

E-liquid used in e-cigarettes may affect the metabolic state

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Background:

Cigarette smoke is correlated with a higher risk for developing metabolic diseases such as type 2 diabetes. In recent years, an increasing variety of cigarette alternatives have been promoted to be less harmful. So far, the effects of e-liquids containing nicotine and flavor as a cigarette alternative on the metabolic health - especially glucose metabolism - is unsettled.

Methods:

C57BL/6N male mice were treated with different components of the e-liquids (propylene glycol (PG)/ vegetable glycerin (VG), flavor and nicotine) via gavage for gut exposure or via intratracheal installation (IT) for lung exposure. The gut exposure reflects oral exposure of inhaled substances after mucociliary clearance and swallowing of particles. The metabolic state was tested with monthly glucose tolerance tests (GTT) and insulin tolerance tests (ITT).

Results:

Mice treated with e-liquid (PG/VG and flavor) via gavage showed slightly impaired glucose tolerance after one month of exposure. Addition of nicotine to the e-liquid (PG/VG and flavor) however, led to an improved glucose tolerance, consistent with an insulin sensitizing effect of nicotine described in the literature. These results matched the ITT results, showing a slightly better glucose clearance in mice exposed to e-liquid plus nicotine.

In contrast to the oral exposure, mice exposed to e-liquid components via lung did not show metabolic changes after the first two months of exposure.

Conclusion:

These preliminary data suggest that e-liquids may have an effect on the metabolic state when exposed via the gut. Furthermore, our study corroborates that nicotine in the e-liquid improves glucose metabolism, consistent with previous literature.