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## The lungs: how they work, what the coronavirus does to them, and the effects of smoking and asthma

Less balloons than buckets of blood strung with air bubbles, the lungs help pull in oxygen, dispel carbon dioxide and play a key role in speech. A person can survive on a single lung, provided it is in top condition, but lungs are easily damaged by illnesses and smoking.



[Anthea Rowan](#)

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We look at how lungs function, and what damage **smoking** and asthma can do to them, as well as how to protect ourselves from flus, colds and viruses that affect the respiratory system. Photo: Shutterstock

Our lungs are a clever combination of effective filter and pair of bellows, huffing and puffing air in and out, pumping with muscle and the aid of the diaphragm and rib cage. Every cell in the body needs oxygen to work properly and the lungs are crucial to this: with every breath we take, oxygen enters our bloodstream and moves throughout the body.

The lungs are one of the biggest organs, a twosome of slightly odd shaped balloons between the liver and heart.

The two are not symmetrical; they're shaped to neatly fit into our anatomy, the right being wider than the left, but shorter to make room for the liver beneath it. The left one is narrower to accommodate the heart. The ribs neatly encircle them in a protective embrace. The surface area of all the tiny alveoli – the little sacs where oxygen and blood meet and mix – would cover a tennis court.

We need oxygen to survive, but if we don't rid the body of carbon dioxide, we'd die anyway. That's where the lungs also play a big role: expelling it.



At rest, a man's lungs can hold about 710ml (24 ounces) of air, a woman's around half that. Photo: Shutterstock

Exhaling toxic CO<sub>2</sub> is just as important as inhaling life-sustaining oxygen – we use only about 5 per cent of the oxygen of every breath, the rest is exhaled and the cycle continues. And lungs also play a key role in speech – the larynx, or voice box, is directly above the windpipe, pushing air from the lungs through the voice box to produce sound.

Lungs are less balloons than buckets – buckets of blood strung with air bubbles. Every time the heart beats, it sends equal amounts of blood to the lungs as it does the rest of the body. Blood is in the lungs for less than a second – long enough to balance the gases.

[Want to quit vaping? It may be harder than quitting smoking](#)

10 Oct 2019



At rest, a man's lungs can hold about 710ml (24 ounces) of air, a woman's around half that. According to the American Lung Association, adults typically take 15 to 20 breaths a minute, about six litres of air, and around 20,000 breaths a day. Babies breathe faster than adults; a newborn's normal breathing rate is about 40 breaths each minute.

The lungs have a neat housekeeping arrangement. Cilia, like a coat of fine hairs, line the bronchial tubes and wave back and forth like seaweed underwater, spreading mucus to help rid the lungs of dust and germs.

A person can survive on a single lung quite well – providing that lung is in tip top condition. Lungs are easily damaged, though. Covid-19, the disease at the centre of the [current coronavirus outbreak](#), is a case in point. Patients in serious condition have inflamed lungs whose tiny alveoli fill with water and pus, and are unable to make the oxygen exchange effectively.



Cilia line the bronchial tubes and wave back and forth, spreading mucus to help rid the lungs of dust, germs and harmful bacteria. Photo: Shutterstock

The first two patients to die from the virus in China were healthy adults, but they were long-time smokers. Dr Raymond Tso, a US-trained Hong Kong specialist in respiratory medicine, stresses that smoking is the single worst thing we can do for our lungs.

“Both [cigarette smoking and heat-not-burn e-cigarettes can cause great damage to the lung tissue](#),” Tso says.

According to the Mayo Clinic, based in Rochester in the US state of Minnesota, **people who smoke have the greatest risk of lung cancer. The more a person smokes, the greater the risk: 15 to 30 times more, according to the US Centres for Disease Control and Prevention – about 80 per cent of deaths from lung cancer can be attributed directly to smoking. More than 60 carcinogens in cigarette smoke directly damage and mutate DNA, a study published in the journal *Nature* last month reported.**

**Despite the assault of smoking, and second-hand smoking** – which has been shown to increase deaths in fetuses and newborns, play a role in sudden infant death syndrome, worsen the severity of asthma in children, and affect healthy lung growth – **after quitting smoking, the lungs can heal virtually completely, that study concluded.**

### [Asthma](#)

is another prevalent lung disease in which the air passageways in the lungs become narrowed and inflamed, making it hard to breathe. It's a common problem in Hong Kong, Tso says. He cites the Hong Kong Asthma Society, which estimates there are 350,000 to 400,000 asthmatics in Hong Kong. The disease's prevalence in Hong Kong, at 10 per cent, is higher than in the US, where it is around 8 per cent. Poor air quality and allergens are the primary causes. Growing up in [cities with poor air quality](#) inhibits healthy lung growth in children, predisposing whole populations to asthma later.

