

Air Travel Safety Secrets

*Safety Information That
Airlines Don't Tell You*

Russell Eaton



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By

Russell Eaton

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The vital information in this ebook will help protect the health and well-being of any airline passenger who reads this information. Wherever you travel in the world, this ebook will make your air travel safer and more enjoyable. Every airline passenger should have this ebook.

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Introduction

Whole books have been written about how to get bargain airline tickets, how to deal with airport congestion, how to cope with baggage loss, how to take advantage of special deals and frequent flyer miles, and how to get bumped up from economy to first class at no extra cost.

But this book is about none of the above. This book is entirely focused on how to stay safe and well aboard a commercial airline. Therefore, if you ever travel on a commercial airline this book is for you. This book is your bible of air travel safety.

It is a myth that airline travel is safe when it comes to your health and well-being. Did you know that nearly half of all airline flights cause serious illness or distress to one or more passengers? Did you know that airline travel is less safe than car travel in terms of death and injury? Did you know that it is unsafe for pregnant women to fly? Did you know that more airline passengers die from flight-induced illness than from air crashes?

All these questions are fully addressed in this book, and much more. Read and follow the simple advice given in this book and you will greatly increase your safety as an airline passenger.

Do not be lulled into a false sense of security just because you think your last flight was perfectly safe and nothing went amiss. For all you know, one of the other passengers

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in your flight may have suffered a fatal illness but you will never know because such incidents are never reported.

Crewmembers are trained to hush things up whenever there is a passenger incident. This happens because during a flight it is important to avoid panic among passengers, and after the flight the airline will be anxious to maintain its good reputation as a safe airline. So statistics of passenger mortality and illness aboard airlines never see daylight.

There is something for everybody in this manual as all aspects of air-travel health and safety are covered. So whether you're a frequent flyer, a first-timer, a vacationer, or just travelling occasionally, this manual will make your trips safer and more enjoyable, and give you greater peace of mind.

The very latest research has been used in the compilation of *Air Travel Safety Secrets* and some of its contents may shock you. This is a 'no holds barred' report on the dangers of modern-day air travel and how to avoid such dangers. There is no intention to make people fearful of flying; on the contrary, by following the simple advice in these pages you will enjoy travelling with greater confidence and safety.

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How safe is air travel?

We delude ourselves if we think that travelling by air is becoming safer in our modern age. The fact that aircraft and airport technology is more sophisticated than ever does not mean that air travel is becoming safer for *you*, the traveller.

Most people think of modern air travel as a routine (but cramped) method of travelling quickly over a long distance. Indeed, the travel industry is always keen to point out that air travel is the safest form of transport in the world. ‘You are much more likely to die in a car accident than in a plane accident’, they will insist. *But they are wrong!*

In fact, you’re about *12 times more likely* to die in the air than in a car ride. Let us look at the facts:

- When the airline industry gives figures about its safety record, it quotes statistics showing that there are about 0.03 fatalities per 100 million kilometres flown, compared with 0.10 fatalities per 100 million kilometres for rail travel and 0.175 per million kilometres for cars. In other words, they are saying that

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air travel is about 3 times safer than rail travel and 5 times safer than car travel per 100 million kilometres of *distance travelled*.

- But these statistics are highly skewed. Typically, planes travel huge distances but 70% of aircraft accidents take place on take-off and landing, manoeuvres which represent only 4% of journey time and are therefore relatively much more dangerous.
- A much more realistic figure is the rate of fatalities per number of *journeys made*. By this measure, air travel takes on a very different complexion. Fatalities per 100 million passenger journeys are, on average, 4.5 for cars, 2.7 for trains, and 55 for planes! This means you are 12 times more likely to die on a commercial jet compared to a car, and 20 times more likely to die on a commercial jet compared to a train.

In the book ‘The Tombstone Imperative’ (Simon & Schuster, 2000) the author Andrew Weir gives the above-mentioned figures after detailed research into US and international transportation fatalities. He says that a lot can be done by airlines to reduce fatalities (such as installing sprinklers and giving out smoke hoods), but they are loath to do this for reasons of costs (the ‘lust for profits’). Weir also concludes that planes usually crash because somebody screwed up. However far down the line it may have occurred, human error must always be the reason, from the drafting of a poor regulation to a mistake

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by air traffic control, bad design, slip-ups during manufacture or maintenance, or the bad judgment of a pilot. To blame the weather for a crash, for example, is generally absurd. If the weather is too dangerous for flight, aircraft should not be flying or should be better built.

Here's a quote from Andrew Wier ('The Tombstone Imperative'):

"[With aviation safety] having declined for the past 30 years or so, the probability of a fatal accident has now levelled off at one per 1.5 to 2 million departures. Innovations continue apace, but overall they are not helping. The latest generation of jets, equipped with flight management systems and fly-by-wire controls, may be cheaper to operate but they are not any safer.

The fact that air travel is growing while the accident rate remains stable means that a decade from now, based on present trends, twice as many people will be killed in air crashes as today.

To maintain the number of crashes and deaths at their present levels, air travel would have to become about three times safer over the next twenty years. That means dealing with the growing crisis in maintenance, ending the communications failures between pilots and flight computers, making aircraft crashworthy, eliminating risky approaches and airports, easing the pressures on pilots, engineers and air-traffic controllers, not to mention

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beefing up inspections and enforcement. And all that is just for starters.

If you flew a Boeing 737 to work every morning and back, you'd be far more likely to die in a crash than if you drove a car. Does the fact that few of us do as much flying as driving make it OK for planes to be so much more dangerous?"

An examination of airline fatality figures going back to 1970 (source: <http://airsafe.com>) shows an average of 17 fatal jet airliner *incidents* a year (each incident usually involving many fatalities and injuries).

Is airline safety getting better in terms of fatalities? If you look at the figures, the answer is no. Furthermore, it is clear that the number of passengers killed and injured is in the *thousands* per year rather than *hundreds* per year. For example, if we look at the last decade (1990 -1999) we have the following:

1. Number of airline fatalities: 12,608 (about 1,261 per year).
2. Number of people killed *outside* the aircraft as a result of those same airline incidents: 461.
3. Total of 1 and 2: 13,069 (about 1,307 fatalities per year).
4. Total number of occupants (passengers and aircrew) in airline fatality incidents: 17,841. This means that of the 17,841 occupants, 12,608 were fatalities and 5,233 were

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injuries or non-injuries. Most likely, virtually all the 5,233 were injuries since the incidents were serious enough to cause fatalities. There are no records of airline incidents involving injuries only, even though they occur *as often as* incidents involving fatalities.

5. Out of 17,841 occupants, 12,608 were fatalities. This means that during the period 1990 - 1999, about 71% of occupants died in fatal airline incidents.

6. The figures show that survival chances (in fatal accidents) are slim. Between 1990 and 1998 an average of only 25% of all passengers in air accidents involving fatalities survived (this book will show you how to greatly increase your survival chances).

The yearly fatality figures for the period 2000 - 2003 are, if anything, worse than the period 1990 – 1999, mainly because of the fatalities caused by 9/11 in the USA.

Here are some of the conclusions we can draw from airline statistics and other accident reports:

- If we take into account all airline crashes, it is clear that on average at least 2,000 airline passengers and crewmembers die or get injured each year.
- About a quarter of passengers involved in *fatal* airline incidents manage to survive, albeit injured. And about 90% of airline air crashes have survivors (*Horizon* TV documentary “Survivors guide to plane crashes” broadcast on BBC2 TV, UK, 3 October 2006).

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Note that these figures only apply to scheduled commercial airliners. None of the figures include aircraft fatalities and injuries applicable to private and chartered aircraft, military aircraft, armed conflict, helicopters and other types of air transport.

Also, the figures do not include the hundreds of passengers that die each year on scheduled commercial airliners as a result of in-flight illness. The number of fatalities would double if on-board illness figures were taken into account, as explained later in this book.

It is sobering to think that a commercial airline accident occurs about once every two weeks somewhere in the world. It is estimated that this will go up to about once every week by the year 2020.

Even more sobering is to realize that many plane crashes produce injuries, but no fatalities, and as a result do not get included in aircraft safety statistics. If we include all aircraft incidents (i.e. with and without fatalities) the picture is dramatically different. Researchers in the USA have found that although your chances of survival (in a plane crash involving fatalities) is only 25%, ***your chances of survival go up to 80%*** when all airline incidents are taken into account. A fatalistic approach is therefore not justified; and by taking certain precautions you can vastly increase your chances of survival or lessen your injuries.

Clearly, the vast majority of plane crashes produce a mix of fatalities *and* survivors with various forms of injuries.

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So when we see airline statistics that, for example, talk about *55 fatalities per 100 million passenger journeys*, we should bear in mind that such figures do not take into account the hundreds, if not thousands, of people that get injured each year from plane crashes. And many of these injuries last a lifetime! Taking the injuries into account, your chances of suffering from a plane crash are very much greater than ‘*55 fatalities per 100 million passenger journeys*’.

Furthermore, it is grossly misleading to talk about the number of fatalities per *million passenger journeys* because fatalities relate to the number of *aircraft* journeys (i.e. plane flights) rather than *passenger* journeys (*aircraft* cause the fatalities, not *passengers*!). If we assume an average of 300 occupants per aircraft journey, the airline statistic of *55 fatalities per 100 million passenger journeys* changes to *55 fatalities per 333,333 aircraft journeys*. That’s about 1 fatality in every 6,060 aircraft journeys!

Ironically, the amazing advances in aircraft technology and passenger comfort does not mean that commercial airline flying is becoming safer! It is estimated that at least 50,000 people world-wide have been killed on passenger flights since 1920, ***without taking into account*** deaths from illness triggered by air flight. And in Africa airline accidents are seven times more likely compared to the rest of the world.

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There is no reason to think that the number of air passenger fatalities will get any better, particularly because of increasing passenger traffic and the growing congestion at all the major airports of the world. A growing shortage of airport land combined with outdated airport buildings and equipment (and stretched financial resources) are inevitably making flying *less safe*, not more safe.

For example, over the ten year period from 1996 to 2005 there were very roughly about 100 air proximity incidents (near crashes) a year in the UK. These statistics can be checked on Internet by going to www.airproxboard.org.uk.

Remember that these are just the *reported* incidents. Aviation authorities readily admit that many ‘close shaves’ in the air go unreported for a variety of reasons. Also, if this is the situation in the United Kingdom, you can be sure that a similar or much greater number of near-miss incidents occur in just about every country in the world (whether the incidents get reported is another matter).

However, crashes between aircraft in the air account for a tiny fraction of air flight calamities. The vast majority of crashes take place on takeoff and landing. Statistics clearly show that 95.7% of plane crashes involving the destruction of the plane’s fuselage occurred during or shortly after takeoff and landing. And 85% of these air crashes are shown to be caused by human error. What are the top five causes of fuselage destruction? They are:

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1. Flight crew (e.g. pilot error)
2. Aircraft (e.g. engine failure)
3. Maintenance (e.g. unchecked wiring leading to fire)
4. Weather (e.g. storm, snow)
5. Ground personnel or faulty airport.

Flying on a modern airline jet, then, is not as safe as we would like to believe. But it's not all gloom and doom. In fact, 80% of airline accidents are survivable if you do the right things. Most air crash fatalities and injuries can be avoided by taking certain simple precautions.

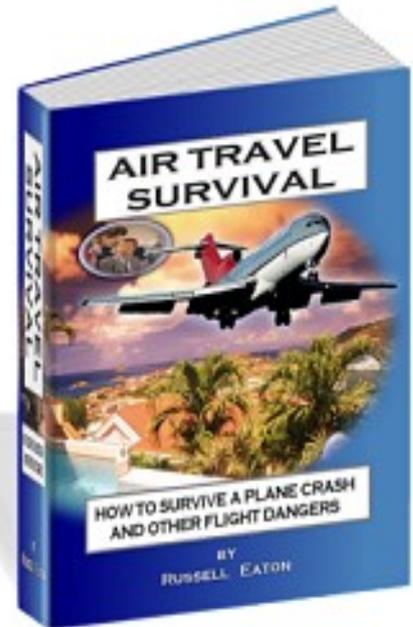
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dangers*

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for airline passengers'*

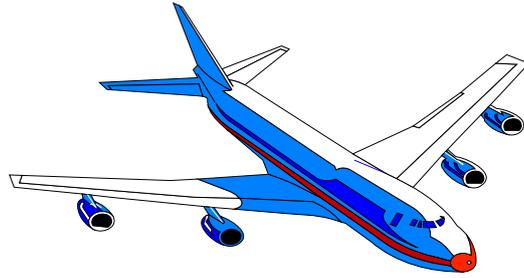


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High Altitude Radiation Avoidance

This is one of the biggest worries for airline crewmembers, frequent flyers, and increasingly for occasional flyers. *High Altitude Radiation* (also known as ‘cosmic radiation’) is mostly caused by radiation from outer-space, and to a lesser extent by radiation from the sun. When the radiation hits the earth’s atmosphere it gets absorbed or deflected by gravity and little reaches the ground.

The further north or south you go (from the equator) the greater the amount of radiation reaching the ground. This happens because (i) less radiation is deflected by the earth’s magnetic field, and (ii) the atmosphere is thinner at the Polar Regions. Therefore, air travellers in the north and south latitudes will get more radiation than air travellers in equatorial regions. Also, the higher the flight altitude the greater the dose of radiation.

When the radiation enters the atmosphere it interacts with oxygen and nitrogen to produce the harmful *High Altitude Radiation* that can affect airline occupants. This harmful radiation takes the form of high-energy neutrons and

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protons that enter your body causing damage to healthy body cells. More specifically, the neutrons and protons from the radiation change the molecular structure inside healthy cells. This in turn changes the DNA structure of the cells, converting them into harmful 'free radical' cells. These free radicals then do the same to other healthy cells, setting off a chain reaction that culminates in harming your health and even causing cancer.

During solar flares the dose of *High Altitude Radiation* is intensified, particularly at the kinds of altitudes used by supersonic aircraft. But we mustn't confuse *high solar activity* with *solar flares*. They are 'opposites'. High solar activity *protects* you from radiation. Solar flares *give* you radiation.

High solar activity occurs when the sun sends a greater amount of energy particles to earth, affecting the earth's atmosphere and gravitation to give us greater protection from harmful outer space radiation. As high solar activity follows an eleven-year cycle, the amount of harmful cosmic radiation also follows this same eleven-year cycle. The current eleven-year cycle reached it's peak in 2001 when solar activity was at maximum, and harmful cosmic radiation at a minimum. In about the year 2006 cosmic radiation will be at its worst for airline passengers.

Some people have argued that low doses of radiation may actually be good for you by acting to *prevent* cancer. The argument goes like this:

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'There is no valid epidemiologic or experimental data to support predictions of cancer resulting from low doses of radiation. Ionizing radiation in low doses does not cause cancer (or genetic defects). It, in fact, has a beneficial effect on one's health. There are epidemiological studies and scientific data on health effects from low to moderate doses of ionizing radiation that show it decreases the risk of cancer.' (Source:

<http://www.lewrockwell.com/miller/miller12.html>).

This viewpoint may well be true. However, in the context of high altitude radiation, the following points should be noted:

- There are no studies to show that low doses of *high altitude* radiation are beneficial to airline passengers.
- Airline passengers are unlikely to get the kind of low dose radiation that is said to be 'beneficial'. High altitude radiation does not take the form of a steady stream of low dose radiation. Typical high altitude radiation occurs in *bursts of high radiation*. The degree of radiation depends on solar activity at the time, flight route, flight altitude, time of day, and other factors.
- Studies of so-called 'beneficial' low dose radiation are based on a steady long-term effect. High altitude radiation experienced by airline passengers involves several factors as mentioned. Because of this, high altitude radiation is sporadic and of different

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intensities. It is therefore inappropriate to compare the two types of radiation, or to conclude that so-called 'beneficial' low-dose radiation is safe for airline passengers.

Man-Made Global Warming Myth

Although *high solar activity* helps to reduce the harmful effects of radiation for airline passengers, the irony is that it also contributes towards global warming. The latest research shows that when *high solar activity* increases, the sun's magnetic field also increases throughout the solar system. And when the sun's magnetic field increases, it blocks the cosmic radiation that helps clouds to form on Earth. With fewer clouds to keep the sun's heat at bay, more heat reaches the Earth's surface, causing the phenomenon of global warming.

Several scientific studies, including data issued by the European Space Agency, have confirmed the alarming conclusion that global warming is caused by higher solar activity rather than carbon monoxide emissions. Given that year 2001 was the peak of the sun's eleven-year cycle, we have the consolation of knowing that global warming in 2008 is at its lowest in the 11 year cycle. But, by the same token, in 2008 *high altitude radiation* for airline passengers is at its worst!

It is interesting to speculate that many experts may be wrong when they attribute fossil fuel (i.e. carbon monoxide) emissions to global warming, when in fact

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global warming as a man-made phenomena may be quite insignificant. Experts who detect an increase in global warming may simply be detecting natural global warming cycles, including the eleven-year solar cycle. Studies of global warming going back over hundreds of years show that the earth has not increased in temperature by any significant amount. And accurate measurements kept since the 1970's show no increasing trend in global warming at all.

A scientific study carried out by eleven leading experts in this field (Report published by European Science & Environmental Forum, Feb. 2002) says the Earth has always shown cycles of cooling and heating, and that to blame mankind for global warming is incorrect.

Indeed, the only accurate way to measure global warming is through satellite readings. Since 1979 more than 50,000 satellite readings are taken every day over every part of the world, and they show no detectible warming trend at all.

'The link between the burning of fossil fuels and global warming is a myth. Global warming is largely a natural phenomenon that has been with us for 13,000 years and probably isn't causing us any harm.' (Professor David Bellamy, Daily Mail, UK, July 9, 2004).

People who question the orthodoxy that the West's rising output of carbon monoxide will produce environmental catastrophe tend to be derided or be accused of being in the pay of the oil industry. Clearly, there are natural cyclical

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patterns in which the Earth has periodically warmed and cooled. But a growing body of rigorous science is showing that the myth of *man-made* global warming through carbon monoxide emissions is in fact just that: a myth. As Dr Richmond Lindzen, a world authority on atmospheric science at the U.S. MIT said, '*there is no evidence that greenhouse gases could disrupt the climate*'.

Another expert, Dr Jan Veizer, a renowned geologist, has shown (i) that there is no correlation between cold and warm periods and low and high levels of carbon monoxide, and (ii) that the ice at the Poles is not getting thinner: in fact, the extent of Artic ice has remained almost unchanged over the past twenty years, and in the Antarctic sea ice has actually increased by about 1.3% per decade.

Unfortunately, the science of global warming has been suborned by politics and ideology. The danger here is that the myth of man-made global warming will so disillusion people that it will damage the real and pressing agenda to steward the Earth properly: to reduce pollution (including car emissions), to conserve energy, to protect the environment, and to deal responsibly with inevitable climatic change.

But what has global warming got to do with air travel? Quite simply this: although *man-made* global warming may be a myth, cyclical climatic change is nevertheless a reality. And climatic change can significantly affect the level of radiation for air travellers.

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Radiation Dangers

As mentioned, *High Altitude Radiation* causes harm when it enters your body by creating ‘free radicals’. These are unstable molecules that harm body cells, leading to disease, accelerated ageing, and cancer. They are the same kind of free radicals caused by air pollution or by your own body when you eat food. Our body’s own defences cope with most of the free radicals that we create when we eat food, but we cannot cope well with the *additional* free radicals caused by other factors such as radiation. This is why the *additional* free radicals that we get from radiation are so harmful.

When you fly on any commercial airline you usually fly at high altitude because this makes the airways less crowded, the journey shorter, and the fuel saving greater. And whenever you fly at high altitude, like it or not, you will receive a dose of *High Altitude Radiation*. Since March 1990 the US Federal Aviation Authority has formally acknowledged that ‘*flight crew, both in the cockpit and in the cabin, are occupationally exposed to varying levels of ionising radiation*’.

According to Dr Wallace Friedberg of the Federal Aviation authority in the USA, when you spend 4 hours aloft at 37,000 feet (a fairly typical altitude), it is the equivalent of one chest X-ray. Dr Friedberg says ‘*Regular weekly air trips, for example across the Atlantic, can represent 170 chest X-rays a year*’. This is also confirmed by Dr Robert

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Hunter of the Civil Aviation Authority in the UK, who says: *'The Radiation dose from a transatlantic flight is similar to the dose from a chest x-ray.*

This means that a typical trans-Atlantic flight of 4-8 hours can give you the equivalent of about *two* X-rays (source: Channel 5 factsheet 'Airsick', Autumn 2000). But ***High Altitude Radiation*** is worse than a chest X-ray because you get a *whole body* X-ray. For frequent fliers and aircrew the accumulated dose can be significant. Indeed, aircrew are amongst the most highly exposed occupational groups to radiation.' (Source: Mullard Space Science Laboratory Press Release dated 9 Oct. 2000).

Although ***High Altitude Radiation*** is a cause for concern, air travellers face the danger that in future, aircraft will fly at altitudes higher than the average 37,000 ft. Many corporate jets already fly at higher altitudes, and new generations of aircraft are being designed to fly much higher than 37,000.

