

Free up general aviation

I WAS disappointed at some of the comments by Elva Rush in the May-June issue of *Flight Safety Australia*. Elva is obviously an experienced GA pilot, but seems to believe that air safety depends upon air traffic controllers. It does not.

Air safety is the responsibility of the pilot in command – it says so in the regulations.

If new and inexperienced pilots feel insecure and uncertain this is a fault of their training. I believe we are over-regulated in this country and that this is a direct cause of diminishing GA flying. We do not need to bring back unneeded services, like the old flight service units, which many in the GA area have fought long and hard

to get rid of.

What we need to do is to put our efforts into supporting the continuing reform of the system and the freeing up of GA flying. Only then can we expect GA flying to increase.

Pat Cliffe-Hickling
Hobart, Tas

Over-breathing and hypoxia awareness

IN RESPONSE to your article on a depressurisation incident aboard a Fokker F27 (*Flight Safety Australia* March-April 2004) a letter from Dr Leo Davies, clinical neurophysiologist (May-June 2004 issue) questioned whether symptoms experienced by the crew were actually due to hypoxia, instead suggesting that over-breathing (or hyperventilation) was more likely to be the culprit.

Dr Davies gives a very precise



Rob Fox

the cabin crew in the Fokker incident.

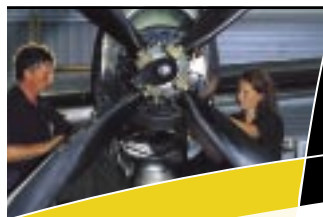
In this incident the symptoms were most likely due to hyperventilation, as Dr Davies says. It is likely that anxiety in the crew may have contributed to hyperventilation during the emergency.

More significant though is that hypoxia is not usually a major problem at 10,000 ft. Healthy individuals adapt and cope very well with this altitude. While there may be minor physiological changes, these usually go unnoticed by the individual. At 10,000 ft haemoglobin is usually better than 90 per cent saturated with oxygen even though the partial pressure of oxygen in the blood is as low as 50-60 mmHg.

Only with extremely prolonged exposures might symp-

Benefits below 10,000 ft:
Some pilots report less fatigue and improved concentration when they use supplemental oxygen for long flights, even below 10,000 ft.

description of the physiology of hyperventilation, and how over-breathing changes the body's acid-base balance and calcium metabolism so that nerve function is disturbed, leading to the signs and symptoms of tingling described by



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toms such as excessive fatigue or headache be noticed. At night, however, we know that there would be a measurable decrease in visual acuity due to the retina's sensitivity to even mild hypoxia. So I agree with the diagnosis by Dr Davies.

I would, however, like to comment on the assertion by Dr Davies that hypoxia cannot cause tingling in the extremities. At altitudes above 10,000 ft it certainly can. When blood oxygen levels fall below around 55 mmHg, detectors called carotid body chemoreceptors are stimulated to send a signal to the respiratory centre of the brain stem.

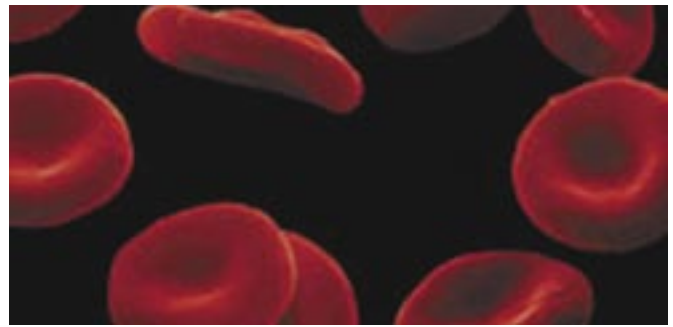
This signal stimulates the respiratory centre to increase the rate and depth of breathing in an attempt to counteract the dropping oxygen level.

This is known as the "hypoxic ventilatory response".

This automatic form of over-breathing may be undetected by the victim, but will inevitably serve to decrease carbon dioxide levels in the lungs and therefore also in the blood (leading to a state known as hypocarbia).

Decreasing the amount of carbon dioxide in the lungs frees up space for whatever oxygen is available. It also leads to the same hypocarbia and symptoms of tingling so well described by Dr Davies, symptoms which can occur via hyperventilation alone. At altitude these symptoms of hypocarbia will be occurring at the same time as other hypoxia-related symptoms.

