

Is lung inflammation worse in e-cigarette users than smokers, as a new study suggests?

March 9 2023, by Aaron Scott and Shaun Thein

PICTUREGOER December 13 1952 23



STANLEY MATTHEWS, Blackpool's quicksilver outside-right, has been capped for England no less than 33 times. Stan takes his training very seriously and soon discovered the cigarette which suited him best. "It wasn't till I changed to Craven 'A,'" he says, "that I learnt what smooth smoking meant."

"The cigarette for me"
SAYS FOOTBALL GENIUS **STANLEY MATTHEWS**

EVERY WEEK crowds warm to the brilliant technical play of master-schemer Stan Matthews—football's greatest name to fans and players alike. Like so many leading sportsmen Stan's a Craven 'A' smoker. "For a really satisfying cigarette that's kind to your throat," he says, "give me a Craven 'A' every time."

P.S. That cork tip really does make a difference, you know. There's a lot more pleasure in a cigarette with an end that's always clean, and dry, and firm between your lips

CRAVEN 'A' smooth, clean smoking

Cigarettes were once regarded as an aid to a healthy lifestyle. Credit: [Science Museum, London](#), [CC BY](#)

A [small study](#) that compared the lungs of cigarette smokers with e-

cigarette smokers found that e-cigarette smokers had more lung inflammation than those who smoked tobacco. The pilot study, published in the *Journal of Nuclear Medicine*, is the first to use PET imaging to compare smokers' lungs with vapers' lungs.

E-cigarettes are now much more than "new smoking cessation tools", they are big business. The global e-cigarette or "vape" market value has increased from [US\\$1.7 billion in 2013](#) (£1.4 billion) to an estimated all-time high of [US\\$24.6 billion in 2022](#) (£20.8 billion). This massive increase in sales reflects an increase in usage beyond the ex-smoker market. Youth uptake is also at an all-time high. Current figures suggest [one in ten](#) middle- to high-school students in the US uses an e-cigarette.

Understanding the effects that e-cigarettes have on the lungs is essential for doctors to prepare for the future. Tobacco cigarettes were originally regarded as an aid to a [healthy lifestyle](#). This poor understanding persisted while [scientific evidence](#) battled with economic interest from big tobacco companies, before the actual devastating effects of smoking were revealed decades too late. This same economic interest persists today, so it is vital for scientists to examine all the emerging evidence to ensure history does not repeat itself.

Many of the studies of e-cigarettes have so far looked at the effects of the vapor on [immune cells](#) in vitro (in a dish). These experiments show that immune cells that are normally involved in inflammation don't function as they should, which might cause damage to the lungs.

Macrophages, immune cells that are in human lungs and help to digest bacteria and regulate inflammation, have [been shown](#) to cause more [inflammation](#) when [exposed to e-cigarette vapor](#).

This latest [pilot study](#), from researchers at the University of Pennsylvania, examined [lung inflammation](#) in people who have vaped,

those who smoked cigarettes, and non-smokers. They used [positron emission tomography](#) (PET) imaging to examine the participants' lungs. This involves using "tracer molecules", and is usually used in [cancer diagnosis](#).

In this case, the tracer targeted an enzyme called inducible nitric oxide synthase, or iNOS. This enzyme is involved in the production of nitric oxide in the body—a gas that triggers inflammation. People with asthma and [chronic obstructive pulmonary disease](#) (COPD) have high levels of inflammation and iNOS.

Participants inhale the tracer, which binds to the enzyme. This can then be detected by the radioactivity receiver. Following this, images can be compared to determine how much tracer has bound in the lungs of smokers, vapers and non-smokers.

Significantly higher levels

The researchers found significantly higher levels of iNOS in e-cigarette smokers compared with both non-smokers and those who smoked normal cigarettes.

They also looked at blood markers of inflammation but found no difference between the groups. These results suggest that inflammation specifically in the lungs is worse in e-cigarette smokers than non-smokers and even those who smoke regular cigarettes.

But how robust are these findings?

For a start, this was a small study. There were five e-cigarette users, five cigarette smokers, and five people who had never smoked cigarettes or e-cigarettes. Larger studies are needed to replicate these findings and provide more robust statistics.

Also, [e-cigarette use](#) is very different between people. The liquid can be of different flavors and can contain varying concentrations of the chemicals used to create the vapor clouds. Different devices heat to different temperatures. And unlike tobacco cigarettes, scientists don't have a way to measure how much someone vapes. All this means that the five e-cigarette users could be extremely heavy users or very light users.

Despite these limitations, the study shows that the effects of e-cigarette vapor on immune cells does lead to inflammation in the lungs, with even higher levels of inflammation than for tobacco cigarette smokers. This is against the current weight of evidence suggesting lower levels of harm in vaping compared with smoking. More important here is the take-home message that [e-cigarette](#) smoking might harm human lungs in the long term, based on the short-term danger signals shown in this study.

Doing harm to prevent a greater harm

The usefulness of e-cigarettes is a more complex issue. Some treatments given to cancer patients [cause harm](#) to healthy parts of the body while helping fight the cancer. It is a [cost-benefit analysis](#) to decide if the benefit is worth the harm associated with use.

E-cigarettes may also cause harm but could still be recommended for the right people and the right reasons. E-cigarettes are being used to help people stop tobacco smoking. When we compare the chances of getting smoking-related diseases like COPD and cancer in people who smoke tobacco cigarettes [compared with e-cigarettes](#), the rates are lower.

Using e-cigarettes to quit smoking seems like the right first step. Yet, as we don't know what problems might be caused by using e-cigarettes for long periods, this should not be the last step on the journey for smokers. Quitting nicotine altogether should be the end goal to ensure long-term health.

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