For example the new Boeing 787 Dreamliner is designed to routinely operate at a cruising altitudes ranging from 40,000 to 50,000 ft. And the new Airbus 380 is designed to cruise at an altitude of 43,100 ft.

At 70,000 ft there is virtually no atmospheric protection against radiation, and at 50,000 or 60,000 ft there is a very significant rise in harmful radiation compared to 37,000 ft.

Of course, many travellers do not fly enough to warrant concern about their level of radiation exposure, but aircrew

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and frequent flyers should be concerned, says the National Radiographic Protection Board. [NOTE: A frequent flyer may be defined as someone who takes an air trip more than once a month]. Links have been found between radiation exposure in air travellers and chromosome aberrations, which could lead to cancer in adults or Down's Syndrome in unborn babies.

According to the National Radiographic Protection Board (NRPB), aircrew and frequent flyers notch up more radiation (about 25% more) than workers in nuclear plants, and about 100 to 300 times the radiation dose they receive at sea level. Dr. Michael Clark of the NRPB said that *'flying exposes those on board a plane to far more radiation than when on the ground. It was possible for airline crews to receive a higher dose over a year's flying than workers in the nuclear industry.'*

In another study published in May 2004 by the British Medical Association (*The impact of flying on passenger health*) the report recommended that 'Frequent flyers are advised to consult expert [cosmic radiation] sources.'

Several research studies have linked cancer to flying:

- (i) In 1999 *The Lancet* (a UK medical periodical) published a Danish paper that reported increased risks of leukaemia and cancer among Scandinavian pilots who had flown more than 5,000 hours.
- (ii) Another study in 1999 conducted in Iceland by Dr. Vilhjalmar Rafnsson showed that skin cancer was 15

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times higher on international routes than compared to the general population. The exposure to radiation was estimated to be only 1 to 2 millisiverts, which represents 200 to 400 hours in the air per year.

- (iii) Several Scandinavian studies have revealed that not only are stewardesses statistically more likely to give birth to Down's Syndrome children than women in other careers but also are twice as likely to develop breast cancer.
- (iv) Numerous studies have concluded that male pilots have a higher incidence of colon, rectum, prostate, skin and brain cancer compared to the rest of the population.
- (v) According to a study by Dudley Goodhead, who runs one of the world's leading radiation and genome stability units, ions from cosmic radiation can damage a developing foetus. Professor Goodhead of the UK's Medical Research Council has found that ionising radiation can produce a wide spectrum of damage to DNA, breaking single and double strands of its double-helix structure. He says '*Cosmic radiation increases the chance of changes or aberrations in the cell*'.

For more than ten years Dr Robert Barish of In-Flight Radiation Protection Services Inc, USA, has been involved in the dissemination of information regarding the health risks of in-flight radiation exposure. At the high altitudes

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that are the domain of commercial airliners, cosmic radiation exposure rates are hundreds of times greater than at ground level, according to Dr Barish. It has been estimated that at high altitudes, where the air is thinner and provides less of a shield, the effect of the sun's 'solar wind' combined with cosmic radiation means air travellers are likely to be exposed to between 100 and 300 times the radiation dose we would receive at sea level.

In November 2000 an Inquiry Into The Aircraft Cabin Environment¹¹ stated that *'an individual would need to fly 200 hours at polar latitudes or 400 hours at the equator to reach the general public allowed dose'*. Put another way, if you exceed an average of 300 flight hours per year you are exceeding maximum safe radiation levels recommended for the public. It should be noted that a person who travels 2 or 3 times a month could quite easily exceed this safe level.

The Inquiry¹¹ went on to say *'we are assured that the health risk from cosmic radiation exposure during flight represents an insignificantly small addition to the range of other factors that could lead to cancer or inheritable mutation.'* The source of this 'assurance' is not given. Furthermore, the Inquiry fails to take into account the fact that the same dose of radiation can affect people in different ways depending on their state of health and age. What may be a 'safe' dose of radiation for person A may prove harmful for Person B, particularly if person B is

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already predisposed to a type of cancer that is waiting to be 'triggered'. It is a fact that a predisposition to some types of cancer can be inherited and can be triggered by environmental factors (including cosmic radiation) later in life.

In a major US survey of 6,000 flight attendants (the largest ever carried out) it was found that the incidence of breast cancer was 30% higher than average. The American Study also found that 175 of those surveyed had developed new cancers between 1995 and 1998. The Study is due to be published in February 2001. (Source: Sky News, January 2001).

Airlines have downplayed the dangers of cosmic radiation but it is interesting to note that many airlines have been forced to institute a policy of grounding female crewmembers as soon as they declare pregnancy. In the UK a pregnant crewmember is, by law, allowed to be grounded on full pay as soon as the pregnancy is declared. In the USA a pregnant crewmember has less legal protection and is allowed to be grounded while pregnant, but with no pay.

Another concern is that even airline passengers who are not frequent flyers can be at risk in some circumstances. For example, a passenger flying just once or twice a month could be at risk from radiation if air trips are taken over Polar Regions during high solar activity and a window seat is chosen.

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The following question arises: *Does the aircraft body or fuselage (which is only 6 inches thick) give airline passengers any protection against **High Altitude Radiation**?* Some experts say NO and some experts say YES. Here are both sides of the argument:

THE NO ARGUMENT: *The fuselage of the aircraft does not give passengers any significant additional protection because the sub-atomic particles of radiation are capable of penetrating the fuselage of the aircraft and entering the human body wherever you sit. You would need several cubic feet of water (or a lead shield) around you to protect your body against some of the radiation particles, which of course is not practical on an airliner.*

THE YES ARGUMENT: *Even though it is accepted that high altitude radiation can indeed penetrate the aircraft fuselage, the seat you choose can make a difference for the following reasons:*

- *According to Richard Hillick, Director of Sage Safety in Scotland (and former Director of safety and quality for Scottish Nuclear), ‘a window seat passenger receives more radiation than an aisle seat’. Gerald M Kendall of the UK’s National Radiological Protection Board also supports this view. There is some evidence that radiation particles are denser near the windows and sides of the cabin compared to the middle of the cabin. This*

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bears out other studies into radiation. For example, it has been shown that wearing a lead apron when having dental X-rays does not protect you as the lead apron serves to concentrate and reflect the radiation into your head/body (the aircraft windows could be having a similar effect).

- *‘The structure of the plane, the bulk of luggage, and the bodies of other passengers all offer shielding, which means that radiation levels are different in different parts of the plane’ (Source: Nuclear News, American Nuclear Society, January 2000). Clearly, the aircraft body does shield passengers from radiation to an extent, however small. The cumulative protection for crewmembers and frequent flyers can be significant over a period of time. Furthermore, not all radiation particles are equal. In particular, there is evidence that some types of radiation particles are less effective in penetrating aircraft than others, thus affording some degree of protection.*
- *By sitting towards the middle of the cabin, with passengers on either side, you will be gaining additional protection from the bodies of other passengers. Sitting on the lower deck of a double-deck plane will additionally give protection from above. It is equivalent to having several cubic feet of water between your body the incoming radiation,*

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*because human bodies are 75% made of water.
Morbid, but true*

Whatever the truth, experts and other professional are becoming increasingly alarmed at the potential harm caused to air travellers by ***High Altitude Radiation***. For example, in May 2000 the European Union issued a directive requiring member countries to ‘assess the exposure to cosmic radiation inside aircraft.’ In October 2000, in the United Kingdom, the Mullard Space Science Laboratory initiated a major project to assess radiation risks to aircraft passengers and crew. Dr Bob Bentley, a scientist with the project says ‘*We know that cosmic radiation at aircraft altitudes is several orders of magnitude more intense than that experienced at ground level, because there is less protection from our atmosphere at high altitude.*’

Modern jet aircraft are increasingly made of strong light-weight composite materials. But these composites do little to keep radiation at bay.

So is ***High Altitude Radiation*** something that you should worry about? If you are a crewmember or a frequent flyer, the answer is YES. But even if you are not a frequent flyer the answer is still YES because you get a dose of harmful radiation, however little, on ***every*** air trip you take. Remember that ***High Altitude Radiation***, however little, causes additional free radicals that your body’s natural defences cannot properly cope with. And free radicals

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have a kind of ‘domino effect’ in the way they kill millions of healthy cells in your body, causing premature ageing, disease, cancer, and lowered immunity.

‘At this point, there is only limited advice from scientists. They say that during solar flares, when radiation exposure can multiply a hundred times, a New York to London flight can then equal a hundred chest X-rays. Pregnant women should not fly. If you are pregnant and planning to fly, call or log on to the Space Environment Center for up-to-date information on solar flares. USA tel: 303-497-3235, website: www.sec.noaa.gov. If there is excessive radiation, the phone message will say, "A solar particle event has occurred." The event can last from a couple of days up to a couple of weeks.’ (Source: Diana Fairechild, an aviation health & safety author, www.flyana.com/radiat.html).

Generally, you are probably **not at risk** of radiation if all of the following apply:

- You are reasonably healthy.
- Not pregnant.
- Not a frequent flyer.
- Not using corporate jets.
- Not flying over the polar regions.
- Not using seat windows.
- Not flying during bad solar weather.

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- Not flying in daylight hours when there is a night time alternative.
- Not flying higher than 37,000 ft.

Unfortunately, the above profile applies to very few airline passengers!

This may all sound very gloomy, but do not despair! There is a lot that you can do to avoid the risks of ***High Altitude Radiation***. Whether you're pregnant, a member of crew, a frequent flyer, or a non-frequent flyer, follow the advice below and you will go a long way to protecting yourself against the very real dangers of ***High Altitude Radiation***.

Radiation Solution

Airlines can, of course, reduce the hazards of ***High Altitude Radiation*** by simply flying at a lower altitude. As James Currie, Director General for Environment, Nuclear Safety and Civil Protection, UK, says: '*aircraft manufacturers could try to design aircraft with greater fuel efficiency at lower altitude*' (Source: Financial Times, 12 April 1999). Unfortunately, it may be some time before airlines do this as flying lower uses up more fuel and makes the journey longer.

But there are things we can do to protect ourselves as shown below. As an air traveller you may not be able to follow all the seven strategies that follow, every time you

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fly, but even if you follow just some of them you will be doing a great deal to protect your health. (See next page)

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SEVEN WAYS TO COMBAT HIGH ALTITUDE RADIATION

1. Antioxidants

2. Fly At Night

3. Choose A Safer Seat

4. Avoid Polar Routes

5. Avoid Solar Flares

6. Radiation Monitor

7. Pregnancy Protection

1. ANTIOXIDANTS

The importance of antioxidants in the diet is well established. It is universally accepted that the antioxidants found in the fruit and vegetables we eat help to combat the harmful free radicals produced by our bodies when we burn food for energy. Free radicals are the left-overs (the toxic waste) produced when food is digested and converted to energy. Free radicals cause cancer, disease and ageing of the body. In a way, there is a kind of equilibrium whereby the antioxidants in the food cancel out the free radicals produced by the same food when used for energy. But when other factors cause free radicals (such as radiation), the food we eat is not enough to neutralise the free radical threat.

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The solution is to take antioxidant vitamin supplements in addition to eating antioxidant rich food. In this manner, the antioxidants will help to shield you against radiation. Foods rich in antioxidants will be those containing beta-carotene, the vitamins **A**, **C**, and **E**, and the mineral Selenium (think of ‘**ACES**’ as in a pack of playing cards). Such vitamin foods include carrots, orange and yellow coloured fruits and vegetables, spinach, broccoli, melons, tomatoes, red peppers, sweet peppers, mangoes, oily fish, flax seed oil, wheat germ oil, sunflower oil, nuts, avocados, sweet potatoes, blackberries and chickpeas. Foods rich in Selenium include Brazil nuts, fish, and wheat products such as bread.

Beta-carotene plays a double role: (i) it helps combat free radicals caused by *High Altitude Radiation*, and (ii) it helps your blood assimilate oxygen more efficiently (important as cabin air is always short of oxygen).

Air travellers, then, should pay particular attention to eating nutritious antioxidant food on a regular basis. Simply taking antioxidant supplements the day before you travel will not help. At the very least, you need be taking them daily for 2 or 3 weeks before you travel.

Exercise is another important factor. It is known that regular exercise increases the amount of antioxidants produced by your body. In summary then, as an air traveller you should eat antioxidant rich food, do regular exercise, and take antioxidant supplements (see table

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below). Indeed, such measures should form part of a healthy life-style, whether or not you travel by air.

ANTIOXIDANT SUPPLEMENTS

- Crew members and frequent flyers: take a daily ***long-term upper safe level*** dose.
- Non-frequent flyers: take a ***short-term upper safe level*** dose on the day that you fly and for one or two days afterwards.

Note: The ***upper safe levels*** indicate amounts that have never been reported to harm a healthy person and are designed for self-supplementation. ***Upper safe levels*** may be exceeded on the advice of a health professional. The Recommended Daily Allowance (RDA) is given below for purposes of comparison. (*SOURCE: 'Are You Getting Enough?'*⁷)

Key A: Daily long-term upper safe level.

Key B: Daily short-term upper safe level.

Nutrient	Daily RDA	Key A	Key B
Beta-carotene	6mg	20mg	Up to 20mg
Vitamin A	800ug	2300ug	7500ug
Vitamin C	60mg	2000mg	3000mg
Vitamin E	10mg	800mg	Up to 1000mg
Selenium	60ug	200ug	700ug

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(Note: 1mg=1/1000g. 1ug=1mcg=1/1000mg)

CAUTION: Consult a health professional before taking antioxidant supplements if you are pregnant, taking medication, or if you have special dietary/medical needs. In particular, pregnant women should not exceed 800ug of vitamin A per day. There is possible evidence that long-term supplementation of synthetic beta-carotene may promote cancer. Do not supplement with vitamin E if you are pregnant, a haemophiliac, or aged under 18 (vitamin E can have the effect of thinning the blood, making bleeding more likely but reducing the risk of blood clot formation).

As an alternative to taking the above-mentioned vitamin and mineral supplements, you can now buy antioxidant supplements specifically designed to combat the harm caused by radiation (referred to as ‘oral antioxidants’). Two well known brand names are ***Phytobronze Intense*** and ***Imeden Tan Optimizer***. They may be aimed at people who want to get a tan, but they can also be effective for airline passengers who want to reduce the harm caused by high altitude radiation.

2. FLY AT NIGHT

Sunlight itself does not deliver radiation through the aircraft window into your body. But as we have seen, High Altitude Radiation is caused mostly by cosmic radiation from outer space and to a lesser extent by radiation from the sun. At night radiation from the sun is greatly reduced (but not eliminated) and cosmic radiation

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is reduced to some extent by virtue of not interacting so much with the 'solar wind'. Night time air travellers will therefore get significantly less *High Altitude Radiation*. If you have a choice of schedules, choose the one giving the maximum number of night time flying hours.

3. CHOOSE A SAFER SEAT

As already mentioned, the metal fuselage of the aircraft, the bodies of other passengers and the luggage aboard all contribute, however little, to shielding you from the outside radiation bombardment coming from above and the sides. Although on a single trip the shielding from the aircraft is insignificant, over several trips the cumulative effect can be significant. No seat is immune from High Altitude Radiation, but some seats can be less prone to radiation than others. There are three things you can do:

- If travelling on a double-decker plane, choose a seat on the lower passenger deck. That way you get a whole upper deck above you (including the bodies of other passengers) for extra protection.
- Choose an aisle (or middle) seat. Apart from not being near a window, you will gain some additional protection from the bodies of other passengers around you.
- Choose a seat near the emergency exit close to the wings. The extra bulk of the wings may shield seats positioned between the wings.

4. AVOID POLAR ROUTES

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The earth's atmosphere is thinner at the Polar Regions. Additionally, in some parts of the Polar Regions the protective ozone layer is diminished by as much as 60% (referred to as 'holes' in the ozone layer). In August 2000 the World Meteorological Organisation announced the ozone hole over Antarctica was now 30 percent greater than 25 years ago. Taysir al-Ghanem, a spokesman for the United Nations said *'This is an alarming rate of decrease and could lead to a much greater ozone hole'*.

Ozone depletion normally begins in late August and peaks in October before recovering in December. The ozone layer acts as protection against harmful radiation generally. High Altitude Radiation is significantly increased when flying through an ozone hole (indeed, airlines should avoid this). For these reasons, High Altitude Radiation presents greater risks for air travellers taking polar routes, particularly between August and December.

Unfortunately, airlines often choose polar routes when flying between continents because they can be shorter, saving time and fuel money. The best way to proceed is as follows:

- If flying to another continent always enquire whether the flight route goes over a polar region. If so, enquire whether there is an alternative non-polar route, perhaps with another airline.
- If no alternative non-polar route is available, check whether you can avoid a polar route by breaking the

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journey into two legs. This becomes much more feasible if you are touring several countries. This may, of course, extend the journey time and may be a little more expensive, but it can be an effective solution.

5. AVOID SOLAR FLARES

Most airline passengers never take into account the solar flare risk factor. Solar flares occur haphazardly and their effects on earth last for 1 or 2 days (until the next one). When solar flares occur the increase in *High Altitude Radiation* can be quite significant and because of this it is closely monitored on behalf of airline flight crews. Unfortunately, passengers are left blissfully ignorant of solar flare activity. Why? Because it could lead to a loss of business for the airlines, although they would argue that any kind of solar flare information service could cause undue anxiety among passengers.

The solution is simple: each time you are planning an air trip check first to see whether solar flares are forecast. If so, avoid flying or travel by another mode. You can gauge the level of solar flare activity by telephone or on Internet as follows:

- (i) Before each air trip you can telephone the **NOAA Space environment Center** in the USA to find out the latest sun weather report and determine if it is safe to fly in terms of avoiding harmful radiation. The telephone number in the USA is: +1 303 4975127.

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- (ii) **In-Flight Radiation Protection Services Inc, USA**, say the following:

Pregnant airline passengers and other interested flyers can learn if there is a solar storm causing elevated levels of radiation at airliner altitudes. Telephone +1 877 SUNFLARE (+1 87778635273) from the departure lounge just prior to boarding. If there is a significant increase in radiation levels, the caller will be advised to consider delaying the trip. Usually a few hours is all that is necessary for conditions to return to a safe level. A nominal charge of US \$3 applies, which must be paid by credit card (Visa, MasterCard, or Amex).

- (iii) The **University of Michigan, USA**, provides a good daily report of solar weather. It also has a simple traffic light graphic that each day shows green, yellow, or red to indicate the risks of solar radiation. The website is:

<http://www.windows.ucar.edu/spaceweather/>

- (iv) A website from Vermont, USA, provides advice on radiation monitoring, combating the dangers of radiation, a daily solar activity report and forecast, and links to other related websites. The website is:

www.healthycrew.org

6. RADIATION MONITOR

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The dangers of ***High Altitude Radiation*** have become much better understood in recent years. Because of this, many airlines are being urged to monitor radiation levels aboard their aircraft by installing radiation monitors. Also, many crewmembers are choosing to wear radiation badges or wallet cards (known as radiation ‘dosimeters’). The dosimeters monitor the amount of High Altitude Radiation your body is receiving and accumulating over a period of time, and they are specifically designed for the kind of radiation you get at high altitude (nuclear plant workers would wear a different type of badge for detecting a different kind of radiation). That way you can know when you are reaching or exceeding so called ‘safe’ levels and reduce your exposure accordingly.

A radiation dosimeter badge or wallet card is normally recommended for flight crewmembers and frequent flyers, but there is nothing to stop occasional flyers from also having such a device. However, it should be realised that the dosimeter badge does nothing to shield you from radiation (only to warn you). Radiation badges, cards and other radiation monitoring advice can be obtained from a variety of sources by doing a search on Internet.

7. PREGNANCY PROTECTION

As mentioned, if you are pregnant, your baby could be at risk when you travel by air. According to H.A.R.M (***High Altitude Radiation*** MONITORING SERVICE) Alington, USA, *‘Flying can expose reproductive cells and the*

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unborn baby to ionising radiation and cause genetic defects. Female crew [and frequent flyers], planning a family, should learn as much as possible about their personal level of radiation exposure BEFORE becoming pregnant. Exposure levels should be discussed with a qualified health professional, when possible, before conception.'

Increasingly, cases of Downs Syndrome are coming to light that are linked to High Altitude Radiation. For example, in October 1999 it was reported that Linda Bear, a British Airways flight attendant for 14 years, gave birth to a Downs Syndrome baby boy. Linda said that '*One of the doctors used to say that we didn't know what the radiation was doing to our insides, that in general it messed up your cycle and could make it difficult to conceive – and for many it did*'

Of course, proving a link between High Altitude Radiation and the birth of a Downs Syndrome baby is extremely difficult. But to be safe, if you are pregnant you should fly as little as possible (and preferably avoid flying altogether for the duration of the pregnancy). *NOTE: The foetus is most vulnerable to harm from **High Altitude Radiation** during the first 3 months of pregnancy.*

Even airlines admit the danger to pregnancy. Most airlines now transfer aircrew to ground jobs as soon as a pregnancy is declared. And airline advice to passengers is to not fly during the first three months of pregnancy.

