They've been called safe, dangerous, a way to quit smoking – and a way to start. New Scientist sifts through the evidence about e-cigarettes

THE juice bar is clean and bright with a nice-looking selection of drinks and cakes – just like a regular London cafe, but with one big difference: the kind of juice that's on offer.

This is one of thousands of small outlets carving out a share of the growing e-cigarette market. Its main selling point is a vast array of flavoured nicotine liquids or e-juices. There are fruit flavours, minty flavours, fun flavours like cola and grown-up ones like rum, pina colada and even tobacco. After testing a few, I settle for watermelon and almond, plus a rechargeable electronic cigarette kit. And so my experiment begins.

E-cigarettes have been around for almost a decade, but in the past year or so have grown rapidly in popularity. And as their use has soared, the debate around their health effects has ignited.

On one side are those who view them as a godsend in the war on tobacco, because they offer smokers a safer way to feed their addiction and a crutch to help them quit. On the other side are those who argue that the devices might not be safe, that they won't help people give up smoking, or, worse, that they could reverse the gains of the anti-smoking movement.

As someone who has repeatedly fallen off the no-smoking wagon, I was interested to know whether arming myself with an e-cigarette could keep me from slipping back into unhealthy habits. But first I needed to find out how much we really know about the impacts of e-cigarettes.

The claim that e-cigarettes are a healthier alternative to smoking makes a lot of sense. Instead of hot, dirty smoke, you inhale cool, clean vapour – and hence avoid the toxins, carcinogens and particulates that are responsible for tobacco's toll on health.

"Smokers smoke for nicotine but they don't die from nicotine, they die from the combustion products in smoke," says Konstantinos Farsalinos, a leading e-cigarette researcher at the Onassis Cardiac Surgery Center in Athens, Greece. "If you compare tobacco cigarettes with e-cigarettes the difference in the risk is vast. For a smoker who switches, there is no doubt that there will be significant health benefits."

Even outspoken critics of e-cigarettes agree they are likely to be orders of magnitude safer than smoking cigarettes. "They have to be less toxic," says Stanton Glantz of the University of California, San Francisco.

That certainly chimed with my experience. After a couple of months, I found I was vaping more than I ever smoked, but it felt like no big deal. I found it relaxing, and except for a bit of a sore throat at first there were no noticeable negative effects – and no smell.

That, however, doesn't mean vaping is a breath of fresh air. I may not be breathing in smoke but I am still inhaling nicotine, flavourings, the solvents in which they are dissolved and numerous by-products, many of which are also found in tobacco smoke.

So far, though, the risks appear small compared with cigarette smoke – at least in the short term. Nicotine itself appears harmless, though addictive. The solvents are classed as safe and the nasties are found in trace amounts.
"We have strong arguments that e-cigarettes are less harmful," says Maciej Goniewicz, an oncologist at Roswell Park Cancer Institute in Buffalo, New York. "But are they really safe? What would happen after 20 years of puffing on e-cigarettes? We need the studies on this."

Unsurprisingly, given vaping’s short history, such studies don’t exist. But from what we know it seems unlikely that in 20 or 30 years we will face an epidemic of e-cigarette-related diseases.

A much more contentious – and important – question is whether e-cigarettes help people quit smoking. Despite anecdotal reports that they do, the evidence is as hazy as a puff of smoke.

Part of the problem is that e-cigarettes are so varied and evolve so fast. Although trials have found e-cigarettes to be as effective as nicotine patches at helping people quit, the results remain inconclusive, says Robert West of University College London. This is mainly because in the time it takes to conduct a clinical trial, the e-cigarettes used in it are already obsolete.

In possibly the most compelling study so far, West collected data on more than 5800 smokers who had tried to quit at some point in the previous six months using various strategies including e-cigarettes. He found that about 20 per cent of the vapers were successful. That was about twice the success rate of those who went cold turkey, roughly the same as those who used prescription drugs or nicotine replacement therapy, but lower than the success rate for "stop smoking" services.

West estimates that around a million people in England have tried to quit smoking using e-cigarettes in the past year. "And that's just the tip of the iceberg because we know that probably another million at least are using e-cigarettes to cut down."

Anti-smoking pressure group Action on Smoking and Health (ASH) estimates that a third of the UK's 2.1 million vapers are ex-smokers who say they used e-cigarettes to help them quit. "That, to my mind, is a huge number," says Gerry Stimson, director of the Centre for Research on Drugs and Health Behaviour at Imperial College London.

Most of the rest continue to smoke alongside vaping – so called dual-users. "I don't see that as a big problem," says Stimson. "Dual use is, in effect, cutting down, and cutting down is a good step to quitting."