With support and drugs, asthma can be managed quite well – and exercise can help to alleviate it. If the condition is under control, exercising is recommended to keep lungs and body in good shape, as it helps to strengthen muscles used in breathing and boost the immune system, helping to protect from respiratory infections.

“With limited personal space in our living environment, transport system and hospital system, Hong Kong residents are particularly prone to get infected with communicable respiratory infections,” Tso notes.



US-trained Hong Kong specialist in respiratory medicine Dr Raymond Tso **stresses that smoking is the single worst thing we can do for our lungs**. Photo: Shutterstock

**Tso explains that covid-19 attaches to a receptor in lung tissue and enters the cells, then makes more copies of itself.** The immune system, recognising these infected cells, mounts a defence, causing cell death. As more cells die, lung tissue is damaged and can stiffen. This makes pumping oxygen to the other vital organs much harder for the heart. It can also lead to a secondary bacterial infection on top of the viral infection. This can trigger an excessive immune response and cause multiple organ damage.

### **How can we protect ourselves from covid-19 and other flus, colds and viruses that affect the respiratory system?**

Tso says many studies “have shown **masks are beneficial for those that are actually sick**, the immunocompromised, helping to prevent further spread of the infections. And of course, masks are warranted for health-care workers as they come into contact with all sorts of infections.”



Poor air quality and allergens are the primary causes of asthma. Photo: SCMP / K.Y. Cheng  
As Tso has advised his own two sons, “the best way to prevent infection is to avoid being exposed to this virus”. That entails careful attention to personal hygiene, including washing your hands with soap and water for at least 20 seconds, or using an alcohol-based hand sanitiser; avoid touching your eyes, nose and mouth with unwashed hands; avoid close contact with sick people; cover your mouth and nose when coughing and sneezing; and keep your home, personal surroundings and objects clean.

To best maintain our lungs to ensure they function well throughout our lifetime, Tso offers sensible advice.

1. If you smoke, quit
2. Take regular aerobic exercise
3. Encourage a stress-free environment
4. Increase your personal living space, if you can
5. Reduce exposure to air pollution or chemicals
6. Prevent infection with good personal hygiene practices (see above)
7. Get a flu jab

This article appeared in the South China Morning Post print edition as: Why smoking can be a death sentence

### [Anthea Rowan](#)

Anthea Rowan has written for papers and magazines on almost every continent and on a huge variety of subjects, from travel in Africa to mental illness in the States to education in Europe. Her work has appeared in The Times in London, the Washington Post in America and regularly at the South China Morning Post.

### **Want to quit vaping? Compared with cigarette smoking, it might be even harder**

Higher levels of nicotine inhaled during vaping when compared with traditional cigarettes could make quitting more challenging, experts say

As vapers tend to be younger than cigarette smokers, traditional smoking groups are not necessarily the answer

Topic | Wellness



[Tribune News Service](#)

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Inspired and scared by the recent spate of US hospitalisations and deaths from a mystery respiratory illness linked to vaping, young people can be seen throwing out their e-cigarettes on social media, vowing to quit.

Just as there is a lot to learn about [e-cigarettes \[1\]](#) – a relatively new trend that is especially popular among young people – doctors say there is little known about how to successfully quit. “Are we going to use the same techniques and medications [used for quitting [traditional cigarettes \[2\]](#) ], or are there unique features?” says Andrea King, professor of psychiatry and director of the Courage to Quit programme at the University of Chicago.

She adds that as these products have come on the market and been rapidly adopted, there just hasn't been enough time to develop specific treatment programmes for those looking to quit vaping.

