# Manganese exposure induces hyperactivity and dopaminergic dysfunction in young C57Bl/6 mice

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## BACKGROUND

- Manganese (Mn) is an essential micronutrient critical for development, neurotransmitter homeostasis, and several enzymatic reactions but is neurotoxic in excess.
- Exposure to high levels of Mn via contaminated drinking water or polluted air is associated with poorer cognition and a higher incidence of attention-deficit/hyperactivity disorder (ADHD) in adolescents.
- Altered functioning of the dopaminergic system has long been strongly implicated in the etiology of ADHD.

## Hypothesis

**Excess Mn exposure alters the dopaminergic neurotransmitter system leading to significant changes in behavior.**


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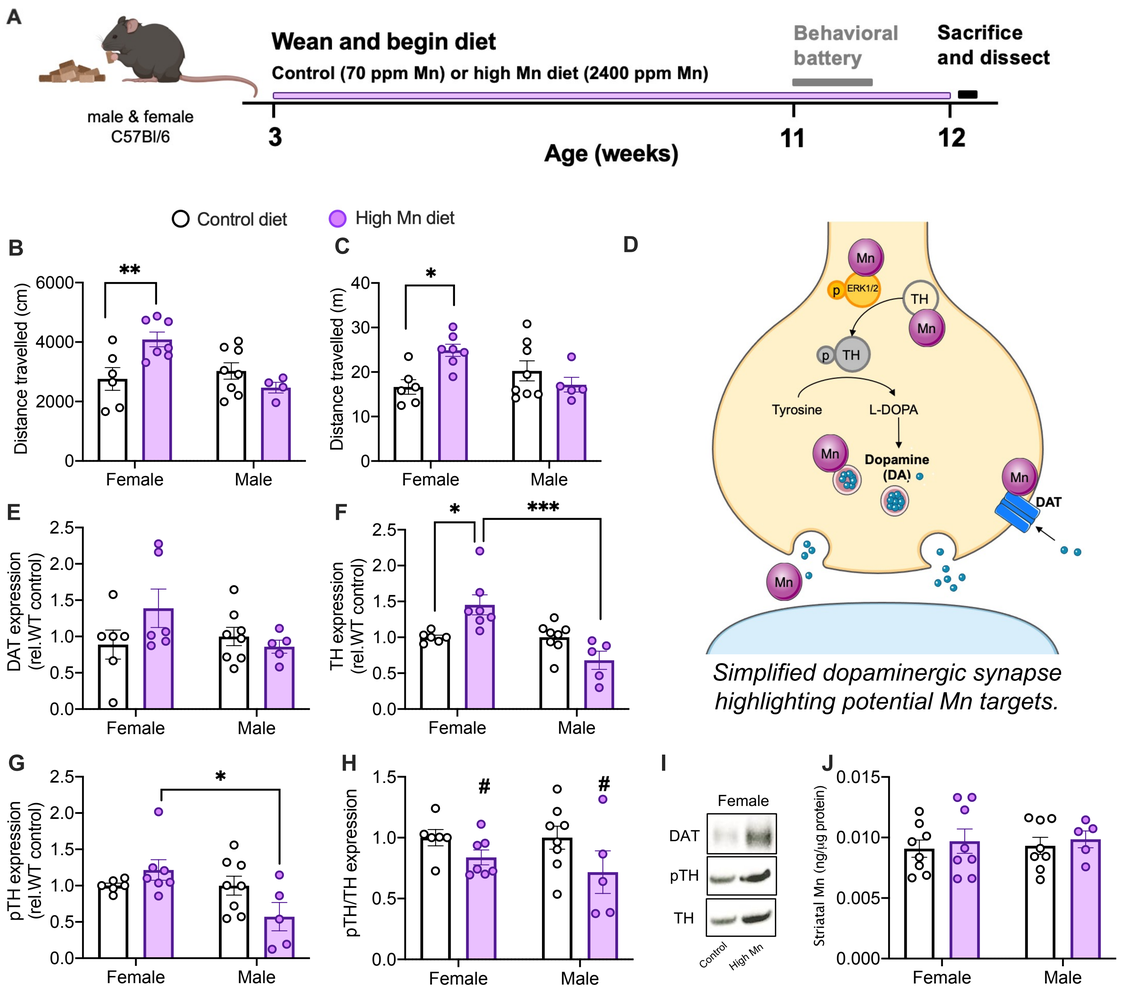
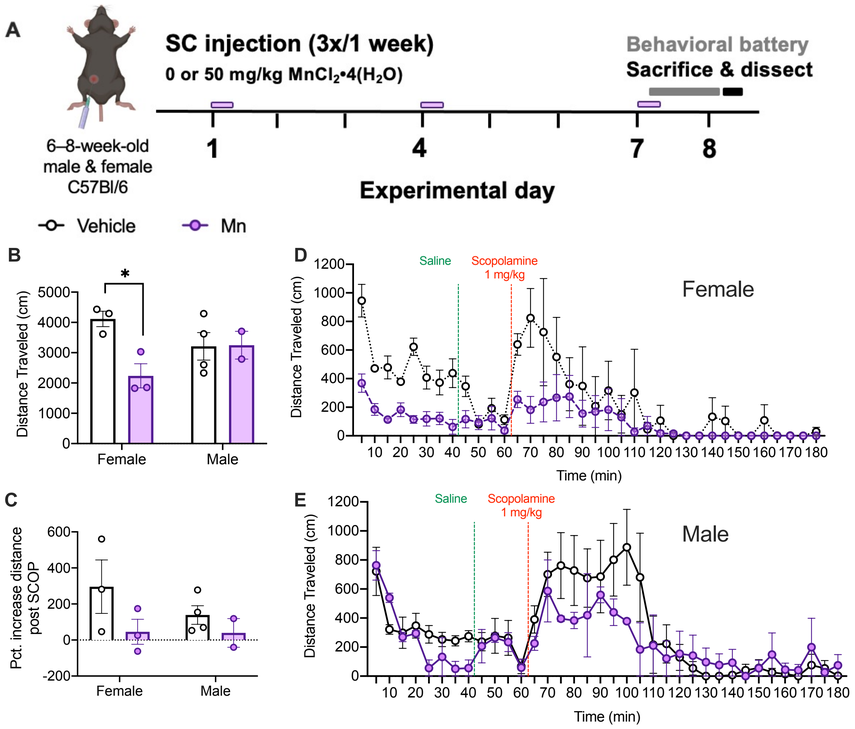
## EXPERIMENTAL DESIGN & RESULTS

**Fig. 1** Chronic high dietary-Mn exposure caused hyperactivity and altered dopaminergic system proteins in female mice only, despite no significant accumulation in striatal Mn concentration. *$p<0.05$, **$p<0.01$, ***$p<0.001$




*Simplified dopaminergic synapse highlighting potential Mn targets.*

**Fig. 2** Acute systemic Mn exposure both decreased total activity and attenuated the activity-inducing effect of scopolamine selectively in female mice. *$p<0.05$




## CONCLUSIONS

- Mn-induced changes in activity are both sex-dependent and route-dependent
- Environmental exposure to metals such as Mn directly impacts the dopaminergic system and related-behaviors