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Also, research is increasingly bringing to light the radiation risks to children: the incidence of all types of cancer and leukaemia in pre-teenage children is doubled by even very small doses of radiation. This means that children should *fly as little as possible*, and ideally not at all!

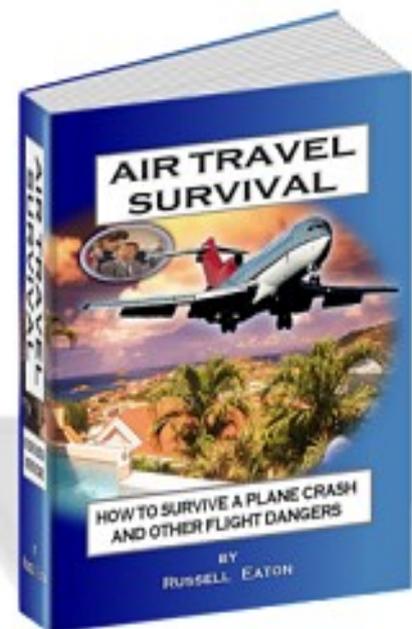
Always remember that there are alternative modes of travel that may take longer, but they don't leave the ground! If you are a crewmember who is pregnant, get a ground job with the airline until your baby is born. And if you cannot avoid flying while pregnant, then at the very least you should follow the precautions presented in this chapter.

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MYTH: There is no particular seat location that is safer than others.

REALITY: Some seat locations on airlines are much safer than others. *Air Travel Survival* reveals the safest seat locations and why they are much safer. It's not what you think: the seat closest to the emergency exit is not the safest seat!



To find out more go to:

www.airtravelsurvival.com

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Oxygen Shortage

Whenever we travel on an aircraft we all suffer from a condition known as mild hypoxia (also known to mountain climbers as ‘altitude sickness’). Mild hypoxia is the medical term referring to a decrease below normal levels of oxygen in the air, blood or tissues. This happens because the cabin altitude control is set at between 6,000 and 8,000 feet and as a result, there is 20 – 26% less oxygen available to breathe. This is like being suddenly put on a mountain at an altitude of 6,000 to 8,000 feet, with no time to acclimatise. If you were to exert yourself during the flight you would quickly feel the effects of altitude and lack of oxygen, just as a mountain climber does.

Oxygen shortage, then, is a consequence of cabin pressurisation, and it can affect people in different ways. Typical symptoms can include: dizziness, nausea, nosebleeds, headaches, smarting eyes, tight chest, hyperventilation, flu-like symptoms, anxiety, swollen feet,

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blood clots, heart attack, asthma, ear pain, stomach pain, toothache, vomiting, feeling bloated, fainting, panic attacks, claustrophobia, dehydration, and dry throat. Sometimes these oxygen shortage symptoms can lead to long-term illness or even death.

This shortage of oxygen makes the cabin air go very dry. At ground level, the normal moisture content of air is 60%. In a pressurised cabin, the moisture content is typically about 2% or less! Another way of looking at this is to realise that the earth's desert regions have a humidity level of about 20% to 25%, whereas the humidity level in the cabin of an airliner is typically a mere 15%. This means the air in the cabin is dryer than the driest desert on earth, and unless you drink water regularly you will quickly get dehydrated.

At ground level, the moisture on your skin evaporates at a rate slow enough to allow the body to continuously replace the moisture. But during an air flight the dry air will virtually suck the moisture from your skin too quickly to be replaced naturally. In fact, your skin evaporates as much as 8 ounces of water per hour, and when you add to this the water lost through breath and excretions, you end up losing about one litre of water per hour! It is therefore essential to drink as much water as you can throughout the flight, and use moisturiser cream and as necessary.

Dry air causes infection ►

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DRY AIR CAUSES INFECTION

The humidity of the air in a jet airliner is nearly completely dry because at high altitude the air sucked in from outside has virtually no moisture. When you breathe in dry air the nasal passages quickly dry out, leaving them without the film of moisture, which usually operates as a barrier against infection. Also, the dehydration caused by dry air makes your blood thicker which in turn compromises the immune system, making you more liable to catching a cold or other in-flight infections

Think of the body as a balloon. When you fly in a pressurised cabin your whole body swells up. This happens because air inside the cavities and the moisture in your body swell by 25% at 6,000 ft. cabin pressure, and 35% at 8,000ft. As a result, the stomach will press against the diaphragm, which in turn can put pressure on a fatty or slightly diseased heart. If restrictive clothing is worn it can cause severe tightness, discomfort and chest pains, with symptoms similar to angina. The passenger may additionally become breathless with panic setting in, followed by hyperventilation, sweating, and fainting.

However, millions of people live at high altitudes of 8,000ft. and over, with no ill effects. The big difference is fourfold: (i) on an aircraft your body does not have enough

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time to acclimatise to the high altitude, (ii) the oxygen shortage in cabin air is much worse than the air breathed by people living at high altitude, (iii) cabin air is *much* dryer than the air breathed by high altitude inhabitants, and (iv) taking off and landing creates sudden depressurisation which can cause illness. Therefore, no realistic comparison can be made between air travellers and high altitude inhabitants.

WAYS OF DEALING WITH OXYGEN SHORTAGE ILLNESS.

- **AIRSICKNESS.** Airsickness and vomiting on descent (or even after landing) can be caused by the shrinking of air in the stomach walls as the cabin de-pressurises. Remedies for airsickness include: (i) staring at a fixed point straight ahead and not looking sideways, (ii) sucking a sweet or chewing gum, (iii) applying an acupressure band, worn on the wrists. Acupressure bands are generally available from travel or medical retailers, but bear in mind they may not be suitable for young children, as they must be positioned correctly to have any effect. Note that airsickness is usually caused by oxygen shortage rather than by motion sickness.
- **ASTHMA.** Asthma sufferers should realise that in a small number of cases decompression can cause gas in the lungs to expand and puncture the lungs leading to a dangerous condition known as pneumothorax. The solution here is to make sure asthmatics are free of

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symptoms before flying and use inhalers more liberally around the time of flying.

- **EAR PAIN.** During descent, ear pain can be caused by air within the ear cavity contracting, forming a slight vacuum. In the worst cases the eardrum can rupture. Here are some possible solutions:
 - Hold your nose and blow or swallow.
 - Push your tongue against the roof of your mouth and swallow.
 - Suck on a sweet (or chew gum) to equalise the pressure within your ears (this is why some airlines pass sweets around just before landing).
- **FEET.** Swollen feet are a common condition caused as your body swells. You can alleviate this by jiggling your legs or bouncing your feet up and down on your toes every 20 minutes or so. Also, walk up and down the aisle once or twice an hour. It may also help to keep your shoes loose or take them off while seated.
- **HEART ATTACK.** Passengers with high blood pressure may develop irregular heartbeats. The solution is to cut down or avoid coffee, tea, salt, and alcohol the day before the flight and during the flight.
- **RED EYES.** The dry air desiccates the skin and eyeballs. The lack of moisture can make your eyes itchy, sore, and red. You should avoid wearing contact lenses and use a personal humidifier, such as a facial

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spray, to keep your eyes moistened from time to time. It also helps to use skin cream moisturiser on your face generally. Do not use a barrier cream such as Vaseline as this does not moisturise your skin.

- **STOMACH.** Stomach pain caused by gas in the stomach or intestines expanding as the plane climbs. The solution is to eat nothing or sparingly just before departure (and avoid gaseous drinks). To get rid of stomach pain in this kind of situation lean forward over your left knee and then sit up again – this lets the trapped gas rise through your system.
- **THE BENDS.** Scuba diving or deep sea diving can be dangerous for anyone flying shortly after a dive. Climbing to high altitudes can trigger ‘the bends’ caused by bubbles of dissolved nitrogen forming in the blood. Never fly within 24 hours of a sea dive below 25ft (7½m), or 48 hours of a sea dive below 50ft (15m). The effects, even at modest cabin altitude can be deadly. There is no risk from the bends when flying if you have not been diving (snorkelling and swimming is okay).
- **TOOTHACHE.** Big changes in altitude can cause toothache when tiny pockets of gas become trapped in deep fillings or areas of decay. To avoid this have a dental check up before you fly and maintain good oral hygiene in the run up to your trip.

AIRLINES CAN EASILY SOLVE OXYGEN SHORTAGE PROBLEM

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Aircraft fly at heights of 30,000 feet and higher to save money: at high altitude the air is thinner (i.e. less oxygen) giving the aircraft less resistance and a shorter distance to fly. This in turn saves fuel and money for the airline. When the air oxygen mix outside the aircraft is the same as inside there is no pressure on the fuselage of the plane. The greater the difference in air oxygen content (inside versus outside the plane), the greater the pressure of collapse on the fuselage of the aircraft.

If a plane were to be completely sealed at ground level and ascend indefinitely upwards the aircraft fuselage structure would collapse from the pressure outside. To prevent this a compromise is used: the cabin is sealed (i.e. pressurised) with an oxygen mix equivalent to a height of 6,000-8,000 feet while flying at a maximum safe altitude which is typically 30,000 to 50,000 feet. The oxygen shortage is caused by the cabin pressurisation. The greater the pressurisation, the greater the oxygen shortage.

So, for example, if the cabin is pressurised at 8,000 ft and flies at 30,000 ft. the fuselage is enduring a pressure differential equivalent to 22,000 ft. Of course, if money were no object, the aircraft could be built with a super strong fuselage that could be pressurised at ground level while flying at 30-40,000 feet. As such airliners do not exist, passengers have to endure oxygen-poor air.

It is commonly believed that simply letting in more fresh air from outside can alleviate oxygen shortage inside

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planes. But this is not so. To understand why, imagine a mountain climber at 8,000 ft: no amount of wind flowing into the climber's face will increase the oxygen mix of the air being breathed.

The problem of oxygen shortage in aircraft can easily be resolved by simply flying lower, thus allowing the cabin altitude setting to also be lowered. For example, if the plane were to fly at 35,000 ft instead of its usual 40,000 ft. it could set the cabin altitude controller at 3,000 ft. instead of 8,000 ft. That way, the same pressure differential (of 22,000 ft. in this example) would apply. For passengers, the oxygen air mix at 3,000 ft will be almost indistinguishable from ground level, and certainly *a lot more* comfortable and safer than 8,000 ft. Airlines, of course, can do this very easily, but they don't for commercial reasons (flying lower uses up more fuel and hence costs more money).

To summarise, oxygen shortage causes three problems:

- (i) A reduction of 20% - 26% in the oxygen content of air, causing discomfort and health risks.
- (ii) A swelling of all gases in the human body by about 25% - 35%, causing discomfort, bloating, stress, and risks to health.
- (iii) A reduction of air humidity from 60% at ground level to 2% in a pressurised cabin, making the air extremely dry. This causes dehydration, headaches, tiredness, easier propagation of infections through

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the air, greater jetlag, and lowered resistance to infection (as nose/respiratory system less able to trap and expel germs)

A study in the *Journal of the American Medical Association* shows that passengers get far more colds after they fly aboard airplanes than when they don't fly. The study used questionnaires given to 1,100 passengers leaving the San Francisco area and traveling to Denver between January and April 1999. A week after a flight, 21 percent of the fresh-air passengers and 19 percent of the re-circulated-air passengers reported having a cold. The researchers said the incidence of colds in non-travelers is about 3 percent.

The study concluded that since those breathing re-circulated air have the same incidence of colds as those who breathe fresh air pumped into their cabins, doctors must look for another cause of the increased susceptibility to colds. Note that re-circulated air is as dry as fresh air in a pressurized cabin because the pressurization causes the dryness.

This study shows that it is likely to be the dryness of the air that causes colds in airline passengers rather than any increase in cold viruses in the re-circulated air. The extra dryness makes the respiratory system more likely to allow a cold infection to take hold. A well lubricated respiratory system will usually stop an invading cold virus from succeeding in causing an infection.

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The airline industry is well aware of the problems of 'oxygen shortage' because it affects airline flight attendants as much as passengers. For example, in the first quarter of year 2000 over 150 British Airways cabin crew reported falling ill with symptoms identical to oxygen shortage symptoms. Every year, thousands of passengers suffer the ill effects of oxygen shortage, with symptoms ranging from mild discomfort to potentially fatal heart attacks, blood clots and blackouts. Oxygen shortage is probably the biggest 'silent killer' on airlines because it kills more passengers than anything else (apart from plane crashes).

In a study by the British Medical Association (*'The impact of flying on medical health'* May 2004), it was revealed that the increase in air pressure (caused by the pressurized cabin) makes the arteries shrink and carry less oxygen around the body. Healthy individuals can tolerate this, but most people are not perfectly healthy. The danger here is that cabin pressure *'may lead to hypoxia [lack of oxygen in the body] in individuals with medical conditions which impair the uptake, transport, or delivery of oxygen in the tissues, including respiratory or cardiovascular disease, anaemia, or infection'* the report concluded.

Just about all airlines are guilty of oxygen shortage because (i) the proportion of fainting passengers is spread evenly over all airlines, and (ii) airlines adopt similar cabin pressurisation settings for passengers. Because of this, all

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airlines carry emergency oxygen cylinders for passengers in distress. So if you do get frantic at the lack of oxygen ask a cabin attendant to give you some. But, of course, this is no excuse for airlines to inflict oxygen shortage on passengers, when it can easily be avoided by setting the cabin altitude controller a little lower.

Oxygen Shortage Solution: A passenger aboard a plane can do nothing to increase the oxygen content of cabin air, as only the pilot/captain can do this by flying lower. Turning on the air ventilation above the seat will make no difference to the amount of oxygen being breathed. Nor can passengers take aboard any kind of pressurized oxygen cylinders as it goes against airline safety regulations. However, there are six strategies that we can use to fight the dangers of oxygen shortage, as listed on the next page:

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SIX WAYS TO COMBAT OXYGEN SHORTAGE

1. Promote 'Oxygen Shortage League Tables'

2. Use Personal Humidifier

3. Avoid Rear Seats

4. Resting

5. Less Food, More Water

6. Inflight exercise

1. PROMOTE 'OXYGEN SHORTAGE LEAGUE TABLES'

The airline industry should be urged to fly planes with lower CABIN ALTITUDE CONTROLLER SETTINGS FOR OXYGEN ('Oxygen Settings' for short). As mentioned, Oxygen Settings are typically set at 8,000 ft. (the maximum that airlines can 'get away with' under air travel regulations). We should all be urging airlines to lower this to a setting of, say, 5,000 ft. or 6,000 ft. maximum, thus increasing the oxygen mix. The way to urge airlines to do this is by getting everybody to get involved in the following:

- (i) Lobby the press, the media, travel agents and air industry authorities to publish '**OXYGEN SHORTAGE LEAGUE TABLES**' by airline.
- (ii) Urge the travelling public to choose airlines that come out best in the league tables.

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- (iii) Encourage airlines to compete by offering the public better oxygen settings compared to competitors. Whenever booking a ticket always ask to be given the airline's Oxygen Setting.
- (iv) Publicise the dangers of oxygen shortage, making reference to '**OXYGEN SHORTAGE LEAGUE TABLES**'.
- (v) Ensure that there is free competition between airlines on Oxygen Settings, and that no cartel agreement on oxygen settings exists.

Airlines will be highly motivated to compete on Oxygen Settings once they perceive a public demand for this. Furthermore, oxygen league tables will help airlines by giving them something else to compete with apart from price.

2. USE A PERSONAL HUMIDIFIER

- A more immediate solution to oxygen shortage is to use a personal air humidifier. An American company called Sharper Image provides a product called 'IONIC BREEZE PERSONAL AIR PURIFIER & HUMIDIFIER' costing about GB £40 (US \$60). It's a personal humidifier that you hang around your neck and it sits on your chest about 6-8 inches below your chin. Here's a brief description:

The device is essentially a personal-stereo-sized version of those domestic humidifiers people hang

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on radiators to keep the air moist at home. This one is worn around the neck and a small amount of water is added to the fabric humidifier tray. A motor powered by 4 AA batteries draws air in, humidifies it, and directs the humidified air towards the wearer's nose and mouth. The humidified air has the effect of increasing the oxygen you breathe (as the oxygen in the vapour is transferred to the air breathed in). Another benefit is that allergens and airborne irritants are to some extent neutralised.

To find personal humidifiers do a search on Internet for “respiratory humidifier” or “air humidifier”.

- Another kind of personal humidifier can simply be a facial spray that you would use on your face every so often. Go to a cosmetics counter in a department store and ask for a perfume atomiser. Then simply put water into it instead of perfume. By spraying your nostrils and throat with atomized water every so often, this will help to moisten the air as it is breathed in.

3. AVOID REAR SEATS

- Pilots are given only fresh air and have 150 cubic feet per minute, compared to about 20 - 60 cu. ft. in first class (depending on number of passengers), and as little as 7 cu. ft. in economy class when full.
- The further forwards you are the better the oxygen mix. You should therefore avoid seats towards the rear. This

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is so because air is taken in through the jet engines at the front. This air is then compressed and heated before entering the cabin at the front, where it then travels along the ventilation system towards the rear. As it travels towards the rear it escapes into any air vents switched open above passenger seats.

- As half the air is recycled after it has been through the cabin, by the time the air gets to the rear seats it is staler and has less oxygen. In economy, chose a seat as far towards the front as possible.

4. RESTING

- When resting, your body needs less oxygen. When you are reclining back or lying down (asleep or not) your body is in a relaxed state and you consume oxygen at the rate of about 0.24 litres/min. When sitting, but relaxed, the rate is 0.34 litres/min. When walking the rate is 0.85 litres/min. When your body needs less oxygen, it will be less affected by oxygen shortage in the air. Therefore, you can fight the harmful effects of oxygen shortage by resting as much as possible (not forgetting to blood-clot-prevention exercises).
- Try to avoid sleeping however long your journey, as sleep more than anything else promotes blood clots in airline passengers (unless you can lie flat). If you absolutely must sleep, make sure that it is in line with the sleeping pattern of the new time zone you are going to.

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If you are not going to a new time zone, keep sleep to a minimum so as not to disturb your daily sleeping pattern.

5. LESS FOOD, MORE WATER

- When you eat your body needs extra oxygen to digest the food. In fact, the intestinal tract (the digestive system) accounts for about 25% of oxygen consumption. By eating little or nothing at all during a flight you will do a great deal to protect your body from oxygen shortage in the cabin. And, as explained previously, the avoidance of food will help combat jetlag. Furthermore, should you face a plane crash, your internal injuries will be greatly diminished if your stomach or digestive system is not full.
- Drink plenty of water throughout the flight, whether or not you feel thirsty (don't wait to feel thirsty – you won't). Experts recommend that you drink one litre (about 1½ pints) of water for every hour in the air. So take at least a two-litre bottle of still water in your hand luggage and be sure to drink it all during the flight. Avoiding dehydration during a flight is probably the best way to stay well and avoid jetlag and illness.
- ***A word of warning:*** Random tests on aircraft have found that about 15% of drinking water stored aboard commercial jets is contaminated with food poisoning bacteria and human waste. It is unclear where the germs enter the water supply – the main culprit may be the water storage tanks at airports and this is currently under

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investigation. So if you want to play safe, take your own bottled water.

6. INFLIGHT EXERCISE

- Exercise has a dramatic effect on the oxygenation of your body. When you do inflight exercise, the body is more able to use the bloodstream to take oxygen to all parts of your body, and the effect is almost immediate. Assuming you are drinking plenty of water, the body will extract oxygen from the water and make good use of it, making you feel better. This is one of the best ways to combat oxygen shortage. But be warned: you won't get the good effect of exercise without drinking plenty of water (about two cupfuls every half an hour).
- If your flight includes any stop-overs, make sure you exercise or walk as much as possible during the stopover (whether or not you leave the aircraft). The exercise will oxygenate your body and help you face the next leg of the journey.
- Do inflight exercise whenever you can or whenever you feel the need (see the inflight exercise section in this book). You may think that this advice contradicts the advice to rest to conserve oxygen, but in fact you should do both for maximum benefit.

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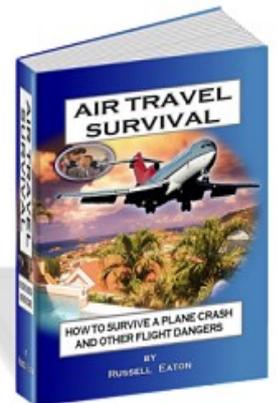
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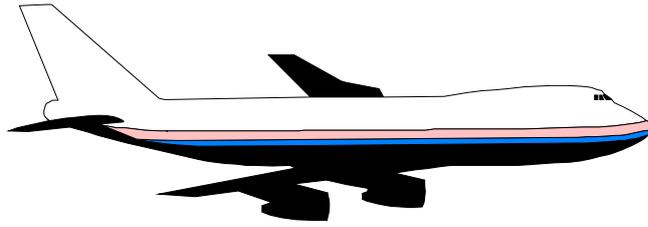
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Avoiding Blood Clots

Quite apart from plane crashes, people die *during* air flights every week of the year. In fact, the number of in-flight fatalities from illness triggered by cabin pressurisation and lack of oxygen is actually greater than the number of plane crash fatalities! This means that on average thousands of passengers die on airlines every year for reasons other than a plane crash. The concern is such that most airlines issue advice on the prevention of DVT, prompted by fears of possible lawsuits from affected passengers.

