

# E-cigarettes containing nicotine cause blood clotting and make small blood vessels less adaptable

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Researcher Gustaf Lyytinen tests the effects of using e-cigarettes on the small blood vessels. Credit: European Respiratory Society/Gustaf Lyytinen

Using e-cigarettes containing nicotine causes an immediate increase in

the formation of blood clots and a deterioration in the ability of small blood vessels to expand and dilate, as well as raised heart rate and blood pressure, according to research presented at the European Respiratory Society International Congress.

Researchers say these effects are similar to those caused by smoking [traditional cigarettes](#) and with [long-term use](#), they could result in [heart attack](#) or stroke.

The study was presented by Gustaf Lyytinen, a clinician at Helsingborg Hospital and researcher at the Karolinska Institute in Stockholm, Sweden. He and his colleagues carried out detailed experiments with a group of 22 women and men aged between 18 and 45 years who were occasional smokers but otherwise healthy.

Each volunteer was tested before and after taking 30 puffs from an e-cigarette containing [nicotine](#), and before and after 30 puffs from an [e-cigarette](#) not containing nicotine. These two sets of tests were carried out on separate occasions, at least one week apart.

On each occasion, the researchers measured volunteers' [heart rate](#) and blood pressure and collected a [blood sample](#) before they used the e-cigarettes, then 15 minutes after use and again 60 minutes after use. Researchers also carried out tests to measure any impact on the circulation of blood through the body's tiny blood vessels, before volunteers used e-cigarettes and 30 minutes afterwards. These tests use a laser to visualise how well blood vessels in the skin are able to dilate and therefore regulate the supply of blood around the body.



Close up of equipment used to test effects of e-cigarette use on small blood vessels. Credit: European Respiratory Society/Gustaf Lyytinen

Comparing the results of the tests, researchers found that using e-cigarettes containing nicotine created a set of immediate short-term changes in the volunteers. Dr. Lyytinen and his team discovered an average 23% increase in blood clots after 15 minutes that returned to normal levels after 60 minutes. There were also increases in volunteers' heart rates (from an average of 66 beats per minute/bpm to an average of 73bpm) and [blood pressure](#) (from an average of 108 millimetres of mercury/mmHg to an average of 117mmHg). Researchers found that the volunteers' blood vessels became temporarily narrower after they used nicotine-containing e-cigarettes.

These effects were not seen after volunteers used e-cigarettes that did not contain nicotine. Nicotine is known to increase levels of hormones such as adrenaline in the body, which in turn can increase the formation of blood clots.

Dr. Lyytinen said: "Our results suggest that using e-cigarettes that contain nicotine have similar impacts on the body as smoking traditional cigarettes. This effect on blood clots is important because we know that in the long-term this can lead to clogged up and narrower blood vessels, and that of course puts people at risk of heart attacks and strokes."

Jonathan Grigg, who was not involved in the research, is Chair of the European Respiratory Society Tobacco Control Committee and Professor of Paediatric Respiratory and Environmental Medicine at Queen Mary University of London, UK. He said: "The damage caused by smoking traditional cigarettes, including the effects of nicotine on the body, are well-known. E-cigarettes are relatively new, so we know much less about what they do to the body."

"This study suggests that e-cigarettes containing nicotine can make clots



form in users' blood and make their small [blood](#) vessels less adaptable. This is a small study, so we'd like to see more research looking at these effects.

"Some people may use e-cigarettes when attempting to quit smoking because they are marketed as being safe, but this study adds to the growing evidence on the harmful effects of e-cigarettes. Other aids to quitting smoking which are evidenced-based and recommended by ERS, such as patches or gum, do not result in the lungs being exposed to high concentrations of potentially toxic compounds."

**More information:** Abstract no: OA2576 "Electronic cigarettes containing nicotine increase thrombotic activity and impair microcirculation", by Gustaf Lyytinen et al; Presented in session, "Tobacco and nicotine research during the pandemic" at 14:45-16:15 CEST on Monday 6 September 2021. [k4.ersnet.org/prod/v2/Front/Pr...?e=262&session=13559](https://k4.ersnet.org/prod/v2/Front/Pr...?e=262&session=13559)

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