Lay Summary

E-cigarette: Solution or Illusion?

Just a few years ago, the dream of many smokers seemed to come true: smoking without harm. The E-cigarette revolution was starting: vape shops popped up everywhere, even the bakery next to my place became one ("better some healthy nicotine in your lungs today, than a fatty bun in your belly tomorrow" my neighbour advised me once, covered in a thick white cloud). The world divided in two: the E-cigarette believers and the sceptics. Who is right? A 2018 PNAS article supports the latter.

If long-term risks are lurking into the vapers' bodies, they will come clean only in years; but Hyun-Wook Lee and colleagues wanted to catch them on time – especially if cancer turned out to be one of them. And they used mice and human cells to see into the future.

Substances that can cause cancer (also called "carcinogens") modify the DNA of our cells or hinder our defences. To understand if the E-cigarette smoke is a carcinogen, the researchers looked for changes in the DNA of mice that breathed it in for 12 weeks for a few hours a day (conditions that mimic someone that has moderately vaped for 10 years).

Hyun-Wook Lee and colleagues discovered that the smoke jeopardised the integrity of the DNA in lungs, heart, and bladder: when the mice breathed in the vapour, nicotine entered their body where it was transformed into smaller compounds; these compounds bound the DNA and formed combinations that are known to increase the risk of cancer. In the lungs, the smoke also reduced the amount of two crucial fighters against mutations, breaching the mechanisms that repair the DNA.

When the scientists gave nicotine to lung and bladder human cells, they saw the same effects: the cells became more vulnerable because the nicotine damaged their DNA and harmed its safeguards. The "smoking" cells also behaved differently from the "non-smokers" as they thrived in an environment where only cancer cells can survive.

This study suggests that the E-cigarette smoke is a carcinogen in mice and, potentially, in humans. The researchers challenge the ideas that vaping is safe and that nicotine is harmless on its own, questioning the way companies

and health services have promoted E-cigarettes. However, they must confirm their results in humans. But shall we stay on the safe side, or take the risk and wait a couple of decades to know? Unfortunately for the vapers, the best answer seems to be the good, old one: you better quit.

Source: Proc Natl Acad Sci U S A. 2018 Feb 13;115(7):E1560-E1569. doi: 10.1073/pnas.1718185115