Here is an example of the kind of DVT advice given out by airlines:

DVT is linked to prolonged periods of inactivity, and so it generally affects people flying long-haul, but passengers travelling by car or train may also be at risk. It could even occur in an armchair at home.

There are some medical conditions that make people more prone to DVT such as the elderly, the overweight, very tall, and very short people. Also, those with leg injuries or varicose veins may be at greater risk.

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Such advice is usually accompanied by information about in-flight exercise, and the importance of drinking water. Unfortunately, in giving DVT advice, airlines pointedly ignore the fact that a major cause of DVT for airline passengers is the *super-dry* air that is maintained in the aircraft (more on this later in the book).

The danger of blood clots for air travellers is real and is increasingly being recognised by the airline industry: Research is still going on to ascertain whether cabin pressurisation, restricted seating, or other factors are to blame. It may well be that several factors combine to bring about the condition.

In the United Kingdom alone about 30,000 people a year suffer from DVT (Deep Vein Thrombosis) caused by blood clots. Of the 30,000, about 3,000 prove fatal and many thousands of people are caused lifelong incapacity. There is no concrete evidence to show how many of the 30,000 cases of DVT are induced, or for that matter triggered, by air travel. But according to Farrol Kahn of the Aviation Health Institute in the UK, many thousands of cases of DVT are caused every year by air travel.

Airlines argue that although some passenger fatalities can be attributed DVT, it is mere coincidence. In other words, those same DVT fatalities would have occurred whether or not air transportation was used.

There is, however, increasing evidence that air travel does cause blood clots, particularly on journeys of more than 4

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hours. For example, in August 1999, Susan Fuller boarded a plane to come back home from the Far East to the UK. She was a fit 55 year old who had never taken a day off work through illness. Towards the end of the journey she got up and walked down the aisle and then collapsed and never regained consciousness. She had suffered a fatal blood clot. Doctors later said that a blood clot had formed during flight and bits of the blood clot had travelled to her lungs causing a fatal pulmonary embolism. She had died aboard, almost immediately from the moment she collapsed. She was travelling with her husband, Roger Fuller, and he is convinced that ignorance killed his wife. He said: *'We slept during some of the flight so we hadn't moved around a lot. Why weren't leaflets ever given out to passengers, so people know they should be moving around during flights?'*

Here is a snapshot of *UK-only* incidents reported in the seventh-month period of May and November 2000. A similar list of DVT incidents would apply in 2008 or any other year:

- In May 2000 the UK 'Daily Mail' newspaper reported that a British air traveller had a leg amputated at the Middlesex Hospital after suffering a blood clot.
- In September 2000, Angie Collins, aged 31, died two weeks after returning to the UK after a nine-hour flight from Cuba. A post mortem revealed a blood clot in a vein in the heart. Since she was otherwise fit and

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healthy, the long-haul flight had to be the cause according to her father, Dave Collins.

- In October 2000, Emma Christoffersen, a fit and slim 28-year-old woman, died from a blood clot within minutes of getting off a jumbo jet in the UK, after a flight from Australia.
- In another incident a 29 year-old businessman who was on a BA flight from Hong Kong to London collapsed within minutes of his arrival with a clot in his lungs. He had developed a blood clot in Club Class during the 13-hour flight and had experienced mild cramp. The unusual aspect of this incident is that he was considered to be low risk because of his relatively young age and because he was sitting in business class with plenty of legroom. He said, *'I could have had a heart attack, a stroke or a blockage too high up in my pulmonary artery but I didn't. I also avoided a clot in my groin which has been known to cause gangrene and require amputation of the penis!'*
- In November 2000 Thomas Lamb, aged 68, complained of breathing difficulties a day after flying from Australia to the United Kingdom. He went into a coma five days after landing and died from a blood clot that had travelled to his lungs.

In a Study released in January 2001 into "Travellers Thrombosis" at Ashford University, UK, doctors monitored the accident and emergency department closest

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to the arrivals hall at London Heathrow Airport. They discovered that over a three-year period (1998-2000) between one and two long-haul passengers die every month from a blood clot *within minutes of landing*.

The passengers in the Ashford Study were aged between 28 and late seventies indicating that people of all ages are affected. Dr. John Belstead, who took part in the Study, said that *Ashford Hospital had dealt with 30 deaths from London Heathrow Airport over the three-year period, and excluded people who were previously at risk of DVT. Only the most severe cases become apparent at the airport. Most patients who suffer DVT while flying will go to their doctor a few days or weeks after flying.*

The Doctors who carried out the Ashford Study believe that they only saw the ‘tip of the iceberg’, i.e. only those passengers who died en-route or within minutes of landing. Most cases of flight-induced blood clots that cause health problems come to light one or two weeks later (and some even up to four weeks later) and therefore do not get associated with flight travel. The Ashford Study estimated that more than 2,000 people die from flight-related deep vein thrombosis each year in the UK alone. Similar figures will apply to all the major airports of the world.

For example, in Japan, Doctors at Tokyo Airport say that in an eight-year period 25 passengers died from blood clots and another 150 were made seriously ill, within minutes of landing. The number of passengers affected by blood clots

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that came to light after leaving the airport is unknown (Source: New Scientist Magazine, 11 January 2001). Dr. Tushiro Makino, Director of a clinic at Tokyo airport, said *'the biggest problem is dehydration and that is made worse by drinking alcohol'*.

Most people don't realise that when sitting in a cramped aircraft seat, this puts pressure on the veins of the legs and it can cut circulation by as much as 50%. Add that to the fact that blood will clot faster in a dry atmosphere (and the air on a plane is drier than any desert!) and you can see why there are problems. The air is dry because of oxygen shortage in the cabin air, and this lack of oxygen causes the surface of veins to wrinkle, creating a greater likelihood of clotting.

Concern among air travellers over the dangers of blood clots has grown to such an extent that a huge worldwide study has been initiated by WHO (The World Health Organisation). On 13 March 2001, at a meeting in Geneva between sixteen major airlines and WHO, Dr. John Scurr, a leading authority on DVT, said *'We were able to agree that there is a probable link between flying and the development of blood clots'*.

On 12 May 2001 J. Scurr published an article in *The Lancet* that said the following:

'It is extremely common to develop small clots. We still do not know how many passengers will go on to get a bigger clot, either affecting the leg on a long-term basis, or

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travelling to the lung. At the same time we studied these passengers, a further 100 passengers were fitted with elastic stockings that squeezed the leg, promoting blood flow through the deep veins and preventing the deeper veins from enlarging during long periods of inactivity. We were unable to detect any clots in the deep veins in these 100 passengers, suggesting that the use of elastic stockings is a very effective way of preventing the development of a clot.

Four of the passengers wearing elastic stockings complained of pain in the superficial veins. These passengers had quite marked varicose veins. It is probable, therefore, that passengers with bad varicose veins are prone to the stocking rubbing on the veins and causing inflammation locally. Superficial thrombophlebitis is not a serious condition although it can be quite painful.

In summary, passengers who fly long-haul are at risk of developing small clots. It is probable that a number of these passengers will go on to develop bigger clots and more serious problems. The use of an elastic compression stocking is an effective way of reducing this risk.'

Naturally, airlines are watching these developments with interest as it could give rise to lawsuits for millions of dollars from families affected by DVT fatalities.

With regard to possible lawsuits, Dr David Flower of British Airways said *'there is an association but I would not be prepared to say there is a causal link between flying*

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and DVT. We are committed to research but we also want passengers to think about whether they are fit to fly'. Later, in May 2001, Flower told Panorama (a British BBC TV programme) that 'British Airways had accepted the link between flying and DVT in the early 1990's'. He said that BA had issued exercise advice to passengers as soon as the airline acknowledged the link.

But in spite of the DVT advice given out by airlines, some passengers (or their bereaved relatives) are taking matters to court. Between 2001 and 2003 there have been several court cases around the world, and some judges have that air travel has indeed contributed to the deaths of passengers as a result of DVT (for example see Hornsey Coroners Court records dated 8 November 2001).

Blood clot alarm is now of such concern that in September 2001 the European Union parliament voted overwhelmingly in favour of compelling airlines to give passengers information about the dangers of blood clots, and this is now done on a regular basis by most airlines.

WHAT IS A BLOOD CLOT?

When you are seated in cramped conditions, and without moving for long periods of time, the veins on the back of your legs (the 'calf veins' between your buttocks and the back of your knees) get restricted or squashed against the front edge of the seat, and this is how deep vein thrombosis (DVT) is caused in the context of seated passengers.

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DVT is a blockage of the main veins caused by blood clotting. Stephen Barker, consultant vascular surgeon at University College, London, says: *'A DVT tends to start in the smaller veins of the calf muscles. A thrombus occurs when blood, which should be pumped back to the heart, solidifies and forms a clot in the deep veins. These clots will be naturally dissolved by the body, but in some cases the body's natural defence systems are overwhelmed and DVT's in the calf muscles can extend, first to the knee level, then to the thigh and then to the lower abdomen.*

Clots can then break off and pass up towards the heart, and then on to the lungs, where they are known as a pulmonary embolus. It is the pulmonary embolus that can cause chest pain, shortness of breath and sudden death.

While seated in cramped dehydrating conditions gravity will make stale blood gradually accumulate and thicken in your legs. The blood accumulates because it is a long way from your legs to your heart. Normally, the calf muscles act as vein pumps to send the blood back up to the heart. The problem is that while seated the vein pump cannot work effectively. After a few hours, small clots will begin to form in the stale blood, which is getting thicker from lack of oxygen and from not being circulated around the body. Platelets in the blood stick to each other and to the artery wall, gradually building up into a clot. These small blood clots usually dissolve once you become active and move around. But in some circumstances they can get

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bigger and harden. The danger is that on a long-haul flight, even a small blood clot can grow bigger and eventually (perhaps a few days later) work its way to a vital vein and cause a blockage. These blood clots can quickly grow to a massive size in the course of an air flight, measuring several inches in length.

If a clot reaches the brain it can cause a stroke. If it reaches the heart it can usually pass through the big vessels of the heart, but then it will be carried on to the smaller vessels supplying the lungs causing a pulmonary embolism which is usually fatal. But blood clots can also get stuck in small veins in the limbs and even the penis!

An excellent website dedicated to the subject of blood clots and air travel can be found at:
<http://www.airhealth.org>.

Whenever you fly, never go to sleep with your ankles crossed or your legs crossed. Equally, don't go to sleep with anything heavy on your lap. Women in particular should never go to sleep holding a baby in their lap. Such action will restrict blood flow and aggravate the risk of a blood clot.

When you get a flight-induced blood clot there are four possible outcomes:

- (i) The blood clot is small enough to gradually melt away causing no harm, and you most likely will not be aware that you have a clot.

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- (ii) The blood clot is big enough to cause a problem if not treated in time, possibly resulting in a limb amputation or causing a life-long dependency on blood thinning drugs and physical restrictions to your life style.
- (iii) The blood clot is big enough to cause a problem if not treated in time, possibly killing you.
- (iv) The blood clot does not break off from the artery wall at all. It simply remains as a deep vein thrombosis, making you that much more vulnerable next time you fly, because the existing blood clot will be waiting there to get bigger and bigger.

To prove the danger of blood clots, scientists at the Aviation Health Institute, UK, tested 200 long-haul passengers in January 2000. According to Farrol Khan, director of the Institute, they found that *‘Most of the volunteers had a marked increase in the thickness of the blood at the end of the flight which puts them at greater risk of pulmonary embolism (blood clot of the lungs)’*.

The blood clot risks of flying have been expounded by many experts, among them Professor Peter Vanexis of Glasgow University (a leading forensic pathologist). At the Pathology 2000 Conference he accused airlines of putting profits before passenger’s health. He said: *‘The relationship between pulmonary embolism and flying is well recognised but I think the documented cases are just the tip of the iceberg’*.

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Also, Dr Paul Giangrande of the Oxford Radcliffe Hospital has stated that blood clots are associated with many forms of long distance travel. *'I simply do not accept that there is no link between DVT [blood clot] and air travel as studies published in various journals show that there is [a link]'*.

When blood clots are seen in patients undergoing surgery, studies have shown that about 25% of those patients are people who have been on long-haul flights in the previous month. This implies that long haul airline travel has a big chance (a 25% chance) of triggering blood clots in people who are not well, i.e. in people who are contemplating surgery.

WHO IS AT RISK?

As an air traveller, you are more at risk of a Deep Vein Thrombosis if you are unusually short or tall (if your legs are long, the seating will be even more cramped; if your legs are short, the seat pressure on your calf veins is likely to be greater, unless the feet are well supported). Also at risk are people who are overweight, dehydrated, pregnant, on the Pill, take hormone replacement therapy (HRT), smoke, have varicose veins or phlebitis, suffer blood disorders, drink alcohol or overeat during the flight, suffer from cancer, or have just had surgery. Taking sleeping pills, drugs or melatonin during flight can also encourage blood clots because they can lead to a

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long period of inactivity that lowers oxygen levels in the blood, increasing its stickiness.

Research published in August 2006 (*Online Journal PLOS Medicine*) shows that travelers whose journeys last more than four hours are doubling their risk of getting DVT.

This study, carried out by scientists at Lieden University Medical Centre in the Netherlands, also showed that women taking the contraceptive Pill increase their risk of getting DVT *by up to twenty times!* It is thought that the hormones in the oral Contraceptive affect the way a woman's blood clots, making it more likely she could develop DVT. If you are taking the Pill, the message is clear: don't fly, or make sure you take measures to avoid DVT as explained in this chapter.

DVT BLOOD TEST

Also at risk are people who suffer from a gene mutation known as Factor 5 (also known as Factor V Leiden). Factor 5 affects the clotting performance of the blood, increasing sevenfold the person's vulnerability to flight related DVT.

Factor 5 is found in one in twenty of the population at large, and one in ten in North Europeans and North Americans. Fortunately, there is a blood test that you can take to determine if you are at risk from factor 5 and other blood-clotting risks. The DVT blood test checks for Factor 5, for anti-cardiolipin antibodies (sticky blood syndrome), and for Factor 2 (a tendency for the blood to form clots).

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If the test comes back positive, patients are advised to take blood thinning medication such as heparin whenever flying.

The DVT test requires a blood sample which cannot be sent by post as the test must be carried out within 6 hours of taking the blood sample. Frequent flyers are strongly advised to take the DVT blood test. According to Professor Sam Machin of University College Hospital, London, *'Once you know your risk factor, you don't need to repeat the test. I would want to know if I was at increased risk so I could take the necessary precautions'*. In the UK this test is available at the Wellman Clinic, 32 Weymouth Street, London, W1N3FA, telephone 0207 6372018. In the USA this test is available from several sources (ask a medical doctor or go to the website www.fvleiden.org for further information).

YOUNG PEOPLE ALSO AT RISK

Young people are at risk as well as old people. For example, late in the year 2000 three British Olympic coaches suffered potentially-fatal blood clots when they flew From the UK to Australia for the Olympic 2000 Games. All were men between 35 and 45, of above-average fitness, and who had never experienced major health problems. One of the coaches, Simon Burney, a former professional cyclist, was found to have a six-inch clot in a vein stretching from calf to knee. All three men were diagnosed as victims of DVT after complaining of

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leg cramps when they arrived on the Gold Coast of Australia to begin training their athletes. Had the clots broken free they could have travelled to the lungs with possible fatal consequences.

In a study carried out by Dr. Patrick Kesteven of the Freeman Hospital, Newcastle Upon Tyne, UK, 86 travellers who developed blood clots in the leg after taking a flight lasting longer than two hours, were aged from 20 to 83. This means that air travellers as young as 20 are at risk of developing potentially fatal blood clots.

In another study carried out the UK government titled *'Inquiry Into The Aircraft Cabin Environment'* issued in November 2000, *'travel-related DVT differed from DVT in general because it affected the young as well as old'*. The study said that *'immobility caused by sitting, especially with the legs bent at the knee, had been linked to blood clots for at least 50 years. During the Second World War a London pathologist noticed frequent DVT cases in those sitting overnight in bomb shelter deckchairs'*.

The UK study goes on to say that women on the pill should take a low-dose aspirin before the flight to thin the blood. *'This can reduce the risk of DVT by 37%'*. Dr. Michael Davies, a specialist in occupational medicine, who advised the committee responsible for the study, said aspirin probably did 'more good than harm' as a preventative measure, providing the users were not susceptible to side effects such as stomach bleeding.

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However, in a more recent study by the British Medical Association (*'The impact of flying on medical health'* May 2004), it was concluded that taking aspirin to prevent DVT in airline passengers was not a good idea. The BMA report said that 17,000 passengers would have to take aspirin to prevent one case of DVT. But for every 40 passengers taking aspirin there would be one case of stomach irritation or bleeding ulcers. The BMA report also pointed out that passengers who take aspirin when flying could be putting themselves in danger of excessive bleeding should there be an accident or illness before, during or after the flight.

While the debate on aspirin still continues, this book recommends that you do not take aspirin as a means of preventing DVT in air travel. There are other better things you can do as explained in this chapter.

The danger of a blood clot in air travellers then, is that it prevents blood flowing past the clot, causing the limb (typically the leg) to swell, thus affecting the free circulation of blood throughout the body. This is why you should keep an eye on your legs during air flight, because if one leg swells *significantly more* than the other it is a strong sign that you have deep vein thrombosis. If this happens you should seek in-flight emergency medical assistance.

BLOOD CLOT MISCONCEPTIONS

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Blood clot misconception no. 1: Any kind of travel (train, bus or air) will promote a blood clot if you are seated for a prolonged period of time. This misconception has arisen because some experts say that a long journey on a bus or train is no different to a long journey on a plane if the seating is equally cramped.

Indeed, The British Medical Association published a study in May 2004 (*'The Impact of flying on passenger health'*) stating that *'air travel may not be any more harmful to health than any other form of transport.'*

However, this BMA study did not examine other forms of transport with the same rigour as air travel; nor did it take into account that the time spent seated in air travel is invariably longer than other forms of public transport. As the BMA report did not draw any firm conclusions on this matter it did itself no justice by implying that air travel may be comparable to other forms of travel when it comes to DVT.

In fact, in the context of blood clots, air travel is fundamentally different to any other kind of travel because of dehydration.

Air travel dehydration (i.e. insufficient water in the body) is caused by three main factors:

- (i) Not drinking sufficient water during the journey.
- (ii) Drinking alcohol. Or drinking tea/coffee instead of water. *Note: Drinking tea/coffee in moderation is*

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better than drinking no liquids at all. But the caffeine in tea/coffee will prevent your body from absorbing more than 50% of the liquid, resulting in dehydration.

- (iii) The extra dry air (caused by cabin pressurisation, which in turn causes oxygen shortage in the cabin air).

So unlike a bus or train, when you travel by air you are much more likely to suffer dehydration, and this in turn increases the danger of blood clots. This is so for four reasons:

- (i) **BLOOD THICKENING.** Dehydration makes the blood thicker and heavier from lack of water, and therefore more likely to settle in the legs instead of circulating freely around the body. The thicker blood allows a blood clot to form and grow more quickly.
- (ii) **VEIN CONSTRICTION.** Dehydration dries the skin and constricts the surface veins. This slows down the blood circulation, also making your blood thicker, thus increasing the likelihood of a blood clot.
- (iii) **HIGHER BLOOD PRESSURE.** Dehydration puts your body under greater stress because all your organs start to compete for the limited amount of water circulating in the blood. This in turn increases your blood pressure. If a blood clot is formed, the high blood pressure can dislodge the clot and carry it through the body to a point where it blocks blood to

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the heart, the brain, the lungs, a limb, or some other part of the body.

(iv) **CHEMICAL CHANGES.** Dehydration causes chemical changes in the body, which dramatically increase the levels of compounds associated with blood clotting.

In concluding misconception #1, a Study published in the British Journal of Haematology (*Long Haul Flights and DVT*, vol. 116, issue 3, p.653 – March 02) stated that the ‘*risk of DVT was only increased in long-haul travellers if one or more additional risk factors were present.*’ In other words, if you are in a particular risk group you are more likely to get DVT when you fly. This Study adds weight to the view that we should all take precautions when flying as no individual can be sure that he/she is not at risk.

Blood clot misconception no. 2: You are less likely to get a blood clot in First Class. In a study published in The Lancet⁵ titled ‘*Association between acute hypobaric hypoxia and activation of coagulation in human beings*’ it was concluded that cabin pressurisation does indeed induce DVT. The study found that cabin pressurisation makes the blood thicker (more likely to coagulate) and hence more likely to induce DVT in vulnerable people.

In another study by Norwegian scientists published in The Lancet in November 2000 it was shown that an increase in cabin pressurisation during a flight is likely to increase the risk of a clot. The study also showed that those in first

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class were *just as likely* to be affected as those in economy because the levels of compounds associated with blood clotting increased by up to eight times in all passengers.

Another study carried out by the British Medical Association (*'The impact of flying on passenger health'*, May 2004), shows that there is no evidence to prove that passengers flying in economy class are more likely to suffer from DVT than those in more expensive seats. This is because the seat pressure under your thighs (the cause of DVT) is not affected by how much space you have *in front of* your knees.

