

E-cig vapor does not induce genetic mutations associated with cigarette smoke exposure

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E-cigarette vapour does not induce DNA mutations commonly observed with tobacco smoke exposures in lab-based tests.

Scientists at British American Tobacco used a method called the Ames test to compare the mutagenic potential of [cigarette smoke](#) with that of vapour from Vype ePen, a commercially available e-cigarette. DNA mutations result in [genetic instability](#), which may be involved in the development of cancer.

The Ames test is widely used method that uses bacteria to test whether a given chemical or drug causes mutations in the bacteria's DNA. The standard test involves five [bacterial strains](#). In this study, two of these bacteria were used Salmonella typhimurium strains TA98 and TA100, both of which are effective at screening 90-95% of potential mutagens. TA98 and TA100 have been used widely to assess tobacco smoke, but never for the assessment of freshly generated e-cigarette aerosols, until now.

Traditionally, the particulate matter in smoke is assessed, but this is only a small fraction of the tobacco smoke. To more accurately reflect real-life exposure, whole smoke was also tested. In all, the researchers tested both the particulate matter and whole aerosol of smoke from a reference cigarette 3R4F and vapour from Vype ePen.

To do this, they trapped particulate matter from smoke or vapour on a filter pad and then washed the pad with a solvent to produce a stock solution that could be diluted into various concentrations. They then exposed the test bacteria to the same concentrations of either smoke or vapour extract. They also exposed test bacteria to freshly generated smoke or e-cigarette vapour.

Exposure to smoke was seen to cause mutations in both bacterial strains in a dose-dependent manner - the higher the dose, the higher the mutation rate. Whole smoke took just 24 minutes to cause mutations. E-cigarette vapour extracts, gave no response, and whole vapour did not cause the bacteria to mutate, even after three hours of continuous exposure, which was comparable to the results obtained from air and untreated controls.

'These findings suggest that Vype ePen vapour does not induce the mutations observed on exposure to smoke,' said Dr James Murphy, Head of Reduced Risk Substantiation at British American Tobacco. 'This study adds data to support the growing evidence base that e-cigarettes have the potential to be significantly less harmful compared to cigarette smoke, though more research is needed' he said.

Many in the public health community believe e-cigarettes offer great potential for reducing the public health impact of smoking. Public Health England, an executive body of the UK Department of Health, recently published a report saying that e-cigarettes are 95% safer than cigarettes. The Royal College of Physicians have said that the public can be reassured that e-cigarettes are much safer than smoking and that they should be widely promoted as an alternative to cigarettes, but called for more research to be done on the potential long term effects of using e-cigarettes.

The results are published in *Mutation Research/Genetic Toxicology and*

Environmental Mutagenesis.

More information: D. Thorne et al, The mutagenic assessment of an electronic-cigarette and reference cigarette smoke using the Ames assay in strains TA98 and TA100, *Mutation Research/Genetic Toxicology and Environmental Mutagenesis* (2016). [DOI: 10.1016/j.mrgentox.2016.10.005](https://doi.org/10.1016/j.mrgentox.2016.10.005)

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