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One person's nicotine addiction may affect another person's liver

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Thirdhand smoke (THS) is the accumulation of secondhand smoke on surfaces that ages with time. THS exposure is a potential health threat to children, partners of smokers, and workers in environments with current or past smoking, and needs additional investigation. Furthermore, the effects of THS from Electronic Nicotine Delivery Systems (ENDS) exposures are not fully understood. Thus, we hypothesized that thirdhand ENDS exposures alter liver function, and result in differential global gene expression in the livers of C57BL/6J mice exposed to towels contaminated with thirdhand vape aerosols compared to room air controls.

We characterized liver gene expression signatures of inflammation after three weeks of exposure to thirdhand ENDS aerosols in mice by performing total RNA-sequencing (NextSeq 75 high PE). Liver weights did not significantly differ between exposed and control mice. However, we identified 20 genes that were differentially expressed in the livers of thirdhand ENDS exposed mice compared to control mice (false discovery rate (FDR) <0.1). Importantly, Ingenuity Pathway Analysis (IPA) identified specific upstream regulators of liver transcriptome alterations, including *Nupr1* (p= 3.76E-04) which has been proposed as a novel target for liver cancer and *Kcne3*, an important part of a gene expression signature of cigarette smoking and cancer. These findings show that liver inflammation is associated with thirdhand ENDS aerosol exposures in mice and highlight the need to comprehensively assess the health impacts of thirdhand ENDS exposures and design policies that will safeguard the health of susceptible subpopulations who may be at the mercy of tobacco product users.