But there is an even bigger reason for saying that first class passengers are, if anything, *more at risk* of a blood clot compared to economy class passengers, and it is this:

First class passengers are more likely to sleep, and sleeping during air travel is by far the biggest cause of blood clots. This is so for three reasons:

- a. Most flight-induced blood clots are formed when passengers fall asleep in cramped conditions. What happens is that as your body relaxes during sleep, the pressure on your calves (the underside of your thighs) is increased, *whether or not your legs are crossed*. This in turn speeds up the formation of blood clots.
- b. When you sleep, the oxygen content of your blood is reduced. This in turn makes your blood 'more sticky' and more likely to form a blood clot.

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c. When you sleep you move around less than when you're awake, thus helping blood clots to form.

Empirical evidence supports this: the vast majority of cases of airline DVT incidents have occurred in passengers who slept. *There is no known case of an airline passenger dying from DVT who did not sleep at some point in the journey!* By the simple expedient of staying awake throughout the flight you will drastically reduce your chances of getting a blood clot.

For long haul flight it is even more important to **not** fall asleep because a prolonged period of sleep is much more likely to induce a blood clot. The only exception to this rule is when you can lie down flat, as in a bed, with no restrictions of movement (available in first class on some airlines).

The point is this: first class passengers are much more likely to fall asleep in the seated position than economy class passengers (by virtue of having more space, more free drinks, and feeling more comfortable). And the more you sleep, the more you are at risk of a blood clot.

Blood clot misconception no. 3: Once a blood clot has formed, death can always be avoided if proper medical treatment is given in time. In fact, large blood clots are difficult to treat successfully and there is a high mortality rate. Take the case of Shirley Henderson, a fit 46-year-old housewife and a keen horse rider. She collapsed in agony after disembarking in Singapore in June 2001. Henderson

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was then hospitalised and fully treated for blood clot, before flying home to the UK. But within days, she died of DVT in spite of continuing her blood clot treatment at a UK hospital.

The frightening aspect of getting a blood clot after air travel is that the illness caused by the clot may not become apparent until *weeks* later (not *days*!). This is because the clot may take a long time to slowly work its way through your body until eventually getting stuck in a smaller vein. And then, even if you get hospitalised at the first sign of illness, the treatment may not be successful in preventing death, long-term incapacity, or amputation.

Since 2003 doctors have begun using a new device that can eliminate blood clots from the body. It's a mini probe in the shape of a small thin pencil, and it acts like a vacuum cleaner. Called Anglojet, the device is 'fed' to the blood clot through an artery where it sucks up the blood clot. This avoids the need for clot-busting drugs, and also it removes the clot from the body rather than dissolving it into smaller pieces which may later cause new blockages and complications.

In another development Provoxis launched *CardioFlow* in 2004, a special kind of extract from tomatoes. According to Dr Stephen Franklin, Chief Executive of Provoxis, *CardioFlow 'has been shown to have a beneficial effect in reducing the tendency for excessive blood clotting, which in some circumstances can lead to heart attacks, stroke*

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and deep vein thrombosis.’ There are plans to make CardioFlow available at airports and aboard airliners in order to combat DVT.

Increasing evidence is showing that the length of an air flight does not necessarily matter – people flying as little as 3 hours and as long as 30 hours have suffered from blood clots, some fatal. In a survey carried out by Aviation Health Institute in 2002 (<http://www.aviation-health.org>) it was found that 17% of DVT cases occurred on short haul flights implying that on-board conditions are more to blame than the length of the flight.

It is estimated that about 12% of all airline passengers develop blood clots during flights but never realise it because the clots are not big enough to block a vein. In a large study published in *The Lancet* on 19 December 2003, it was found that three to four passengers on every Jumbo Jet are likely to develop DVT. Professor Beasley who led the study said *‘Our findings suggest that DVT is a potentially important health problem to many long-distance air travellers, including those without recognised risk factors.’*

Referring to this study, Ander Cohen, a leading expert on DVT at King’s College, London, said *‘it shows people get a false sense of security out of taking aspirin when in reality it will not protect you against DVT.’*

This is very much in line with another study by Prof. John Scurr (a consultant surgeon at the University College and

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Middlesex Hospitals in London, UK). It was estimated that on virtually all airline flights about 1 in 10 air travellers develop blood clots, which usually dissolve without consequence. But occasionally they don't and that's when problems can arise a few days later. As a result, many blood clot incidents are not linked with air travel in medical records. Scurr believes that the number of recorded incidents of flight induced DVT is a gross under-estimate. He says '*It can take up to 10 days before a blood clot breaks off and moves to the lungs. What this means is that you can die of a pulmonary embolism days after the flight. I believe that hundreds of Britons are dying every year because of this disease*'.

Other research suggests that jet lag 'may help cause DVT in air passengers' according to a UK Government Study (published in September 2001). It warns that changes in sleep patterns, and resulting alterations to metabolism, could help trigger a blood clot. This means that passengers who fly on a second or third leg of a journey may be at extra risk of a blood clot if travelling while suffering from jet lag. The solution, of course, is to avoid jet lag (see Jetlag chapter).

Blood Clot Solution

What Airlines Can Do:

Medical records show that the danger of flight-induced blood clots has been known to airline company doctors since at least 1968, and attempts to engage in serious

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research have been blocked by a scandalous refusal to disclose passenger statistics (and an insistence that the incidence of DVT in long-haul passengers is no higher than in the population as a whole).

It is easy to criticise airlines for their commercial cupidity, but passengers do like to have cheap airfares – as long they are safe. The dilatory response of airlines to a succession of DVT deaths should make every air traveller be very concerned about DVT, particularly as airlines are always trying to squeeze more passengers into limited seating space.

Airlines can greatly reduce the risk of blood clots and DVT without significantly sacrificing costs or the number of passenger seats available. Here are six things airlines can do quickly and at little cost:

- (i) **FOOTREST.** Provide a ‘pedal footrest’ that allows the passenger to rest and move the feet while seated. Some airlines already do this. For short people and women this is critical as it allows the legs to be held higher, taking pressure off the calves.
- (ii) **MODERN SEATING.** Redesign airline seats to allow more leg space. This can be done without reducing the number of seats by simply making the seats thinner. Modern materials are more than strong enough for this and seat comfort would not be sacrificed. Current airline seats have acres of old fashioned foam padding and are very out of date.

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The cost of installing modern, thinner seating would be recouped by being able to offer more seats.

- (iii) **WATER.** Encourage passengers to drink plenty of water (provided free) and restrict alcohol consumption by selling it at greatly inflated costs. Ensure airline drinking water is totally pure.
- (iv) **INFORMATION CARDS.** Provide information cards in airline seat pockets, at check-in desks and ticket desks that warn travellers about the dangers of DVT and what to do to reduce the risks. Many airlines are now doing this, albeit reluctantly.
- (v) **EMERGENCY ADVICE.** Add blood clot prevention advice to the audio emergency advice given by crewmembers at the commencement of air flights.
- (vi) **SEAT PITCH.** Make the pitch between seats a minimum of 34 inches (86cm), including economy class. This may involve having fewer seats on aircraft, but it will help to reduce cramped seating. Some airlines already provide a 34-inch pitch on some of their aircraft (e.g. American Airlines B777 and Malaysian Airlines B747). Unfortunately, most airlines provide seat pitches that vary from 28 to 32 inches as a way of squeezing more paying passengers into their aircraft.

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WHAT THE PASSENGER CAN DO:

Ways To Combat The Risk Of A Blood Clot

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|---|---|
| <ol style="list-style-type: none">1. <i>Don't Sleep</i>2. <i>Omega-3 Oil</i>3. <i>Inflight exercise</i>4. <i>Foot Exerciser</i>5. <i>Vitamin E</i>6. <i>Support Stocking</i>7. <i>Sitting Correctly</i> | <ol style="list-style-type: none">8. <i>Blood Pressure</i>9. <i>Oxygen</i>10. <i>Drink Water</i>11. <i>Better Seating</i>12. <i>Medication</i>13. <i>Keep Warm</i> |
|---|---|

1. DON'T SLEEP. Airlines and the air travel industry are failing to give the single most important piece of advice to airline passengers: *Don't sleep*. As already explained above, sleeping during air travel is by far the biggest cause of blood clots. By the simple expedient of staying awake throughout the flight you will drastically reduce your chances of getting a blood clot.

Keeping awake calls for careful planning: If flying for more than three hours get plenty of sleep before you fly so that you will have no problem staying awake. It is even worth changing your sleeping pattern one or two days before you fly, or taking sleep medication, so as to be sure to get maximum sleep before departure. For example, if flying at night, sleep during the day, right up to the time you have to go to the airport. Never be tempted to sleep just because other passengers around you are sleeping, and

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from now onwards regard *all* your air travel as a ‘no sleep zone’. Make the association: sleep = blood clot danger.

2. OMEGA-3 OIL.

- The latest research shows that omega-3 oil helps to reduce the risk of a blood clot. It acts by making the blood less likely to get ‘sticky’ and form a clot. Doctors have known for some time that eating food rich in omega-3 oil protects against heart disease and stroke. The latest findings, in the Journal of the American Medical Association (January 2001), surveyed 79,839 women over 14 years, from 1989 to 1994. It found that eating omega-3 rich food reduced the risk of stroke by up to 50%. Other studies have found that omega-3 oil prevents and slows down the growth of tumours, boosts the immune system, and improves symptoms of arthritis and other inflammatory diseases including asthma. For the technically minded, Omega 3 oil (also known as Oleic Acid) is anti-inflammatory and forms prostaglandins in the body that reduce the ability of your blood to clot.
- An hour before you fly (or after boarding) take two spoonfuls of pure Omega 3 oil (or several Omega 3 oil capsules). Eating foods rich in Omega 3 (such as almonds, canola. Olives, flax seeds, pumpkin seeds, sesame seeds) is good for your health **but will not be enough** to thin the blood when travelling. According to Dr Ray Rice, a food scientist in the UK, *‘Anyone worried about having a blood*

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clot on a long-haul plane trip should consider taking an oil capsule rather than aspirin to reduce the risk.'

Unlike aspirin, Omega 3 oil has a mild effect on thinning the blood and will not cause irritation or bleeding ulcers. It is therefore an ideal alternative to aspirin.

- Avoid Omega 6 oil (also known as Linoleic Acid) when flying as it does the opposite to Omega 3: it encourages the formation of blood clots. Safflower, Sunflower, and vegetable oils (including margarine) are rich in Omega 6 and should therefore be avoided when flying.

3. INFLIGHT EXERCISE.

- When waiting at the departure gate to board a flight, walk around instead of sitting down. That way you will not be going from one sitting position to another.
- When on board walk about at *regular* intervals to keep blood flowing in the legs, but note the following: it is more beneficial to do regular exercises while seated than to do infrequent walkabouts. The *frequency* is the important factor. While seated, stretch your legs every so often (space allowing!). Also, while seated massage your thighs and legs with your fingers.
- Here is the exercise recommended by the Cardiac Patients' Association for avoiding blood clots while flying:
 - a. With your heels on the floor, bring your toes sharply up towards your knees and hold for three seconds. Then reverse by pointing your toes downwards and*

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hold in this position again. You should feel the muscles in your legs contracting and pumping the blood back towards your heart. Repeat this exercise every fifteen minutes while seated.

b. Lift your right leg as high as you can, keeping your knees bent and taking care not to bend your body forward. Hold for a count of eight, and then slowly lower your leg again. Repeat three times with each leg. Then quick march (seated) on the spot for a minute, lifting your knees as high as you comfortably can.

4. FOOT EXERCISER. Use a foot exerciser to improve blood circulation while you sit. This stimulates the calf muscles to pump blood up the legs, avoiding the danger of blood clot formation. A foot exerciser is a small lightweight device you can buy and take anywhere. There are several products on the market such as the following two: (i) An 'airogym' (see picture below) is a small inflatable cushion that you press on with your feet to make your legs go up and down. It measures 18 x 6 inches (45 x 15 cm) when inflated and can be bought for about UK £8 (US \$12) at major airports and travel outlets. For more information go to www.airogym.com. (ii) The Skywalker is a small device that unfolds to about the size of two CD's which you then press on with your feet (similar to the airogym, but not the same). Skywalker information can be obtained from <http://www.huntleigh-healthcare.com>.

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Airogym



Skywalker



Tip

Try to keep your thighs from pressing down onto the edge of your seat. If travelling in Business or First Class keep your feet up on the leg rests at the highest elevation. Alternatively you can rest your feet on your hand luggage.

5. VITAMIN E. Take 800mg of vitamin E (as well as Omega 3 oil) just before flying. The American Institute of Medicine has set an upper safe limit of 1000mg per day, so an occasional dose of 800mg when flying is well within this limit. Vitamin E is fat soluble, so it goes well with Omega 3 oil. And like Omega 3 oil, vitamin E helps to thin the blood and reduce the risk of blood clot formation. Also, vitamin E is a powerful anti-oxidant so it will help to protect you from the harmful effects of

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High Altitude Radiation. *Note: Consult a health professional before taking vitamin E if you are pregnant, a haemophiliac, or aged under 18. Do not exceed 800mg of vitamin E in a 24-hour period.*

6.FLIGHT SOCKS.

- Wear flight socks specifically designed to help blood to flow against gravity and maintain circulation. They look like normal black socks except that they are long, reaching to just below your knee. Flight socks (also known as ‘compression stockings’) work by applying gentle pressure to the ankles and lower leg, which squeeze blood up towards the heart and keep it flowing around the body. In a Study published in The Lancet in May 2001, it was found that none of the passengers wearing flight socks developed blood clots, while 10% of passengers *not wearing* flight socks developed blood clots that could have led to DVT! (Source: Scurr, Frequency & Prevention of Symptomless Prevention of DVT in Long Haul Flights, The Lancet, UK, 12 May 2001).
- Flight socks can be bought at airports, in travel shops and other stores (cost is about \$15 and well worth the price). If you have any difficulty finding flight socks contact Scholl who make them (www.scholl.de or info@scholl.de). In the UK you can buy flight socks at ‘Boots’ or telephone 0161 6543000) Alternatively buy medical ‘support stockings’ from a good medical

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supplies store. You can also get flight socks from the 'Aviation Health Institute' in the UK (see Appendix 4).

7. SITTING CORRECTLY.

- If your height is over 6 ft (1.83 m) book a cabin seat next to an emergency exit (can be window or aisle, but aisle is best for emergency exit reasons). Generally, you get extra legroom in seats next to the emergency exit. Use the extra legroom to stretch and move your legs often.
- What counts is the pitch of the seat (the distance between your seat and the seat in front) and the height of the seat, as the objective is to not squash the veins under your thighs (i.e. not restrict blood flow). Therefore, do not cross your legs while seated and avoid putting luggage anywhere that restricts free leg movement. If your legs are too short to allow your feet to fully and comfortably reach the floor, use a piece of luggage or rolled up blankets to fit between your feet and the floor (otherwise, the weight of your legs will put pressure on your calf veins).
- If you absolutely must sleep, make sure all your limbs are unrestricted and not under pressure. You want to avoid letting your calves make prolonged contact with your seat, and if you can only do this by staying awake then do so.

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8. BLOOD PRESSURE. High blood pressure increases the risk of a blood clot being carried to a part of the body where it will get stuck and block the free flow of blood to the heart or brain. Keep your blood pressure low by avoiding harmful stress (see the chapter ‘Dealing With Flight Stress’). Also, eat sparingly to keep blood pressure down (a heavy meal will increase blood pressure to aid the digestive process).

9. OXYGEN. Remember that blood clots are likely to be caused by a combination of sitting in a cramped position and the oxygen shortage in the cabin air. To increase the oxygen content of the air you breathe you can do three things:

- a. Choose a seat towards the front of the aircraft. Seats at the rear of the plane are likely to have less oxygen (and be more at risk of air pollution and infections).
- b. Use a personal air humidifier, as explained in a previous section of this book.
- c. Walk up and down the aisle a few times, breathing deeply to oxygenate your blood as much as possible. Even when seated, breathe deeply at regular intervals to increase oxygen content.

10. Drink Water. Drink plenty of water to avoid body dehydration and keep the blood thin. A lack of water makes the blood ‘stickier’ and more likely to form a clot or get blocked by a clot getting stuck in a smaller vein. Ideally, you need to drink about one pint (2 full size

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glasses) of water every three hours on a long haul flight. Take your own bottled water as you may not get enough water served on board. Furthermore, in tests carried out by Britain's Public health Laboratories, it was found that aircraft drinking water is contaminated with Ecoli and human waste in 15 % of the water fountains used by aircrew to serve water. Avoid alcohol, coffee and tea during the flight, all of which dehydrate the body. Also remember to not drink a lot of alcohol one or two days before flying as the dehydrating effects of alcohol will overlap into the flight period.

11. BETTER SEATING. If you can afford it, choose first class if the pitch between the seats is greater (but do not be tempted to sleep more by virtue of being in first class!). The pitch refers to the distance between the backs of the two headrests on a plane. The greater legroom will make a big difference to your comfort and the risk of a blood clot. You can find out on Internet which airlines offer better seat pitches by going to <http://www.aviation-health.org/seatpitch.asp>. Always ask your travel agent to book you on the airline with the best seat pitches whenever there is a choice of airlines.

12. MEDICATION. Research carried out by scientists in Canada has revealed that a drug known generically as statins can substantially reduce the risk of DVT for airline passengers (Source: University of Toronto, New Use For Cholesterol Drug, 20 June 2001). The Canadian Study

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looked at 100,000 people with heart problems and found that statins reduced the risk of DVT by 22%. Statins work by reducing the build-up of fatty deposits in blood vessels (by reducing the level of LDL cholesterol). Best of all, statins are regarded as safe to take on a regular basis by the population at large, with no known side-effects.

According to Dr Peter Jones, a cardiologist at Baylor College of Medicine, Houston, USA, 'If you go to dinner with a group of cardiologists and ask them how many take a statin, most of them will put their hands up. I believe statins are safe enough that they can be used by anybody from adolescents on up,'

You should consider taking a daily statin pill if you are a frequent flyer *and* if you suffer from one of the following: obesity, heart disease, high cholesterol, or high blood pressure. Statins cannot be used as a short-term precaution for a specific air trip. Statin medication offers long-term protection against clogged arteries and hence the avoidance of blood clots when flying. To obtain statin medication you will need to obtain a prescription from a physician.

Another option is to take Zinopin. It is promoted as *'The most complete long-haul natural travel supplement developed, not only because of its anti thrombotic effect inhibiting platelet activity, but its effects in reducing ankle swelling, calf cramps, as well as its significant anti nausea, anti travel sickness properties without the risks*

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of gastro intestinal bleeding from aspirin or side effects from current prophylactic therapies.'

Zinopin is a medication developed as a result of research carried out on behalf of the *World Health Organization*. To find a source of supply, check with your local drug store or do a search on Internet.

13. KEEP WARM. A blood clot is more likely to form when you are not warm enough. Research shows that many more people develop DVT in winter or in colder weather because a colder temperature makes blood vessels constrict. This in turn reduces blood flow around the body making blood clotting more likely.

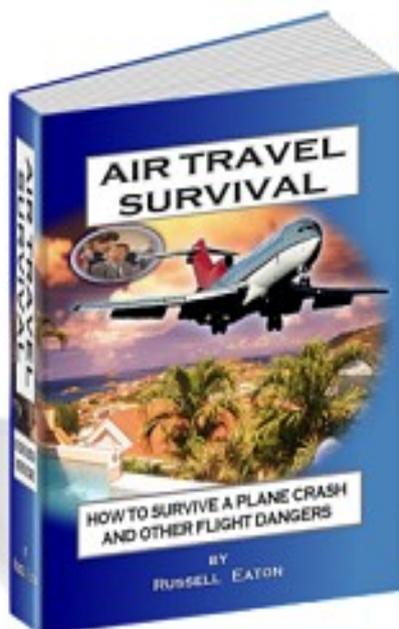
In a French study by epidemiologist Dr Fabrice Boulay, published on 14 September 2001, it was found that hospital admissions for DVT increased by about 25% in cold weather. The implication for air passengers is that you can significantly reduce the risk of DVT by the simple expedient of staying warm during the flight. Avoid wearing shorts, carry spare clothing, and make sure your feet are warm by wearing thick socks or two pairs of socks.

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How to survive a plane crash and other flight dangers



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The Trigger Effect

The trigger effect is by far the biggest threat to health faced by air travellers. Here we are talking about diseases that can be tipped or *triggered* into a critical phase during or after an air trip. The trigger effect is the ‘silent killer’ of the airways because it doesn’t make headline news the way a plane crash does. Usually, you will not be aware of a passenger death occurring on your air flight as it will be kept as quiet as possible for fear of spreading panic during the flight.

Worldwide, the trigger effect accounts for more fatalities during air flights than fatalities from plane crashes! For example, in the USA alone there are about 14,000 medical emergencies per year causing about 350 inflight fatalities on the nine major USA airlines. This figure far outnumbers the annual toll of fatalities caused by air accidents in the USA. (Source: Daily Mail, UK, 24 Oct. 2000, p.12).

According to the Aviation Health Institute, UK, in 1998 there were about 1000 people who died in their seats while

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flying. This compares with 730 people who died in plane crashes.