Nicotine patches deliver smaller, slower amounts of nicotine to ease withdrawal symptoms, with dosing based on how many cigarettes someone smokes each day – something harder to calculate with vaping. Photo: Alamy

Because the basis of a vaping addiction is nicotine, King says, it's possible that traditional methods for quitting could work. Those use a combination of counselling on changing behaviours together with medications that quell nicotine cravings, and are proven to be more effective than someone going “cold turkey” or quitting on their own. **But experts wonder if the higher levels of nicotine inhaled during vaping when compared with traditional cigarettes could make quitting more challenging.**

[\[3\]](#)

**“It's almost going to be easier to get people off traditional cigarettes than e-cigarettes because of the dose [of nicotine],” says Dr Sana Quddus, a pulmonologist at Loyola University Medical Centre in Maywood, Illinois.**

There are other factors that make vaping unique. Users may also vape [THC \[4\]](#), the ingredient in marijuana that creates a high, and they tend to be younger, even adolescents, a group that hasn't been studied when it comes to medications and other resources that help people kick smoking.

In King's programme and others, the strategy is to use a combination of techniques. The programme educates and helps change behaviours with individual, group or phone counselling, King says, and also uses medication such as Chantix that interferes with the brain's response to nicotine. Nicotine patches or gum can also help ease the symptoms of nicotine withdrawal.

The US Centres for Disease Control and Prevention has confirmed 380 cases across the country of a mysterious respiratory disease linked to vaping. Photo: Alamy

But dosing is an issue for those looking to quit vaping, says Lori Wilken, a clinical pharmacist at the University of Illinois at Chicago who runs a tobacco dependence clinic.

For patches and gum, which deliver smaller, slower amounts of nicotine to ease withdrawal symptoms, dosing is based on how many cigarettes someone smokes each day, Wilken says. When patients come to her hoping to quit vaping, she has to estimate a dose based on how many pods they vape, which usually have higher amounts of nicotine that enter the system faster.

**It's really important for parents to be a part of this and have knowledge and also offer support. It also opens up a conversation where they can show they're invested, interested and they care Jim Brunetti, clinical director, Renz Addiction Counselling Centre**

Wilken and others who run quitting programmes say that while they often deal with adults, adolescents could benefit from seeing other peers quit, in addition to traditional cessation methods. “A traditional smoking group isn't exactly the right fit,” says Jim Brunetti, clinical director at the Renz Addiction Counselling Centre in Elgin, Illinois, who is developing a new programme geared toward teens who want to quit vaping.

The centre would like to partner with school districts to offer the programme, which refers students caught vaping at school to a “psychoeducational group” where they learn about the harmful effects of e-cigarettes and nicotine withdrawal alongside their peers, Brunetti says. Then, they break into groups for individual counselling, while their parents also receive education on vaping. Afterwards the students and parents come together.

“It's really important for parents to be a part of this and have knowledge and also offer support,” Brunetti says. “It also opens up a conversation where they can show they're invested, interested and they care.” There is still a lot to learn about the health effects of vaping. Photo: Alamy

Parents and teens alike are becoming more aware of vaping after reports emerged in the US earlier this summer of otherwise healthy patients who regularly vape requiring hospitalisation after they struggled to breathe.

The respiratory illness still mystifies public health officials, who continue to investigate the cases. The US Centres for Disease Control and Prevention has confirmed 380 cases across the country. At least seven of those patients have died.

Dr Kiran Bojedla, a family medicine doctor at Advocate Christ Medical Centre in Oak Lawn, Illinois, says he has had patients and friends come to him, asking how to cut back on vaping, “similar to the cigarette panic that slowly happened over decades”. But with vaping, “it feels like it’s all at once”. He says traditional smoking cessation programmes now address vaping but use traditional smoking cessation philosophies.

Bojedla says he is also concerned that adults who [turned to vaping to quit smoking \[5\]](#) could be tempted to return to their prior bad habit. He tells them “as much as possible, try not to do either”.

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#### **Links**

[1] <https://www.scmp.com/lifestyle/health-wellness/article/3010622/smoking-vs-vaping-debate-continues-and-experts-offer-ways>

[2] <https://www.scmp.com/lifestyle/health-wellness/article/3010979/facts-about-smoking-health-risks-how-many-die-e>

[3] <https://www.scmp.com/lifestyle/health-wellness/article/3031846/asian-american-fitness-influencer-losing-weight>

[4] <https://www.scmp.com/lifestyle/health-wellness/article/3002511/cannabis-linked-psychotic-disorders-schizophrenia-and>

[5] <https://www.scmp.com/lifestyle/health-wellness/article/2167818/i-used-e-cigarettes-quit-smoking-after-10-years-trying>