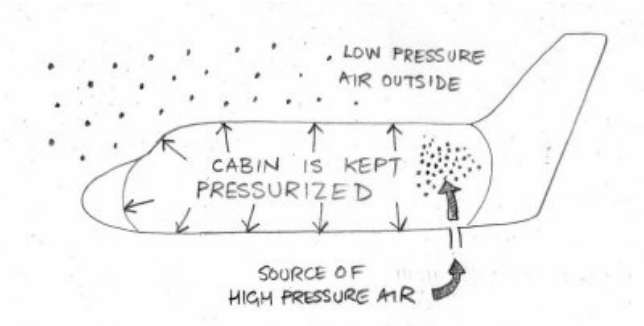
Airliner cabin air – the surprising truth about how and why it could be very dangerous to your health.

An industry insider reveals the truth

What you are about to read may seem too far-fetched to be true. Sadly, it is an accurate picture of a little known, yet serious problem. Have you ever wondered why you feel under the weather after a flight? Usually this is attributed to jet lag. However, even travel to South Africa, only 1 hour different to the UK causes so-called jet lag so clearly there is another reason. This document may give you cause to rethink your travel plans.

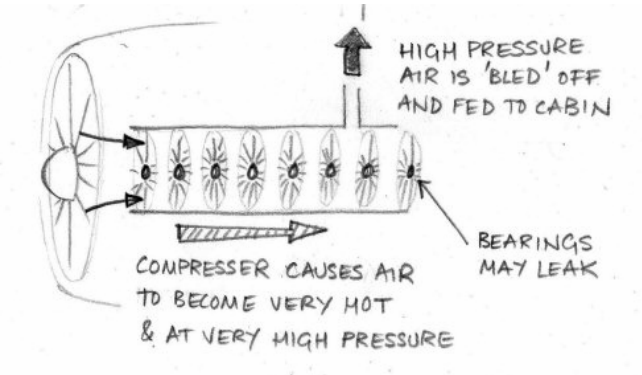
At the altitudes at which airliners fly, the outside air pressure is very low so the cabin has to be kept supplied with a source of pressurised air to ensure that there is sufficient oxygen for the occupants to breathe.



Early airliners used a separate machine to supply this air, however for several decades designers have used the engines as a source of pressurised air. This is cheap and convenient - but potentially dangerous - source of air for the cabin, as we shall see. Let's have a brief look at the workings of a jet engine:

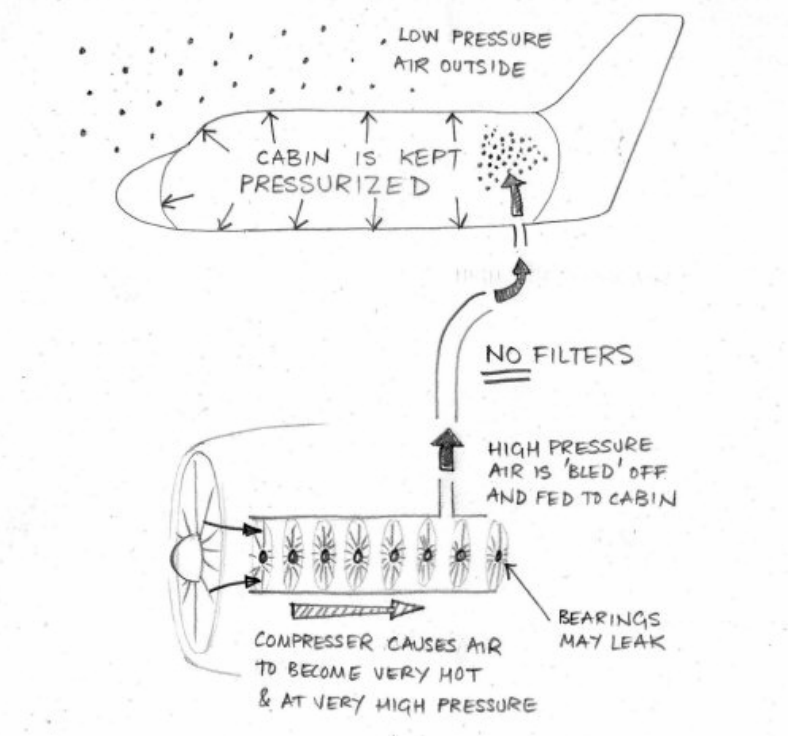
How jet engines work

Most people are familiar with the appearance of a typical airliner's jet engine; a fat tube with a large fan at the front. This fan provides most of the thrust that propels the aircraft in flight. Behind this large fan lies a series of much smaller fans which take in the air that is used to burn the fuel. Each of these fans progressively compresses and heats the air before it reaches the engine's combustion chambers. In modern airliners, a small amount of this very hot compressed air is 'bled' off; this bleed air is then used to supply the cabin after it's treated for pressure and temperature. However, remarkably, no filters are used between the engines and the cabin. Yes, you did read that correctly.



Bearing seals

All the fans are attached to two or sometimes three shafts, mounted on a series of sealed bearings which must be lubricated by engine oil. The bearing seals are actually *designed* to leak tiny amounts of oil to maintain a good seal. However, if any of the engine's many bearing seals become worn or damaged this can cause them to leak at a much greater rate. Such leaks can allow greater quantities of engine oil to escape the bearing and become vaporised as it mixes with the bleed air on its way to the cabin. Check the diagram below to see how easy it is for any leaking oil to find its way into the cabin.



Inhaling a tiny bit of vaporised jet oil may not sound too bad - until you know what's in it. Jet engine oil is not like auto oil – one crucial difference is that it contains up to 5% organophosphates (OPs). OPs are a highly potent neurotoxin and have been used for chemical warfare purposes; they also formed the basis of the Sarin gas used in the Tokyo underground attacks. Yes, what amounts to nerve gas might well be in the air you have to breathe for the entire flight. Yes, you did read that correctly.