Most large European airlines experience about 10 to 20 in-flight deaths per year. For example, in the 2-year period May 99-April 01, 16 people died on British Airways (source: Nigel Dowdall, Consultant Occupational Physician, BA Health Services). This is below average compared to many other airlines, and when you add up the figures worldwide, the total is far greater than air accident fatalities.

But airlines generally do not admit to having any in-flight fatalities at all! (Hats off to British Airways for being so frank). There are four reasons for this:

1. Many airport authorities will not permit the aircraft to off load a dead body. Normally, if death is declared on board, the aircraft will be obliged to keep the dead body aboard until the aircraft returns to its home base (much to the distress of passengers sitting nearby!).
2. Airlines, quite naturally, fear bad publicity and do not like the idea of flying around with dead bodies aboard.
3. In law, the state of death has to be declared by a qualified physician, and no doctor on board would want to risk his malpractice insurance premiums by pronouncing a passenger dead on an airplane.

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4. If 'Dead In Flight' is ever declared, there would likely be an investigation of the death, causing delays or cancellation of the aircraft for the next leg of the journey.

To resolve this dilemma, airlines have adopted the practice of never declaring the death of a passenger on board. Airlines take the view that their crewmembers are not necessarily qualified to medically certify whether a person is dead.

So instead, they continue the process of 'life support and stabilisation' (even if that just means propping up the dead body with pillows and seatbelts).

Then, on landing, emergency medics are summoned to continue the 'stabilisation process' and take the body away. This allows the body to be declared 'Dead On Arrival' at a local hospital, leaving the airline with one less headache (and one less statistic) on its hands. This is why in-flight fatality figures never get published!

It is well known that the vast majority of air passenger illnesses and fatalities are caused by the trigger effect, and its dangers should not be under-estimated. Existing medical conditions can quickly be triggered into a serious illness, which may develop during the flight or afterwards, sometimes leading to death. This can occur from a combination of factors facing air travellers, such as lack of oxygen, cabin pressurization and de-pressurization, cramped seating, cabin air pollution, dehydration, and the sheer stress of flying.

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So quite apart from the number of actual fatalities, the trigger effect can also cause greater or more prolonged illness, and ruin business trips and vacations. Fortunately, there is a lot you can do to stop an air flight making an illness worse or putting your life at risk.

Since the 1940's when military and commercial aviation became widespread, scientists, medical researchers and surgeons in the armed forces have carried out extensive studies on the trigger effect. As a result, there is comprehensive material on a subject that is now known as 'aerospace medicine'.

This chapter gives a list of known high risk conditions to air travellers. If you suffer from any of these conditions you should consult the airline's medical department or a health professional before flying. By doing so, you will not necessarily be stopped from flying, but at the very least you can make an informed decision on whether to fly or take precautions for the specific condition so as to avoid the trigger effect.

Study the MEDICAL CHECK LIST that follows and determine which conditions may apply to you. Then make sure you are as well prepared as possible for your particular condition(s) so as to minimise the risk of the trigger effect.

Danger List

The trigger effect danger list is as follows (in alphabetical order):

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- 1. Angina.** The full medical term ‘angina pectoris’ occurs when the heart cannot get enough blood. This causes a sense of suffocation and pain in the centre of the chest, and if not treated may lead to a more serious heart attack. During air flight, the heart can become starved of blood from a combination of dehydration, cabin pressurisation, and sitting immobile for long periods of time. To prevent in-flight angina walk around periodically to stop blood accumulating in your lower body, drink plenty of water and eat little or nothing.
- 2. Anaemia.** Cabin pressurisation will aggravate any conditions, which are susceptible to bleeding. Because of this you should consider not flying if you suffer from severe anaemia or haemophilia. If you have sickle cell anaemia you shouldn’t fly at over 22,500 feet (airlines usually fly at 37,000 feet).
- 3. Aqualung or Scuba Diving.** If you dived to a depth over 20 feet (6 m) wait at least 12 hours before flying. If you dived to a depth over 30 feet (9 m) wait at least 24 hours before flying. The danger here is decompression sickness (known as ‘the bends’). The symptoms include *very* severe pain in the muscles, breathing difficulties, and severe cramp. Flying too soon after diving has the same effect as coming to the surface too quickly after diving and can sometimes cause permanent damage.

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4. **Asthma.** Oxygen shortage and polluted cabin air are known to trigger asthma attacks. This can be aggravated by the stress of flying. Do not fly while suffering from asthma. Make sure that when you do fly you make liberal use of an asthma inhaler before and during the flight.
5. **Blood clot.** As explained in the chapter “Avoiding Blood Clots”, if you are overweight and have high blood pressure you are more at risk from a blood clot (particularly if you are also a smoker). But people of all ages and states of health can be at risk of a blood clot. Cabin pressurisation makes the air extra dry and short of oxygen. Your body’s dehydration can be made worse by drinking alcohol, tea or coffee. As the super-dry air dehydrates your body it constricts your surface veins, making your blood thicker, and increases the likelihood of a blood clot. Also, the shortage of oxygen puts your body under greater stress which in turn increases blood pressure. If a blood clot is formed, the high blood pressure can dislodge the clot and carry it through the body to a point where it blocks blood to the brain, the lungs, a limb, or some other part of the body. The solution is to drink plenty of water throughout the flight, do regular in-flight exercise, eat little, and practice de-stressing techniques.

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6. **Bronchitis.** This occurs when the air passages leading to the lungs get inflamed and congested. People susceptible to bronchitis may find that it is triggered or made worse during air flight because of oxygen shortage and polluted cabin air. Drink plenty of water and use a respirator mask to filter out air pollutants.
 7. **Colostomy or Ileostomy.** If this applies to you it may be necessary to take extra dressings and bags in your hand luggage, as there will be an increased amount of gastrointestinal gas due to pressurisation.
 8. **Common cold.** When your mucous membranes are swollen from a cold (or the flu) the Eustachian tube between the inner ear and the sinus cavity becomes congested. This in turn leaves less space for air to reach the inner ear and adjust the pressure. As a consequence, when air pressure changes during take off and landing, your cold can prevent your inner ear from adapting to the changing pressure. This can cause severe discomfort, ear pain, and at worst can cause permanent damage to the eardrums. If your cold is severe consider postponing your flight.
- Should you start to feel pressure build up in your ears (particularly on descent) you can make them pop and relieve the pressure by applying the ‘modified Valsalva manoeuvre’. Do the following: Pinch your nostrils closed and breathe in deeply. Then breathe out through the nose as though you were trying to blow

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your fingers off your nostrils (of course, no air actually goes out of your nose). Blow in short, firm bursts until you feel your ears 'pop'. *Note: If you are suffering from a cold during flight, never blow your nose too hard as your sinus and inner ears will be extra vulnerable.* Here are two further alternatives:

(i) Yawn while keeping your nose closed.

(ii) While holding your nose closed, keep your mouth closed and swallow two or three times (this can be very effective.

9. Contact lenses. The extremely dry air in the cabin will dry out your contact lenses and make them uncomfortable to wear. Consider not wearing contact lenses during the flight. Use spectacles instead. If you must use contact lenses during flight, use eye-moisture-drops to keep your eyes and lenses moist.

10. Contagious diseases. If you have an infectious or contagious disease do not fly as the disease can be spread quickly throughout the plane. If you cough or sneeze on a plane always use a tissue or handkerchief.

11. Contraceptive pill. As the contraceptive pill can aggravate a blood clot, consider not taking the pill on days that you fly (but make sure you remember this may put you at risk of conception if you don't take alternative precautions!).

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12. **Diabetes.** Finnish research shows that a diabetic passenger may have to increase their dose of insulin when travelling West and decrease it when flying East on long haul flights. If you take insulin for diabetes check this out with the Airline medical department.

13. **Ears and sinuses.**

- The space between the eardrum and the inner ear is your ‘middle ear’. The only access of air to this middle ear is through the Eustachian tube that opens at the back of the throat. In the case of the sinuses, there are tiny holes called ostia that vent into the back of the nose. If you are suffering from a cold (see ‘Common Cold’ above), the flu, or hay fever the lining of the Eustachian tube and the nasal sinuses become swollen and inflamed making it painful to vent air. This swelling becomes worse in a pressurized cabin, creating the risk of perforated ear drums, dizziness, disorientation, temporary deafness, and tinnitus. These trigger effects can last for one or two weeks after travelling.

- Use decongestants and hay fever remedies as applicable. Alternatively, use ear-plugs designed to relieve air-travel pressure (go to www.cirrusworldwide.com and see ‘earplanes’). If you’re one of the 44 million people who suffer from earache when flying, ‘earplanes’ may help as

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they contain a filter that slows down the change in pressure in the ear, thus preventing pain (even pilots use them). Alternatively, buy ear-plugs from a pharmacy.

14. **Epilepsy.** The stress of flying and shortage of oxygen is known to sometimes trigger an epileptic attack. Brief the cabin attendant and the person sitting next to you so that they will know what to do should you have an attack. If you take medication for epilepsy make sure you have the right dosage for air travel purposes. *Note: if you cannot keep your epilepsy under control with medication for the duration of the flight you should not fly.*
15. **Menstruation.** Flying promotes body swelling generally. As a result, if you fly on the first or second day of a period you may find that it will be heavy. Either avoid flying on such days or take extra precautions. If flying long haul, realise that your menstrual cycle may be affected by becoming shorter, longer, or irregular.
16. **Heart disease.** People can have several types of heart disease or heart conditions. If you have a heart condition, be aware that flying can disturb the muscles of the heart and the heart's rhythm. The shortage of oxygen combined with cabin pressurization serves to swell all organs in the body, including the heart, vessels and arteries (often, blood pressure is also

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increased). The risk is that an existing heart condition can be aggravated into a more serious condition. A healthy heart can normally cope with flying, but if you have any doubts about a heart condition you should consult with a health professional. *Note: If you have a chronic heart condition you should use supplemental oxygen during flight. For this, you will need to order oxygen from the airline in advance.*

17. **I.U.D.** An intrauterine device can become displaced when flying due to gas expansion. After your air trip, check it and if in doubt see a gynaecologist.

18. **Medication dosage.** If you are taking medication which needs to be continued during the flight, be aware that oxygen shortage and cabin pressurisation may possibly reduce or increase the effect of the medication. Query this with the airline medical department or with a health professional to make sure you take the correct dosage during the flight.

19. **Open sores, ulcers, cysts or inflammation in cavities or semi-cavities of the body.** The condition can be severely aggravated through gas expansion inside your body as a result of oxygen shortage and cabin pressurisation.

20. **Peptic ulcer.** This occurs when digestive juices (acids and pepsin) break through the lining of the digestive tract. Cabin pressurisation, dehydration,

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physical immobility and the act of eating a main meal may combine to trigger a peptic ulcer in people who are susceptible to this condition.

21. **Plaster casts.** The plaster cast will have trapped gas/air which will expand and may compress the limb. This compression, combined with oxygen shortage can cause gangrene following long-haul flights. The general advice is not to fly within 7 days of having a new plaster cast if there is any possibility that the limb inside the cast is swollen. If you must fly with a fresh cast and a swollen limb, consider cutting the cast (under medical supervision) to loosen it before a flight. If doing this proceed with caution to avoid the danger of misaligning the limb. After the flight you can re-strap the cast tight until it can be renewed or discarded.
22. **Pregnancy.** Do not fly during first 12 weeks of pregnancy because of the danger of radiation to the foetus. Avoid flying after the 34th week (240 days), particularly long haul. Ideally, do not fly while pregnant as the baby is at risk from radiation and from the mother's oxygen shortage. Pregnant women who fly are more likely to miscarry (changes in air pressure can induce labour).
23. **Respiratory conditions (bronchitis, emphysema, whooping cough, wheezing, influenza, coughs, colds, sore throat).**

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Be aware that oxygen shortage, cabin pressurisation, and polluted dry air will serve to aggravate just about any respiratory condition. Carry all necessary medication. Ask a health professional whether you might need oxygen during the flight. If so, alert the airline *before the trip* so that this can be made available to you should the need arise.

24. Skin conditions (eczema, psoriasis, heat rash, skin allergies). Skin conditions can become more irritated because of the extreme dryness of the air. Using a skin moisturiser for such conditions is usually **not** helpful (and may aggravate the condition) because the skin needs *water* moisture rather than oil. Instead, use a water spray on the affected area, or simply apply a damp cloth to the skin.

25. Skull fracture. During a flight, trapped gas in the fracture could expand and exert pressure on the brain tissue. Seek professional advice before flying with a skull fracture.

26. Stomach upset (dysentery, diarrhoea, food poisoning, gastroenteritis). Clearly, you cannot fly if you need to go to the toilet every few minutes. If you have any kind of stomach upset remember that during the flight the gas in your stomach (and all other cavities of the body) will expand, aggravating the condition. If you think you are well enough to fly, eat

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as little as possible (or nothing at all) on the day that you fly. Take appropriate medication.

27. **Stroke.** If you have suffered a stroke in the past it would be wise to never fly again. This is because any weakness in the arteries leading to the brain will be aggravated when the arteries swell due to cabin pressurisation (not to mention other dangers from oxygen shortage, increased blood pressure and the stress of flying). Why take the risk? Discover the joys of travelling by train or ship!

28. **Surgery.** Air is introduced into the tissue when the body is opened for surgery. This air needs time to be reabsorbed (anything from a week to a month depending on the type of surgery). You should not fly before the air is reabsorbed as otherwise the trapped air will expand and may cause a haemorrhage. For this reason, on the day that you fly, if your surgical stitches (internal or external) are not yet completely healed, it is best to avoid vitamin E, and blood-thinning agents such as Aspirin or anti-coagulant medication. But make sure you drink plenty of water and take in-flight exercise to avoid the risk of a blood clot.

29. **Teeth.** Loose fillings, abscesses, and recent oral surgery. Cabin pressure can cause toothache, aggravate abscesses, or cause bleeding from recent oral surgery.

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30. **Varicose veins.** Sitting in one position for long periods of time increases the risk of developing a blood clot or deep-vein thrombosis, which can be fatal if the clot reaches the lungs or the brain. People with a family history of the problem, or who have varicose veins, are particularly at risk and should ideally consult a health professional before flying.

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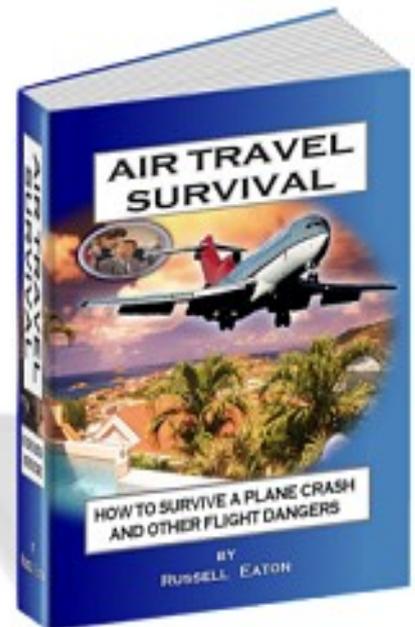
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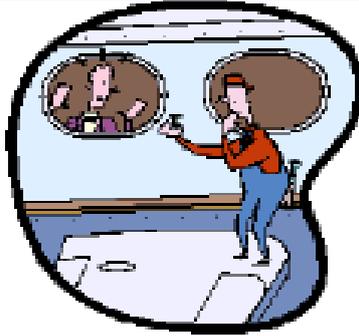
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Foolproof Jetlag Remedy

Jetlag is one of the most misunderstood maladies in air travel medicine.

Most long haul air travellers know how jetlag feels. You arrive at your destination feeling out of sync with local mealtimes and bedtimes. You've had a long trip in cramped conditions, you're lacking in sleep, feeling generally fatigued and perhaps suffering from a headache or feeling a little nauseous and disoriented. Some people feel as if they have a hangover and just want to go to bed and sleep it off.

Jetlag affects people in different ways, depending on numerous factors. Put two identical twins on the same long haul flight, but have one twin drink alcohol, stay awake, drink little water and travel in economy, and have the other twin travel in first class with plenty of space and lots of rest, no alcohol, and drinking lots of water. You can be pretty sure that one of the twins will suffer more jetlag than the other. Equally, you can have two *different* people travel on the same flight and do all the *same* things,

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but suffer jetlag in different ways. Some people sleep better and cope better on long haul flights than others, and this will affect how quickly they adapt to the new time zone and get rid of jetlag.

Jetlag is the most common complaint among long haul flyers. It wastes time and money for business travellers, and it robs valuable leisure time from vacationers due to the physical and mental impairments it causes. Jetlag is also a major concern for professional sports people travelling to sports events.

But there is nothing mysterious about jetlag and it is very easy to avoid. This chapter will show you how, but first, let's answer the question: *what exactly is jetlag?*

- The dictionary definition is: A *'temporary disruption of bodily rhythm caused by high-speed travel across several time zones'*.
- Jetlag is not an illness or any kind of medical condition. There is no *medical* cure for jetlag.
- Based on latest research, jetlag can be defined in two simple words: INSUFFICIENT SLEEP.

Here are four common misconceptions about jetlag:

MISCONCEPTION NUMBER ONE: *'Jetlag is caused by the stress and tiredness of travel'*. This is not so. In fact, if you are fatigued from a long journey, you are more likely to sleep (from the tiredness) and recover quickly from jetlag. The only reason you feel jetlagged is because

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you are suffering from a lack of sleep, nothing else. Naturally, if the stress and tiredness of travelling have the unusual effect of actually disrupting your daily sleep routine, then of course, they contribute to jetlag. In fact, anything that causes insufficient sleep is a contributory factor to jetlag. Anything that is not related to causing insufficient sleep has nothing to do with jetlag. It really is that simple.

MISCONCEPTION NUMBER TWO: *‘Jetlag is caused by flying over time zones or by flying from one time zone to another’.* This is not so. After all, time zones are man-made concepts (artificial lines drawn on a map). The act of flying over one or even ten time zones makes absolutely no difference to your sleep quota.

MISCONCEPTION NUMBER THREE: *‘Jetlag is mainly caused by long haul flight travel’.* This is not so:

- Jetlag is caused by anything that *significantly* causes insufficient sleep. The human body is very adaptable, and even changing bedtimes can be coped with. For example, if you go to bed at 10 pm one day, and 1am the next day, the body can usually take this in its stride. That is, the body will not make you feel ill with the symptoms of jetlag or force you to go to bed to recuperate. This is so because the body clock inside you is quickly re-set by many other cues, such as daylight hours, mealtimes and other routines. However, if you were to go to bed at 2pm

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(in a darkened bedroom with a sleeping pill) and get up at 10pm, for three days in succession, and then go back to your normal daily routine, you will give yourself jetlag: For one or two days you will feel symptoms of jetlag similar to having travelled to the other side of the world. The point here is that long haul flight in itself does not cause jetlag, only the factors leading to significant insufficient sleep cause jetlag.

- In fact, this has been proved experimentally. Several studies have shown that shift workers, such as fire fighters and night nurses, can experience the symptoms of jetlag when changing from a day shift to a night shift. For example, in ‘Aviation, Space and Environmental Medicine’ by four NASA scientists, it was shown that the Jetlag caused by aerospace travel was akin to the symptoms affecting shift workers changing from working during to day to working at night, or vice-versa.

MISCONCEPTION NUMBER FOUR: Jetlag is caused by flying East to West, or West to East or flying at high altitude.

Jetlag has nothing to do with flying unless the act of flying deprives you of sleep. It so happens that flying is a major cause of sleep loss, and therefore flying is associated with jetlag.

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But if you were to stay at home and go nowhere, you would get jetlag if you were to get one hour's sleep instead of your usual 6-7 hours sleep.

Jetlag then, is not some kind of medical illness. So called experts who say that jetlag is a 'medical condition' are wrong because this implies that jetlag is an illness that requires medical attention. It is not even some kind of tiredness or fatigue. Jetlag is simply another word for 'insufficient sleep'. Now, of course, the consequences of sustained insufficient sleep can lead to serious medical illness, but that is another matter. Once we appreciate that the *sole cause* of jetlag is insufficient sleep, we can devise an effective strategy to beat jetlag. But there is one further point to make: jetlag is caused by *significant* insufficient sleep. This, of course, begs the question: When does insufficient sleep become *significant*? The answer is when the body clock becomes disrupted.

THE BODY CLOCK

The body clock is a small cluster of brain cells that controls the timing of biological functions (circadian rhythms), including when you eat and sleep. The body clock is designed for a regular rhythm of daylight and darkness, and it can get thrown out of 'sync' when it experiences daylight and darkness at the 'wrong' times in a new time zone.

To regulate our daily living pattern the body clock uses hormones that help us sleep, keep us awake, provide

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energy in daylight hours, tell us when to eat, and so on. For example, to help us sleep at night time the body clock reduces production of serotonin and increases production of melatonin. In daytime the opposite happens: the body clock increases serotonin and reduces melatonin to keep us awake and active.

Our body clock has evolved over millions of years of living on a planet revolving around a sun. The 24-hour cycle of daylight and night time controls our body clock, which in turn control's our body functions. So our daily sleeping and waking and eating patterns have been controlled by the sun's day and night cycle throughout our evolution.