As Dr Sham points out in his response to Dr Davies' letter, the cause of these symptoms is largely irrelevant to the aviator. The important thing in flight is to assume the worst case sce-



Pressure: Hypoxia affects the gaseous exchange of carbon dioxide and oxygen in the body. As the partial pressure of oxygen falls, less pressure is exerted to achieve the transfer of oxygen from lungs to blood.

nario, don oxygen immediately, and treat the thing that is most likely to kill you – hypoxia.

Dr Davies also states that hypoxia has no warning symptoms, and that "it is not helpful to promulgate the false impression that hypoxia is detectable by the victim".

There is no doubt that the early symptoms of hypoxia are subtle, and the victims may well "remain oblivious

to their fate", because hypoxia will profoundly affect decision making, judgement and insight into their plight.

However, I am sure many thousands of military aviators across the globe would argue that hypoxia is indeed detectable if you are properly trained to recognise it. And many of them would be able to recall the pins and needles and tingling sensations that are so

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Australian Government
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M. Textler

Rare views: A chance photo of a microburst in action showing columns of virga with rings of dust associated with the microburst outflow.



commonly reported by aviators undergoing this training.

Many lives have been saved as the result of hypoxia awareness training in hypobaric chambers, such as that carried out at the RAAF Institute of Aviation Medicine. Having worked in aviation physiology training for many years, I can say with certainty that hypoxia awareness training is one of the most important training experiences an aviator can have.

At a simulated altitude of 25,000 ft, symptoms of hypoxia are easily recognisable after 30-60 seconds, and are consistent and reproducible for each individual on repeat exposures. Therein lies the value. A recent review of Australian Defence Force hypoxia incidents showed that 86 per cent of the aircrew recognised the hypoxia in themselves or in others and were able to take corrective action. Studies of untrained individuals paint a very different picture to this, with loss of consciousness quite common.

Hypoxia is detectable if you know what you are looking for. Whether the cause of subtle symptoms in flight is hypoxia or hyperventilation or both does not really matter, because the cure is identical. Any unusual symptoms must be treated with oxygen because that is the safest course of action.

-Dr Gordon Cable, Aviation Training Medical Officer RAAF Institute of Aviation Medicine President, Australasian Society of Aerospace Medicine

The emergency procedure for hypoxia should be followed regardless of the diagnosis of hypoxia or hyperventilation. This is a fail-safe procedure. If the aircrew fails to diagnose the condition correctly, the action will still have a safe outcome.

Microburst caught on film

FURTHER TO your article on microbursts in the May-June issue of *Flight Safety Australia*, I have seen dust rings caused by microbursts from the air

on at least two occasions while glider flying.

After speaking with fellow pilots, I don't think that there are many photographs of this potentially dangerous phenomenon from the air.

I was flying a Discus glider on a 500 km glider flight from Gawler (YGAW) to Quorn and back on Valentine's Day this year. It was 43°C with a headwind of at least 20-25 knots aloft.

There were high-based cumulus clouds (base around 9,500 ft to 12,000 ft AMSL), with active convection (I was able to climb to 11,000 ft on numerous occasions, thank goodness I had supplementary oxygen with me). I was on the return leg from Quorn heading south, abeam Jamestown at around 8,500 ft AMSL. It was to the east that I spotted a microburst event. The photographs show the column of virga, with a ring of dust associated with the outflow.

-Michael Textler, Walkerville, SA

Report volcanic activity

IT WAS fascinating to read John Winslow's account in the May-June issue of *Flight Safety Australia* of his flight planning experiences during the 1991 Mt Pinatubo eruptions.

Sixteen damaging aircraft encounters with volcanic ash from the Mt Pinatubo eruption

were recorded between June 10 and June 15, 1991, including one in which all four engines had to be replaced. The damage bill topped \$US100 million. Twelve of these encounters occurred over Southeast Asia at distances of 720 to 1740 km west of the volcano.

John Winslow's assertive actions as a pilot may have saved a lot of damage to his aircraft and he certainly avoided a life-threatening situation.

Volcanic ash in the air is difficult to see by day or by night. Over the Southeast Asian and Melanesia region, the status of volcanic monitoring, SIGMET compliance, frequent cloudiness and the sheer number of volcanoes mean that volcanic ash is far from a solved problem.

Pilots are advised to get on top of this issue as much as possible and to report all volcanic activity.

For more information about the effects of Pinatubo on aircraft, see pubs.usgs.gov/pinatubo/casa/index.html, and for more about the International Airways Volcano Watch, see the Darwin Volcanic Ash Advisory Centre website at <http://www.bom.gov.au/info/vaac/>.

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Pinatubo encounter: A plume of volcanic ash and steam spews from the Mt Pinatubo caldera during the volcano's 1991 eruption. Sixteen airliners were damaged