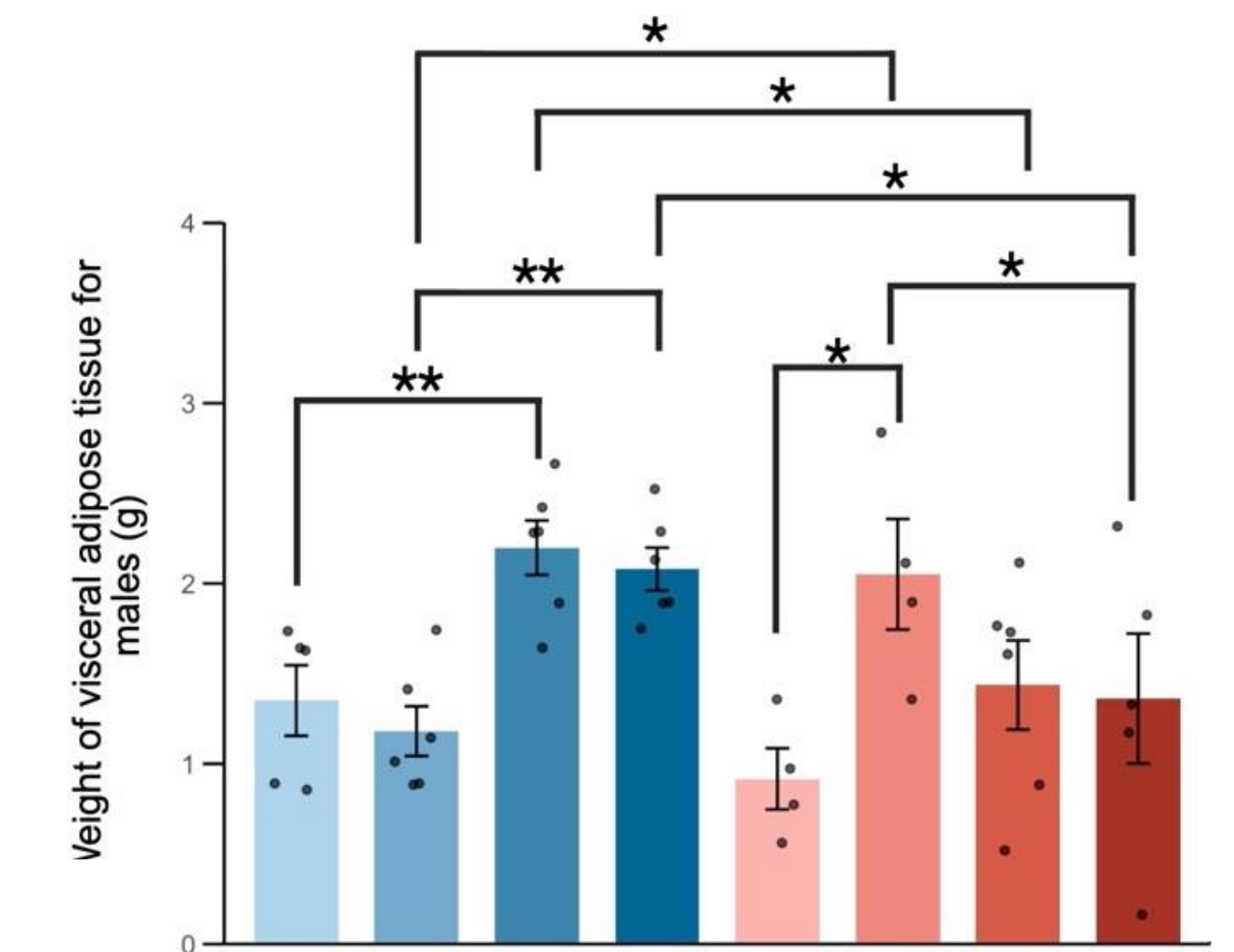
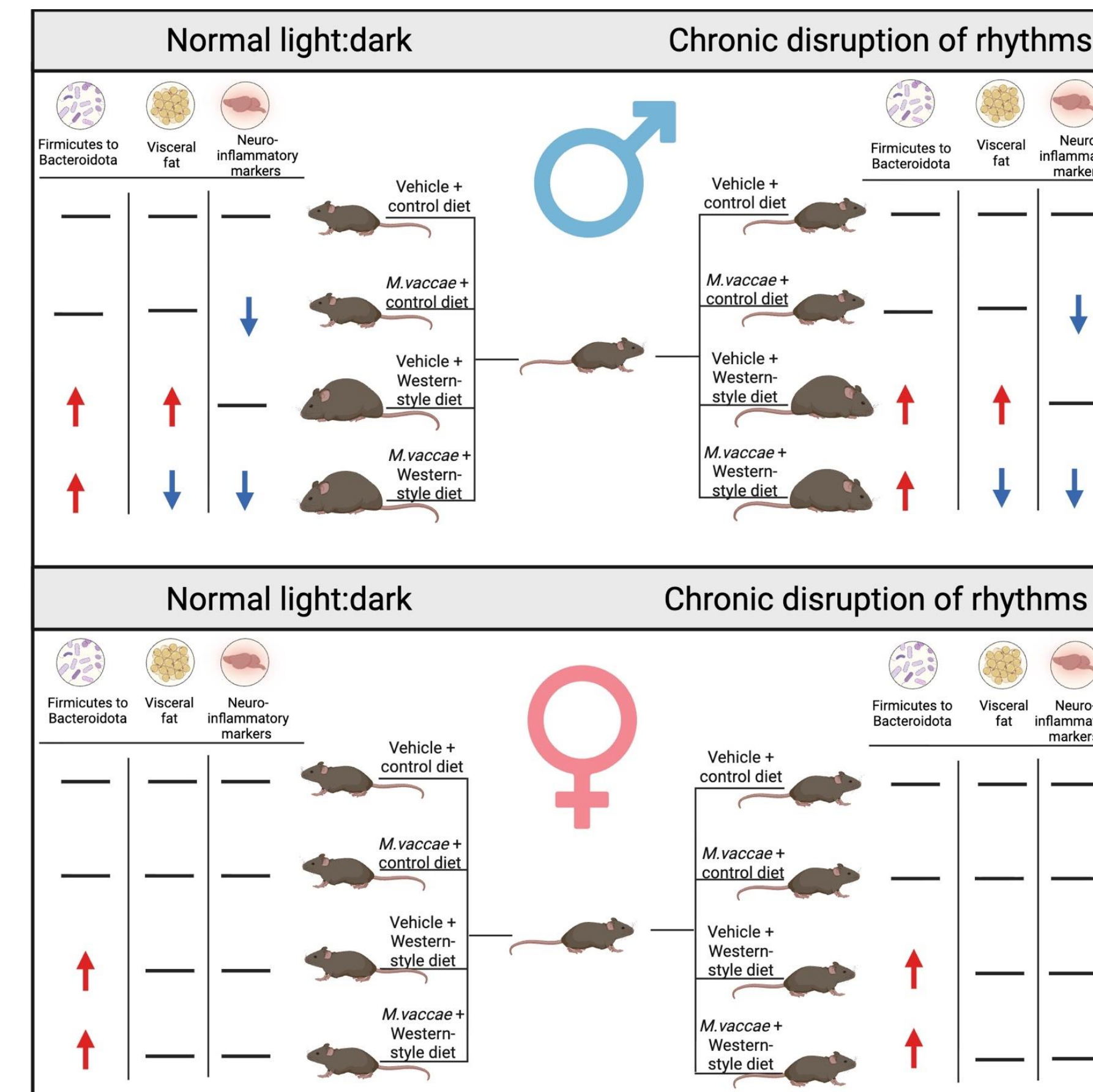
Outcomes measured:

- Behavioral (EPM, OLM, EFT)
- Gut microbial composition (16S rRNA sequencing from fecal samples)
- Body weight & visceral adiposity
- Neuroinflammatory mRNA (RT-qPCR from hippocampus)

Key:

BBS = Borate-buffered saline
CD = Control diet
CDR = Chronic disruption of rhythms
EPM = Elevated plus maze
MV = *M. vaccae* ATCC 15483
NLD = Normal light:dark cycle
OLM = Object learning memory test
OFT = Open field test
WD = Western diet
ZT = Zeitgeber

Results



Conclusions

- MV blocked weight gain/adiposity in male mice
- MV reduced biomarkers of neuroinflammation and microglial priming (*Nlrp3* & *Nfkb*) in the hippocampus
- MV decreased anxiety-like behavior in the open field test amongst male mice
- MV did not alter gut microbiome composition

References

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