To some extent we can move our body clock routine forwards or backwards without ill effects. For example, we can start going to bed one hour earlier and getting up one hour earlier. After a day or so, our body clock re-adjusts and we continue to live life normally with no ill effects. If your sleeping hours change from day to day, such as staying up late on weekends but not weekdays, you will generally sleep less well and your health may be affected (you are giving yourself a mild, on-going form of jetlag).

The body clock loves routine in everything you do. But equally, the body clock is very adaptable, so you don't have to be a slave to routine. However, the more you can keep to a routine regarding sleeping hours and eating

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habits, the more your body clock will look after you by making you sleep better, feel more energetic, and be more healthy. As you get older your body clock becomes ‘more rigid.’ That is why younger people can adapt to body clock changes more easily (and are less affected by jet lag) than older people.

When we travel to another time zone our *mind* knows we will be sleeping and eating at a different schedule, but our *body* won’t get the message until we actually start doing it for a while. The moment we disrupt our body clock by giving it a new routine, we also disrupt our daily sleeping pattern (and this disruption will continue until our body clock adjusts to the new routine).

In the excellent book ‘The Body Clock Diet’ (published by Vermilion, 2000) the authors Baker and Baar state that the best way to prevent jet lag is to reduce as far as possible the disruption to the body caused by changing to a new time zone. They advocate following meal and sleep routines before and during the flight that fit in with the meal and sleep routines of the new time zone. This makes sense because it helps your body adapt more quickly and with less trauma to the target time zone, thus reducing or eliminating jet lag. Sometimes, planning *what to do and not do* (to avoid jetlag on a specific journey) can be a complex affair. To help you do this planning go to the following website: www.stopjetlag.com.

HARM CAUSED BY JETLAG

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Disrupting the body clock brings with it changes in blood pressure, blood sugar, mood, energy level, alertness, and hormonal levels. According to a study undertaken by three UK universities in 1999-2000, jetlag can even damage the memory and slow the brain. Airline cabin staff tested were found to have high cortisone levels compared to controls and this resulted in memory impairment. (Source: Journal of Neuroscience, Dr. Kwangwook, of the Medical School at University of Bristol, UK). Such body clock disruption has an adverse effect on sleep, causing what we experience as jetlag.

In a further study, published in May 2001 by Kwangwook Cho of the University of Bristol, it was revealed that frequent air travel without adequate rest and recovery shrivels parts of the cortex and hippocampus (the thinking and learning parts of the brain). Cho took images of the brains of 20 air hostesses and found significant brain shrinkage compared to a control group. According to Charalambos Kyriacou, a biologist at the University of Leicester, UK, it seems that when the body clock is disrupted, it affects cell division in the brain, and this in turn could be causing a withering of the hippocampus.

In another study conducted by Professor Jo Arendt of Imperial College, London University, research has shown that upsetting the body clock can keep levels of glucose and fat in the blood dangerously high after a meal, which might explain why heart disease is such a hazard for night

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shift workers. This is another good reason for avoiding big meals on long haul flights.

The conclusions of the above Arendt study are supported by a UK Government study published in September 2001 that concludes that jet lag may induce blood clots. Clearly, if jet lag keeps levels of glucose and fat in the blood at a high level (assuming you eat a full meal just before or during the flight), this in turn makes blood thicker and more likely to form blood clots.

IN A NUTSHELL

The best way to combat jetlag is to help your body clock re-adjust to the new time zone as quickly as possible, thus making sure you get sufficient sleep.

Remember:

Insufficient Sleep → Body Clock Disruption → Jetlag.

Sufficient Sleep → No Body Clock Disruption → No Jetlag.

So we get jetlag whenever we disrupt the body clock through insufficient sleep. If this is done frequently it can have serious effects on our health. For example, when jetlag plays havoc with the body clock it causes a reduction of 'natural growth hormone' in our bodies (we never stop needing natural growth hormone). Also, insufficient sleep causes a shortage of melatonin (every cell in the body needs melatonin to combat harmful free radicals). Studies show that a shortage of natural growth hormone, combined with a shortage of melatonin, promote the growth of breast

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cancer cells, and is leading some scientists to think that flight crews and frequent flyers are exposed to greater cancer risks generally (Source: Occupational and Environmental Medicine, 1999).

Combating jetlag is therefore important for reasons of health, quite apart from making you feel well for a business trip or a vacation. What follows is a list of ways to combat jet lag. Keep in mind that the *only cause* of jetlag is insufficient sleep. Therefore, anything you can do to avoid insufficient sleep will help you to *avoid* jetlag. And anything you can do to recover lost sleep will help you to *get rid of* jetlag. To combat jetlag successfully, long haul flight travellers need to do both, i.e. take measures that *avoid* jetlag and measures to *get rid of* jetlag.

Five Ways To Combat Jetlag

1. Melatonin

2. Time zone adoption

3. Using light and darkness

4. Staying well during air travel

5. Short visit strategy

1. MELATONIN

- Although conventional sleeping pills may help induce sleep, they usually do not help with the other symptoms of jetlag such as headaches, poor concentration, dizziness, nausea, and so on. Furthermore, sleeping pills often leave you feeling as

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if you have a hangover, thus aggravating jetlag. Numerous human studies have shown that melatonin has become one of the most effective ways in combating jetlag (whether caused by travel, shift work or severe insomnia) because it resets the body's clock and restores balance. Taking a melatonin supplement tricks the body into thinking it's time to go to bed for the night.

- An endocrinology professor at the University of Surrey, UK, tested the effects of melatonin on some 400 travellers and noted that those to whom melatonin was given were able to reduce their jetlag by 50%. Another study by French researchers involved 30 volunteers travelling from the USA to France. They had all experienced difficulty with jetlag in the past. On the day of the flight and for three days thereafter they took either a placebo or an 8 mg melatonin pill. The volunteers on melatonin were able to sleep and focus better and experienced fewer or none of the symptoms typical of jetlag.
- Melatonin functions on two levels – it helps you sleep better and it readjusts your body clock faster. It also acts as a powerful anti-oxidant by neutralising harmful free-radicals. As melatonin is a natural substance produced by our own body, melatonin supplements are regarded as safe to take, non-addictive, and have no known harmful side-effects.

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Melatonin is sold over the counter in the USA and other countries. It can also be ordered over Internet. As a quick solution for jetlag, melatonin is an ideal remedy.

- **MELATONIN PRECAUTIONS:** *Never take melatonin during an air flight, as it will affect your ability to react in case of emergency. Equally, avoid melatonin when you need to be awake for driving, working, etc. Only take melatonin when settling down for a night's sleep. There is no recommended dosage for Melatonin. Therefore, become familiar with the effects of melatonin first, by using it at home (then you will know how much and when to take it, when using it on a trip away from home). If you take melatonin at the wrong time it will make your jetlag worse and it will delay your adaptation to the new time zone. Consult a health professional if taking melatonin over the long term or if pregnant. As we age, our bodies make less melatonin. Therefore, children or people in their 20's should not consider taking melatonin at all.*

2. TIME ZONE ADOPTION. Adopt the destination time zone as soon as you can as this will minimize or avoid jetlag. This is how:

- If flying **east** choose a flight that leaves early morning and gets in late afternoon. Then you can have a light meal and an early night, and adapt more

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easily to the new time zone in the morning. One or two days before departure go to bed later (say, 2 hours later) and get up later. Darken your bedroom (to help you sleep later in the morning) and use melatonin as necessary. Also, eat your evening meal later. That way you are getting closer to the new time zone that you will be adopting, and the disruption to your body clock will be less severe. It is best to not sleep on flights under 5 hours, as you want to be sleepy on arrival in the evening. You may have to use melatonin at the local bedtime if you are not feeling sleepy.

- If flying **west** choose a flight that leaves late morning and gets in late afternoon. Eat a normal evening meal and go to bed at the usual local time. One or two days before departure go to bed earlier (say, 2 hours earlier) and get up earlier. Darken your bedroom (to help you get to sleep at an earlier time) and use melatonin as necessary. Also, eat your evening meal earlier. That way you are getting closer to the new time zone that you will be adopting and the disruption to your body clock will be less severe. You may have to force yourself to stay awake until it is late enough to go to bed for the night (in which case you won't need melatonin!). It therefore makes sense to sleep a little on the flight, so that you can stay awake long enough to fit in with the local bedtime.

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- If flying **east or west** to a destination time zone that is 9 to 12 hours different, simply follow the eating and sleeping routine aboard the aircraft. That is, sleep as much as you can when the cabin lights are dimmed for this purpose. Do not use melatonin or any kind of sleeping medication on long haul flights as it will affect your capacity to react quickly if an emergency arises. Remember to eat sparingly and drink lots of water throughout the trip.
- Adjust your watch to the destination time zone as soon as you board the aircraft. Completely forget the old time. Live with the new time throughout the flight so that you get used to it psychologically and physically. If you must eat during the flight, try to eat at the times applicable to your destination time zone. Naturally, you can only eat when the food is served. The way round this is to take a small empty plastic container (and spoon) with an airtight lid. When served with food, if the mealtime is ‘wrong’ keep what you want to eat by putting it into your container. Then you can eat at what would be a ‘normal’ mealtime of your destination time zone. This will go a long way to adjusting your body clock to a different time zone.

3. USING LIGHT AND DARKNESS.

- When you arrive, use light and darkness to trick your body clock. If you’re having difficulty staying

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awake (to wait for the local bedtime) stay in daylight or open the curtains. When bedtime is approaching you need to make yourself sleepy. Do this by closing the curtains and dimming the lights an hour before bedtime or as you get ready for bed. This will help to stimulate melatonin in your body. In the morning, try to have breakfast in bright sunlight if you want to minimise jetlag and be effective that day, as this will stimulate serotonin to keep you awake and energetic.

- Remember the basic principle: use light for waking hours and darkness for sleeping hours. According to Dr. David Flower, the British Airways jetlag expert, the key to combating jetlag lies in two simple factors: sleep management and light exposure. According to Dr Flower, it's vital to drive your body forwards (or backwards) to the time zone that you are going to be in, and the quickest way to do this is to use light and darkness strategies to get your body to adjust to the new time zone as quickly as possible. This in turn ensures you get sufficient sleep, and no more jetlag.
- You can use science to manipulate light and darkness by wearing a daylight visor designed for the purpose. A company called '*Outside In*' produces a 'Jet Lag Combat Kit' and details can be

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obtained from their website on Internet. To get contact details, see 'Outside In' in APPENDIX 4.

4. STAYING WELL DURING AIR TRAVEL. By staying well on the aircraft your body clock will adapt more quickly and easily to the destination time zone, making you feel better and minimizing jetlag. Do this as follows:

- Combat oxygen shortage (see “Oxygen Shortage” chapter).
- Combat air pollution (see “Combating Air Pollution” chapter).
- Drink plenty of water, eat as little as possible, and take periodic cabin exercise. Remember to take at least a litre bottle of still water in your hand luggage and make sure it is empty by the end of the flight.
- Avoid tea, coffee and alcohol, which cause dehydration and make you feel puffed and bloated.
- Rest as much as possible but do not sleep unless (i) taking a nap when flying West, (ii) the sleeping hours coincide with the bedtime hours of the destination time zone, (iii) the flight duration is over 5 hours.

5. SHORT VISIT STRATEGY. If you are visiting another time zone for just a short time, your body clock will not be able to adapt before you leave. Trying to adapt to a new time zone for just one, two or three days and then

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going back home (or on to another time zone) will play havoc with your body clock and be counter productive. In this situation proceed as follows:

- Adopt your final destination time zone while visiting a temporary time zone. Your destination time zone will either be your home time zone that you are going back to or some other time zone that you are on route to. Regard a temporary time zone as any time zone where you will stay for 1 to 3 days. Regard a destination time zone as any time zone where you will stay for 4 or more days.
 - For example, if you were doing business in a temporary time zone that is two hours ahead of your destination time zone, you would set up a business meeting at, say, midday local time. When you attend the meeting you will know that *for you* the true time is 10am and you will act accordingly in terms of not having lunch yet, etc. Equally, you will go to bed at, say, midnight local time, knowing that for you the true time is 10pm. In this manner you can visit another time zone temporarily and be back home with no symptoms of jetlag. By doing this, your short business trips abroad will be much less tiring and more productive.
- Four days is the bare minimum that you need to re-set your body clock to a new time zone. This is so

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even if you manage to avoid jetlag and quickly adapt to a new sleeping routine. Remember that when you change to another time zone you cannot avoid disrupting your body clock, however little. And when you disrupt your body clock, this triggers changes in hormonal levels, blood pressure, energy levels, and other body functions beyond your control, and it takes several days for these body changes to settle down as your body clock disruption fades away. Therefore any attempt to adapt to a time zone during a short visit is pure folly, leading to greater jetlag and possible illness.

- Numerous studies have shown that whatever measures are taken, a change to another time zone disrupts your body clock for several days. The greater the time difference, the greater the disruption. Extensive research has gone into this subject because professional athletes and sports people who travel to international competitions need to avoid or get over jetlag as quickly as possible. For example, research during 1999 involving German gymnasts showed that travelling long haul affects more body functions than had previously been suspected and for a much longer period.
- In two separate studies, members of the German Olympics squad took part in a series of tests after flying to the Atlanta Olympics and to Japan. Up to

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13 gymnasts were given continuous blood pressure monitoring while training in Germany which was compared to results in training after they had flown to the competitions. Doctors found ‘complex disturbances’ in blood pressure and heart rate patterns at least 11 days later, and changes in blood concentrations of melatonin and the stress hormone cortisol up to two weeks later. According to Dr Bjorn Lemmer, a pharmacologist at the University of Heidelberg, these changes were in addition to disruption in body temperature, reduced muscle strength and other well-recognised symptoms of jetlag such as insufficient sleep.

- Richard Godfrey, a sports scientist and chief physiologist at the British Olympic Medical Centre, has developed a finely tuned strategy to avoid jet lag and ensure that athletes arrive in peak condition on trips abroad. He says you should not underestimate the duration of jet lag: *‘People feel that they are over it within five days. In fact, performance tests show that it takes 8 to 10 days for the symptoms to clear.’* (Source: Sunday Times, UK, 24 Sep. 2000, Style Magazine, p. 53).
- In June 2000, Dr Bjorn Lemmer told a conference on travel health in Washington, USA, that jetlag is a serious problem. He said: *‘We tested top athletes who were in excellent condition and training so the*

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physical activity should have helped them return to normal more quickly but they were still affected. We found their cardiovascular functions were greatly disturbed. There was a shift in their blood pressure profile and it took several days to normalise. Even 11 days after flying there was a much higher increase in blood pressure after training than it had been in Germany. There was a similar finding in heart rate with a much higher increase 11 days after time-zone travel’.

- The implications of Dr Lemmer’s findings are that if top athletes can be so badly affected by jetlag, the effects on mere mortals like you and me will be that much greater. It is clear that when the body clock is disrupted by travelling to another time zone the effects last for several days, finally fading away about two weeks later. This implies two important things:
 - The problem for people going to another time zone for just a short visit is that during such a visit you will be seduced into *temporarily* adopting the local bedtimes and mealtimes. This would be a grave mistake as you will be giving your body clock a double blow: firstly, you disrupt the body clock by adopting the temporary time zone, and secondly you disrupt the body clock *again* by adopting the destination time zone. By not adopting the

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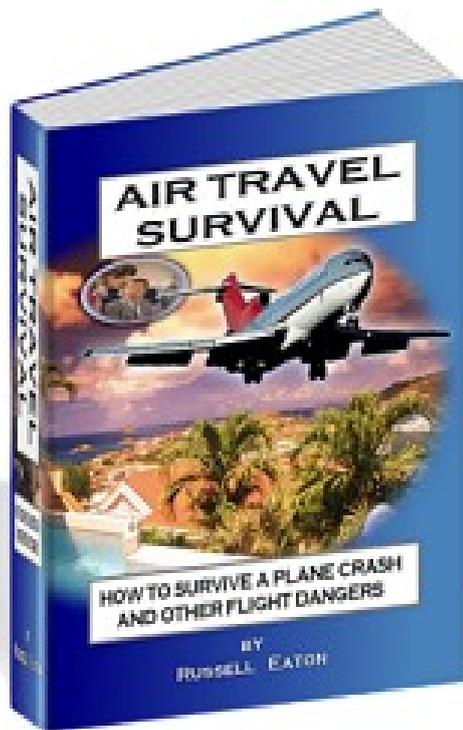
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temporary time zone you keep your body clock intact, you avoid jetlag, and you protect your health and well-being.

- Do not try to minimise jetlag and body clock disruption by breaking down a long haul trip into two or three stages. This would be the worst possible thing to do, unless staying at each stage for several weeks. It is much better to complete the long haul trip in one go and then adapt to the destination time zone as quickly as you can. That way, your body clock only gets disrupted once instead of two or three times in succession.

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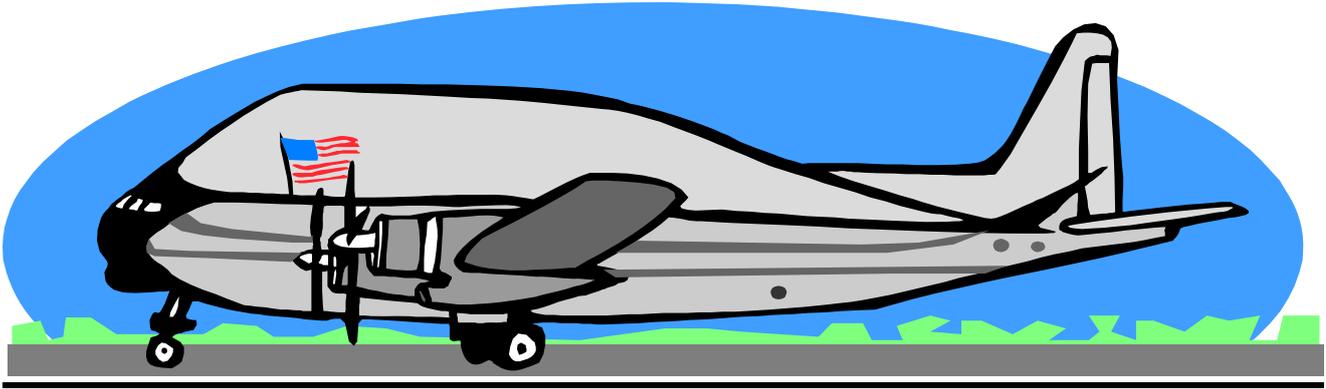
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Combating Cabin Air Pollution

Airlines try to save money by re-circulating the same cabin air, round and round, with occasional injections of fresh air from outside (about once every 12 minutes). Technically, what happens is that fresh air is taken in through the jet engines. It is compressed and heated before entering the cabin. In this process the air sometimes becomes contaminated with toxic vapours from oils and hydraulic fluids, and random tests show that this is happening with increasing frequency.

Note however, that the latest aircraft being built in the 21st Century are designed to take in cabin air without it being channelled through the jet engines.

The only reason for not allowing more fresh air into the cabin is cost. Every time fresh air is 'bled in' from outside it affects thrust, which uses up fuel, which in turn costs money. It has been shown that on a full flight, the extra cost (to the airline) of increasing fresh air in economy from 10 to 20 cu.ft. per minute equates to about 60 US cents per

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passenger. Clearly, if passengers are made aware of what is at stake they would happily pay an extra dollar on their tickets for cleaner air.

TOXIC ENGINE FUMES

According to an Australian Senate Inquiry concluded in October 2000, toxic leaks are endangering as many as 40,000 passengers and crew a year on some of the most widely used commercial jets. The Australian Inquiry said that many types of airliners are guilty, including the Boeing 737, the Airbus A320, McDonnell-Douglas MD80, the BAE 146, and Boeing 757s. In particular, the Australian enquiry made the following comments regarding cabin air quality in the BAE 146 aircraft:

- *As well as a record of unpleasant odours, from time to time fumes from lubricating oil used in the aircraft's engine have entered the aircraft's cabin.*
- *There has been for some time an occupational health effect suffered by a number of aircrew and cabin crew flying the BAE 146.*
- *As a result [of polluted cabin air] those employees who have experienced the most severe health effects have had to either cease flying, transfer from flying on the BAE to other aircraft types or take varying periods of time off work to recover.*
- *There have been recorded incidents, in Australia and elsewhere, involving the BAE 146 during which air*

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quality on the aircraft has deteriorated during a flight to the extent that aircrew and cabin crew experienced effects such as dizziness, nausea and disorientation.

- *The committee recommends that the Civil Aviation Act 1988 should specify a national standard for checking and monitoring the engine seals and air quality in all passenger commercial jet aircraft.*

Scientists say cabin air is being contaminated with oil fumes that become vaporised and mixed with the air as it passes through the jet engines into the ventilation system. This happens when oil seals inside the jet engines become faulty or wear down and spray oil into the engine. This produces a cocktail of toxins containing harmful organophosphates that get mixed into the fresh air being drawn into the engines.

After the air passes through the engines (picking up any engine toxins on the way) it is forced through ventilation packs that cool it down. The air is then pumped into the cabin ventilation system for it to travel through various regulated valves until it reaches the outflow nozzles above the heads of passengers.

