

## **Chronic traffic noise stress accelerates brain impairment and cognitive decline in mice**

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**Objectives:** To investigate the effects of light/dark cycles and sex on the impact of chronic traffic noise exposure on mouse brain structure-function.

**Background:** Although traffic noise exposure is a well-known environmental pollutant whose negative health effect has been discussed in different aspects of the human life, only a few animal studies have tackled this issue as a cohort study, which is not feasible to be addressed in human studies. In addition to the deleterious impact of the daytime noise on well-being, chronic nocturnal noise can also disturb sleep and affects physical and mental health, but to date, little research has examined the neurobiological effects of light/dark cycles of traffic noise exposure.

**Methods:** The mice were randomly assigned to either one of two stress conditions or a control condition. Animals were exposed to traffic noise on either the light-cycle (LC) or dark-cycle (DC) for 30 days.

**Results:** Traffic noise exposure caused the hypothalamic “pituitary” adrenal (HPA) axis hyperactivity, anxiety-like behavior, impairments in learning and memory, dysfunction in balance and motor coordination, and a reduction in variety of brain measures including a brain volume, medial prefrontal cortex (mPFC) area, cortical thickness, hippocampal volume, amygdala area, and the neural density in mPFC and dentate gyrus.

**Conclusions:** All behavioral and brain measures revealed adverse effects of the chronic noise stress irrespective of the LC/DC exposure or sex. Our findings were a re-emphasis on the significance of noise prevention and mitigation strategies for public health.