If vaporised oil does reach the cabin, the exposure mechanism is by inhalation, against which the body has few defences. It is an undisputable fact that passengers (and aircrews) are frequently being exposed – a recent 2008 Panorama TV programme carried out covert testing during several routine flights, and found OPs every time and every where they looked. This suggests it's likely that all passengers are being exposed on most flights. Aircraft are not fitted with fume detectors, so even crews may not know when fume events occur. Even when events are known about, airlines are not informing their passengers. Did I mention the lack of filters? Shockingly, it has been said that the only OP filters on airliners are the lungs of passengers and crews. You may have heard about in-cabin filters – but these only filter air that has already entered the cabin, and in any case are not designed to filter OPs, so they offer no protection to passengers and crews.

It seems that some people are particularly sensitive to exposure to OP toxins, and for these people even extremely small exposures are potentially very serious. Sensitive individuals can even find themselves literally incapacitated by the fumes in short order. Your pilot could quite possibly be one such individual. There's something to think about.

At least one such incident is on record, in which a crash was narrowly averted, and it is probable that crashes have already occurred in which contaminated air was a major factor – we will never know because dead pilots are not tested for OP exposure because officially, the contaminated air problem does not exist.

After exposure, symptoms then typically develop over many months. Because of this time delay, pinpointing the cause of illness caused by this form of poisoning usually never happens - most people with Aerotoxic Syndrome – a term coined in 1999 - have absolutely no idea what's wrong or why they have become so ill. Medical professionals are similarly unaware of this scandalous situation and have no idea that exposure to OPs routinely occurs on flights. From their point of view, the closest 'fit' is depression, so many exposed and symptomatic individuals are misdiagnosed and prescribed anti-depressants. A further dose of toxins in the form of synthetic pharmaceuticals is absolutely not what you need after being poisoned.

Please don't underestimate just how unpleasant the effects of inhaling OPs can be. OPs are extremely toxic even in extremely small quantities. A brief summary of some of the many possible symptoms of Aerotoxic Syndrome follows. It can take literally years to recover from exposure, and some people never recover. Symptoms are of two basic types, neurological and physiological:

Short term symptoms (i.e. weeks to months)
These can include severe and chronic fatigue, and even incapacitation. Also blurred or tunnel vision, disorientation, shaking and tremors, loss of balance and vertigo and seizures.

The delicate chemistry of the brain is disrupted, typically causing the individual to be more emotional, reactive and volatile, and easily irritated and/or angered.

Memory impairment, headache, light-headedness, dizziness, confusion, feeling intoxicated, gastro-intestinal symptoms such as nausea and vomiting, respiratory symptoms such as coughing and irritation of nose and upper airways.

Breathing difficulties such as shortness of breath and chest tightness.

Cardiovascular symptoms such as increased heart rate and palpitations. Irritation of eyes.

There is also an increased chance of birth defects for newborns and miscarriages for pregnant women.

Long term symptoms (months to years; symptoms may never resolve)
These typically include weakness and fatigue leading to chronic fatigue-type symptoms, exhaustion, hot flushes, joint pain, muscle weakness, muscular aches and pain.

Other typical neurological symptoms include chronic memory impairment, forgetfulness, reduced ability to concentrate for extended periods, reduced co-ordination etc. Sufferers often find that administrative tasks which would formerly have been easy have become extremely demanding, so personal affairs can easily descend into chaos.

Headaches/migraine, dizziness, depression, sleep disorders, gastro-intestinal symptoms such as nausea, vomiting and diarrhoea.

Respiratory symptoms such as breathing difficulties and chest tightness may occur. Irritation of eyes, nose and upper airways.

Cardiovascular symptoms such as chest pain, increased heart rate and palpitations.

Chemical sensitivity leading to acquired or multiple chemical sensitivity.

Cancer and nervous system disorders such as motor neurone disease, possibly leading to death.

What can passengers do about this?

The bleed air system of pressurising airliners is as you can see, fundamentally flawed (and perhaps criminally so) on health grounds. If you are on an aeroplane in which a contaminated air event occurs and you are unprepared there is absolutely nothing you can do about it, and nor will the airline inform you it's happened (fume events are not always noticeable). The problem can occur on any aircraft type and in 2006 University College London (UCL) estimated around 200,000 individuals become symptomatic after exposure every year in the UK alone. Some think the real figure is far higher. UCL tested 27 pilots in 2006 and found a similar type of brain damage in every one of them. Boeing's forthcoming new 787 will go back to the old and safer pressurisation system which was abandoned decades ago. In the meantime, personally, I will not risk travel by airliner any more. You have been warned.

Protective mask

OP molecules are relatively large, and are therefore easy to filter out using a charcoal-based filter. With this in mind, a suitable face mask could provide effective protection against OP fumes. These may be purchased from the Aerotoxic Association or from the DIY chain Wickes (paint & odour respirator; £2.79 stock no. 186936). To be sure of a high degree of protection, the mask would have to be worn throughout the entire time you were on board. Yes it would look very silly, and might even arouse suspicion from the cabin staff – but what's the alternative?

If you want to know more about Aerotoxic Syndrome, there's plenty of information at:

www.aerotoxic.org Site of the Aerotoxic Association. Here you will find aircrew and passenger testimonials, lots of information, videos and protective masks.
www.toxicfreeairlines.org
www.gcaqe Global Cabin Air Quality Executive.
www.aopis.org Aviation Organophosphate Information Service.
www.dftenterprises.com The film *Welcome aboard Toxic Airlines* may be found here.