Others, though, strongly disagree. Arch critic Stanton Glantz admits that while e-cigarettes help those who are intent on quitting, most vapers aren't using them in that way. "They are propping up smoking," he says.

Overall, he claims, e-cigarettes discourage smokers from quitting as well as enticing non-smokers to start. That's because they allow smokers to circumvent smoking bans, helping to destigmatise – or "re-normalise" – smoking, and target young people through advertising.

"What's driving [the decline] is the unacceptability of smoking. The way to solve the problem is to continue pushing people down that curve. What cigarette companies are trying to accomplish with e-cigarettes is to reverse that process," says Glantz. "That's why you shouldn't be allowed to use e-cigarettes where you can't smoke."

"There are still some important unanswered questions, but the writing is on the wall. The net public effect they are having is going to be negative," he adds.

Similar arguments apply to advertising. Glantz fears that adverts making e-cigarettes look cool could encourage young people and ex-smokers to start vaping, and eventually lead them to tobacco. Adverts often use celebrity endorsements, speak of freedom or insinuate health benefits. "I feel like I'm back in the 1970s," says Glantz. "We are seeing all the same marketing. It's bizarre."

Nonetheless, the UK and 26 US states already ban the sale of e-cigarettes to minors. And under new European Union legislation, which will be enforced from 2016, advertising of e-cigarettes will be restricted.
The re-normalisation argument also has its detractors. "You could argue it's de-normalising because it's normalising an alternative," says West. What's more, many of the arguments apply to first-generation products that were designed to look like cigarettes. But modern ones are totally different, West says. "If you are in a room with someone who has lit up a cigarette or if you are in a room with someone who has taken out their e-cigarette, there is absolutely no comparison."

West and others also say there is no evidence to support claims of re-normalisation. "The worry is simply not borne out. You've got smoking rates going down, you've got quit attempts going up and you've got minuscule numbers of people who have never smoked using electronic cigarettes," says West.

There is also little evidence that e-cigarettes can be a "gateway" to tobacco. A recent survey of more than 25,000 adults across the EU found that just over a quarter had tried an e-cigarette. Of these, three-quarters were current smokers and most of the rest had recently quit. Just 1.2 per cent of people who had never smoked had tried them.

Morals vs evidence
Proponents of vaping say that its critics are making arguments based on morals, not evidence. The focus should be on harm reduction, they say, and e-cigarettes are a useful tool. "I am not unconcerned," says West. "But we need to be mindful of the potential benefits that smokers may be getting from a product that, if it weren't available, then they might still be smoking."

These arguments are now playing out at the highest levels of global health. Earlier this year, 50 scientists wrote to World Health Organization director Margaret Chan urging a light touch in e-cigarette regulation in the interests of public health. They argued that tight regulation would help the large tobacco companies by allowing them to squeeze out innovative products and "re-assert their oligarchy with e-cigarettes", as Clive Bates, director of ASH, puts it.

In response, 129 health and medical experts wrote to Chan pressing for e-cigarettes to be regulated in the same way as other tobacco products. Light regulation would mainly benefit big tobacco, they argued.

Last month, the WHO issued its judgement – and it came down hard on e-cigarettes. It called for strict regulation, including a ban on use indoors and in public places, and tight controls on advertising. The WHO also said there was insufficient evidence to claim that e-cigarettes help people to quit and that flavoured nicotine liquids should be banned until there is proof that they do not encourage young people to vape. And so the arguments rage on.

After a few months, I have become quite attached to my e-cigarette and use it most days. I would never have smoked as much. I am sure vaping is better than smoking, but the long-term effects are a concern. I found myself more tempted to smoke when my e-cigarette ran out of charge. With that in mind, I have decided to put it away for now.

For hardcore smokers, though, the benefits of switching seem immeasurable. A recent study comparing the overall harmfulness of cigarettes and e-cigarettes, carried out by the UK's Independent Scientific Committee on Drugs, gave cigarettes a score of 99.6 out of 100. E-cigarettes scored just 4 (European Addiction Research, vol 20, p 218).

It is worth recalling that when nicotine gum first came out there was huge amount of opposition to it, says West. "I think we still have that puritanical ethic and I think we just have to be aware that millions of lives are at stake. That's the most important thing."

But even as society wrestles with the implications of this upstart technology, the ground keeps on shifting. Philip Morris, the world's second biggest tobacco company, has revealed plans to launch a new kind of electronic cigarette next year – one that contains tobacco. Stick that one in your e-cigarette and smoke it.