Thousands of passengers on hundreds of flights a year are being exposed to these dangerous vapours, causing a variety of symptoms: blurred vision, tremors and seizures, loss of balance, impaired memory, slurred speech, asthma, headaches, and flu-like symptoms. Organophosphates can

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also cause long term damage to body's nervous system. The harm caused by these organophosphates has been compared to the harm caused by sheep-dip chemicals used by farmers, or to the nerve gas chemicals used by the Nazis in the Second World War.

The Australian Inquiry considered research compiled by Dr. Jean-Christophe Balonet of the international Aerospace Medical Association who said that he knows of *'dozens of pilots and cabin crew who are still incapacitated with clear neurological sings years after exposure'*. He concluded that *'neurotoxicity occurs on some 300 flights per year worldwide, affecting about 40,000 aircrew and passengers'*.

The problem of 'toxic mist' as it is referred to, is well known in the aviation industry. Airline authorities in several countries, including Australia, USA, United Kingdom, and other European countries are facing legal actions involving flight attendants and pilots who claim to have suffered organophosphate poisoning {sources: (i) Prof. Winder in the USA Seattle Times; (ii) the UK Sunday Times, August 20, 2000, page 14; (iii) Australian Senate Enquiry²}.

In the past ten years (1990-2000) incidents have been reported from all over the world involving cabin air contamination with toxic fumes. In the United Kingdom alone toxic fumes were reported on 17 BAE 146s, 20 Airbus A320s, 33 Boeing 737s and 21 Boeing 757s.

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In March 2000 an Alaska Airlines Boeing 737 jet aborted its flight to Anchorage after passengers complained about a chemical mist. In November 1999 the crew on a BAE 146 in Sweden were forced to put on oxygen masks because of suspected fumes in the cabin. And in July 2000, evidence of organophosphates leakage into aircraft indicates that the Airbus 320's and Boeing 737's have fared worse than the BAE 146's! (Source: Aviation Health Institute bulletin, September 2000).

For example, the UK Civil Aviation Authority (CAA) gave evidence to the Australian Senate Committee in early 2000 showing the number of incidents (of cabin air pollution from organophosphate leakage) applicable to just UK registered aircraft. The figures over the 1990's decade were as follows:

<u>Aircraft</u>	<u>No. Of Toxic Mist Incidents (in UK only)</u>
Boeing 737's	33
Boeing 757's	21
Airbus 320's	20
BAE 146's	17

Aircraft manufacturers say fumes entering the cabins are too dilute to pose any serious health threat because air

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filters would reduce any toxicity and in any event any problems would be dealt with very quickly. Pilot Unions in the UK and USA counter this by saying that all the evidence points to the contrary, that the fumes are not too dilute to be a health threat and they accuse the plane manufacturers and airlines of ignoring the health risks to passengers and air crews. Bruce d'Ancey, technical secretary of the British Airline Pilots Association (BALPA) says *'we know there is a way in which these organophosphates can enter the cabin air. We have several pilots who are thought to have been affected'*.

In the USA union officials say there has been inadequate research to assess the problem. According to Shane Enright of the International Transport Workers Federation *'the airlines are running scared of the problem. There needs to be equipment on board planes to monitor what the crew and passengers are breathing'*.

In November 2000 an Inquiry Into The Aircraft Cabin Environment¹¹ concluded that *'The absence of confirmed cases of TOCP [organophosphate] poisoning from cabin air...lead us to conclude that the concern about significant risk to the health of airline passengers and crew are not substantiated.'* Clearly, without putting organophosphate monitoring equipment on board planes there will never be confirmed cases of organophosphate poisoning!

NOT ENOUGH FRESH AIR

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Best in first class: In modern aircraft today, about 50% of the cabin air is drawn from outside the plane – the rest is recycled. It is a significant economy, because fresh air has to be heated from –50c before it can be pumped into the cabin. As already mentioned, the cockpit gets no recycled air at all, giving the pilots 150 cubic feet of fresh air per minute. First class and business class get about 20 to 50 cu.ft. per minute (depending on number of passengers), and economy class (which is usually quite full of passengers) is typically getting only 7 or 8 cu.ft. This should be compared against the *absolute minimum* standards of 20 cu.ft per minute recommended by the American Society of Heating and Refrigeration and Air Conditioning engineers (A.S.H.R.A.E) for indoor spaces on the ground, *with no oxygen shortage*.

Worse in economy: The problem is worse in economy (compared to first class and business class) for two reasons: (i) the seats tend to be smaller resulting in a greater number of passengers per square metre, and (ii) the fresh air from outside visits the front of the aircraft first, so when it gets to economy it is staler. But nobody is immune and eventually the bugs in the air are circulated to everybody aboard (except the cockpit which is air conditioned separately).

Fresher in old planes: It is ironic that in older aircraft, in the days when smoking on board was allowed, the cabin air was actually fresher! There are two reasons for this: (i)

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No cabin air was recycled so the cabin air would undergo a complete change about every 90 seconds. So any foul elements in the cabin at any given moment would be quickly dumped overboard as new clean air rushes in. In today's no-smoking cabins up to 50% of the air is recycled and the air-changing process occurs about every 6 to 12 minutes. (ii) When smoking was allowed, the air was better because it was 100% fresh. Furthermore, the cigarette-smoke chemicals discouraged the proliferation of bacteria in the aircraft ventilation systems. Now, with recycled air in no-smoking cabins, you are worse off!

QUICK DROP IN AIR PURITY

First 20 minutes: The air on a modern jet liner, carrying a full load of passengers, will remain reasonably fresh for the first 20 minutes from the moment the aircraft takes off. After that the quality of the air drops alarmingly before reaching a low plateau of staleness. As already mentioned, cabin air is recycled continuously, making the air oxygen-poor. But this recycling also makes the air dry and disease ridden. Another danger is that in many airports aircraft have to line up and wait for 20-60 minutes before take off. When this happens, cabin air quickly deteriorates because very little fresh air is being sucked in from outside. Furthermore, as planes wait for take-off they often suck in toxic fumes from other aircraft.

False sense of security: The powerful aircraft ventilation system blows the recycled air directly to each passenger's

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face through the overhead ventilation nozzles, and as mentioned, up to 50% of the same stale air is always recycled. In effect, a powerful ventilation system is being used to blow air pollutants, bacteria and viruses right up your nose with every breath you take. This provides the means for quickly spreading infections to every passenger on the aircraft. Furthermore, you are lulled into a false sense of security because the powerful ventilation fans make you feel that the air is fresh when in fact it is stale and disease ridden.

GOVERNMENT ENQUIRIES

The issue of stale and polluted air in aircraft is widely acknowledged in the airline industry. According to the Aviation Health Institute (AHI) in Oxford, United Kingdom, the problems of air pollution are worst on long distance flights. Farrol Kahn of the AHI stated in April 2000 that *'The elderly, and those with chronic health problems cannot afford to expose themselves to such conditions for hours at a time'*. Several governments around the world are formally enquiring into the dangers of air pollution on airliners as the hazards to passengers are now widely acknowledged, particularly in economy class.

In November 2000 a UK government 'Inquiry Into The Aircraft Cabin Environment'¹¹ stated that *'bacteria, fungi, and moulds are often associated with dusts and aerosols and, in the aircraft cabin, present the greatest theoretical risk to health from particulates. The evidence...shows that*

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particulate levels in the cabin atmosphere are generally very similar to those in typical houses and office buildings. Whatever the nature of particulates in the cabin atmosphere, comfort and health considerations dictate that their levels are kept low, and in any case below published exposure limits.'

Two points arise from the previous paragraph: (i) Unfortunately, airlines have so far refused to routinely install equipment to monitor virus and bacteria levels in cabin air, and in rare cases where this has been done the data has not been made available to the public. The Inquiry¹¹ recommended that this be done and expressed surprise that airlines do not already do so. And (ii) evidence that particulate levels in aircraft cabins are similar to houses and offices is of no consequence because in houses and offices you can open a window or walk away. In an aircraft cabin you are trapped virtually immobile and forced to breathe whatever is thrown at you, and because of this the standard of air in the cabin needs to be much better than a house or office.

The British Medical Council published a report in May 2004 (*The impact of flying on passenger health*) stating that the '*Transmission of airborne disease aboard aircraft is uncommon and, when it does occur, is usually a consequence of the potential for contact and the potential for droplet spread resulting from the contact of passengers.*'

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The report looked at the incidence of SARS in 2003 and found that 69 *flights* showed one or more cases of SARS that could have been caused from cross infection. It makes you wonder how many cases and flights went undiscovered or unreported.

Clearly, the incidence of cross infection in aircraft cabins is uncommon, as stated in the British Medical Council report, but that's because only serious cases get reported. If you fly to another country, and you get a cold a few days later, you are hardly likely to report the fact to the relevant aviation and regulatory authorities!

The reported cases of cross infection represent the tip of the iceberg and it would be false to say that cabin air circulation does not cause cross infection, both during flight and while on the ground.

THE CURSE OF DRY AIR

As mentioned previously, the cabin has to be pressurised to allow the aircraft to fly at altitude. The pressurization process involves taking up to 35% of the oxygen out of the air, and this makes the air extremely dry. Recycling stale air causes further dryness. The relative humidity in aircraft is only between 2% and 10% - dryer than any desert and far dryer than the 40% humidity in most homes and offices. The dryness of cabin air increases susceptibility to infections by impairing the filtering function of the nose and upper airway: the lack of moisture prevents the hairs and epithelial cells in your nose and respiratory system

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from trapping and expelling viruses and bacteria. In effect, the air pollutants and viruses fly straight into you, causing infection.

QUICK SPREAD OF INFECTION

TUBERCULOSIS

- The U.S. Federal Center For Disease Control (FCDC) reports regular cases of tuberculosis and other serious infections in people who have recently travelled by air. Follow-up enquiries have revealed instances of several passengers getting infected with the same bug on particular flights. For example, in 1998 two Scottish women contracted a virulent strain of tuberculosis on a flight to New York – the source of the infection was traced to a 21-year-old Liberian woman sitting 15 rows away (source: British Medical Journal). The FCDC says that the transmission rate of infectious or contagious diseases in the air may be as high as 72%.
- In contrast to this, the ‘Inquiry Into The Aircraft Cabin Environment’ (McCarran International Airport, Las Vegas - 41,441,531) stated that *‘the modern aircraft cabin environment generally poses no greater risk of transmission of infection between its occupants than crowded situations elsewhere’*. This, however, assumes that the aircraft ventilation and filtration systems are working at optimum level (which is by no means the case). Also, as the Inquiry readily admits, in the cabin environment the passenger would be *‘exposed for the*

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duration of the flight' whereas in other situations of similar crowding this is not the case. The Inquiry goes on to say: *'We recommend the industry as a whole to review and substantially improve overall in-service performance monitoring of [aircraft] filters.'*

WIDESPREAD INFECTION

- In 1998 the US Center For Disease Control (CDC) reported that a flight attendant with active tuberculosis passed the disease onto 13 fellow workers (and an unknown number of passengers) before her status as a TB carrier was discovered. According to the CDC, a TB carrier is potentially capable of infecting *every passenger* aboard an airliner during a 9-hour flight.
- In another study carried out by MMWR [Morbidity and Mortality Weekly Report, USA, June 15, 2001/50(23); 485-9] Bacterial Meningitis infection among airline passengers was found to be a likely occurrence if anybody aboard is carrying the disease. Bacterial Meningitis is more serious than viral meningitis and can lead to brain damage, deafness, and even death. The MMWR Study found that *'Commercial aircraft are suitable environments for the spread of airborne pathogens, including N. meningitides (the cause of bacterial meningitis)'*. The Study cites a case of a 62-year-old man with bacterial meningitis who travelled to JFK, New York, on 20 May 2001. It was later discovered that the person sitting next to him had been

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infected. It was not know if other people on that air trip were also infected, as they were not followed-up. Remember that the risks of infection in everyday proximity with people is very different to the risks of infection in the cabin environment of an airliner (where the air is stale, dry, and recycled).

- As the recycled air is constantly journeying in and out of people's lungs it can gradually spread infections to just about everybody aboard. If your immunity is not strong you are much more likely to catch a disease. It is known that germs from a sneeze can reach other people from a distance of 20 ft (7 m). In the confines of an aircraft cabin with constantly re-circulating air, tests have shown that minute infected particles can be spread across 20 rows of seats by a single cough or sneeze. An unprotected sneeze introduces a million aerosolised droplets, each with their own contingent of potential pathogens, and a cough about 100,000. And up to 30,000 bacteria per minute per passenger can be released on skin scales. A Canadian study demonstrated that microbes, which had been released in the rear on an empty Boeing 707, contaminated 100% of the cabin.
- The Pall Corporation manufactures HEPA air filters for aircraft. According to Dr. William Needleman of Pall, *'Re-circulated air is highly infected because coughing and sneezing generate millions of bacteria. Unless high-performance filtration is employed, these will circulate*

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in the cabin. Generally, it is very difficult to prove passenger infection from air travel because the symptoms generally do not become apparent until some time afterwards. As the Inquiry Into The Aircraft Cabin Environment¹¹ readily admits '*The incubation period for most viral and bacterial infectious diseases is typically several days or even weeks*'. Nevertheless, several case studies have provided hard evidence that air travel infection is taking place on a large scale.

- A 1999 study of business travellers carried out by Liberty Occupational Health, based in the United Kingdom, found that 50% of the travellers were sick on trips and 12% working time was lost. In the study, the control group of similar people with no air travel lost no working days though illness.

AIR VENTILATION FILTERS

After just 2,000 flight hours the air ventilation filters used by aircraft get clogged with a black odorous mess, full of pollutants, allergy-causing microbes, skin flakes, fungi, fibres, bacteria, viruses, and dust. Changing the filters costs the airlines time and money, so they do it as infrequently as they can get away with. As soon as filters get clogged, they contaminate all air passing through and they slow down the flow of fresh air, making matters worse. Changing the filters more often is a relatively small cost, and airlines should be urged to do this every 1000 hours maximum. Unfortunately, filter flight hours among

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airlines vary from 1,500 to 4,000 hours. League tables should be published, showing filter flight hours by airline!

Unfortunately, aircraft filters that trap bacteria and viruses cannot catch chemical pollutants such as toxic organophosphates derived from fuel fumes that may leak into the air ventilation system. Passengers, therefore, are often faced with a double whammy of aircraft induced pollutants and human induced pollutants, made worse by recycled stale air, by dry air, and by clogged air filters!

Another problem is that airlines choose to use cheaper filters that only catch about 50% of particles per cubic meter of air. This goes against best practice guidelines that recommend filters of 99.99 efficiency. The Inquiry Into The Aircraft Cabin Environment¹¹ strongly says *'we recommend the Government and regulators to make filtration to best HEPA standards mandatory in re-circulating systems'*. Best quality air filters are more expensive, but airlines do not use them to save costs.

INTERNATIONAL INFECTIONS

As mentioned, the periodical injections of fresh air from outside the aircraft are kept to a minimum as a matter of airline policy. Airlines everywhere do this as a means of saving money on fuel costs. As a result, viruses and bacteria float around the cabin, infecting a captive audience. Even on short trips you don't escape the menace, but clearly any kind of international air trip is much riskier in terms of infection. This is particularly so

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when passengers from different cultures and countries travel together, as the bugs will find new human hosts with no built-up immunity.

POLLUTED WATER

Never drink water from the taps in aircraft toilets. Airlines take no action to purify such water to drinking standards, and water-bound diseases such as cholera have been found in onboard toilet tap water. In 1999, Kristina Asplund, hygiene manager of Finnair, said *'Cholera was found in toilet tap water on a flight from Peru to the USA. I would avoid drinking water from the taps in the toilets. But the drinking water on board is safe because it is chlorinated'*.

Of course, if aircraft tap water is chlorinated (and there is no evidence of this), then the chlorine in the water cannot be good for you either!

However, in another study, the *Environmental Protection Agency* (EPA) announced on 9 November 2004 that it found evidence of harmful bacteria in the water of one of every eight aircraft tested (12.6% of all aircraft tested). Whilst for the most part bottled water is drunk by passengers 'tap' water is certainly used on scheduled flights for tea and coffee, so beware.

The EPA tested drinking water aboard 158 randomly selected US and international airlines and found that 20 had drinking water that did not meet Federal safety standards. Unfortunately, in the USA, the UK and most other countries is not the civil aviation authorities, but the

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local health authorities who hold responsibility for airline water standards. As a result, tap water aboard aircraft is not monitored properly. Furthermore, airlines know that a disease caught from impure tap water aboard an aircraft is unlikely to show up during the passenger's trip, and is therefore unlikely to ever be associated with air travel, let alone a particular airline.

The percentage of aircraft with impure tap water is thought to be much higher in less developed regions of the world where at best the quality of water will be on a par with local tap water. As a result of the EPA findings, twelve major US airlines have agreed to sanitation improvements and increased testing of drinking water aboard aircraft. Unfortunately, the EPA findings are unlikely to have any impact on the many other airlines around the world.

The best advice is to take your own drinking water, or use just bottled water (and remember to avoid hot drinks unless the cabin crew can prove that specially purified water is being used).

PESTICIDE DANGERS

As if chemical pollutants, viral and bacterial infections were not enough, passengers in some countries and some airlines also have to suffer pesticide dangers. Several major US airlines freely admit they use spray pesticides on a regular basis to 'disinfect' the cabins of aircraft. Sometimes the spray pesticides are used when cleaning the

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cabin before embarkation, and sometimes when passengers are aboard (either way it's harmful).

According to the US Dept. of Transportation, passengers on international flights are being sprayed with dangerous aerosol pesticides and this is occurring in several countries, particularly in the USA. Becky Riley of the Northwest Coalition for Alternatives to Pesticide (an environmental group based in Eugene, Oregon, USA) says *'Pesticides break down slowly in the enclosed, poorly ventilated aircraft. Passengers are sealed in a chamber that has been gassed, and sit there for hours'*. The chemicals/pesticides used are outside the regulatory area of responsibility of the Federal Aviation Administration (or any other regulatory body), and as a result dangerous chemicals are being used with impunity.

Airlines all over the world are increasingly switching to spraying the cabins while no one is on board (in order to overcome passenger objections). But experts do not agree this is safe: the chemicals in the pesticide get impregnated into the fabric of the cabin, which then get touched by passengers' hands. Also, the chemicals can linger in the air for hours.

For example, many airlines spray unoccupied cabins as a matter of routine, using a nerve toxin called 'Black Night Roach Killer.' This toxin has d-phenothrin and permethrin, which are classified by the World Health

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Organisation as possible carcinogens. The people doing the spraying have to use special masks and protective clothing!

In June 2001, travellers to Australia, New Zealand and India were singled out as being exposed to potentially dangerous pesticides during flights according to the AFA (Association of Flight Attendants, who represent 50,000 airline employees). The AFA says that the governments of these three countries are requiring incoming aircraft to use cabin sprays that contain dangerous pesticides that are banned in the USA (such as permethrin and phenothrin).

According to Patricia Friend, the AFA's international president, *'The use of these pesticides is a serious public-health issue. You wouldn't spray a can of insect repellent in someone's face, but that's essentially what passengers experience on some international flights. Exposure to these pesticides can have devastating health effects, ranging from simple flu-like symptoms to neurological damage, and is particularly harmful to infants.'*

The use of such pesticides is not banned by the World Health Organisation. But this assumes that they are used on open land, not in the confines of an airline cabin, where the air is mostly recycled!

Bill Plapp, an insecticide toxicologist formerly with the University of Arizona, says that tralomethrin, a synthetic pyrethroid, is commonly used in aircraft sprays and studies show it can be very harmful. Tralomethrin is like DDT and contains bromide and other harmful chemicals that can

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cause thyroid disease, reproductive problems, allergic reactions, asthma, and can even be carcinogenic. *'Airlines have no business doing it. It's stupid and if it isn't illegal, it ought to be'* he says.

Airlines say they do it to protect passengers from insects and rodents. The truth is that they do it for *public relations* (they don't want passengers to see the occasional insect and think that the aircraft is not cleaned properly). The occasional insect is infinitely preferable to the dangers of pesticides, and in any event there are less harmful ways of dealing with insects on aircraft. Furthermore, such practice is useless unless the spray directly hits an insect. Regarding rodents, they don't infest aircraft, and in any event no amount of spraying is going to kill rodents. Dr. Jack Thrasher, an immunotoxicologist in Alto, USA, has studied the subject and says *'this practice is insanity. Airlines have no business spraying pesticide. I don't care if it's 0.05 percent'*.

The Solution

The solution to cabin air pollution is shown under two headings: *What Airlines Can Do* and *What Passengers Can Do*.

What airlines can do:

- (i) Reduce the re-circulation of stale air from 50% to 25%. The cost to the airline for doing this is relatively small and would be recouped from increased passenger

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traffic and from less sickness absenteeism among crewmembers.

- (ii) Install equipment on board to monitor what passengers and crew are breathing. This is strongly recommended by the Inquiry Into The Aircraft Cabin Environment¹¹: *We recommend...as the highest priority...the real-time monitoring of air quality and other aspects of the cabin environment, with a view to establishing new and clear regulatory minima for passenger cabin ventilation*'.
- (iii) Change air filters at most every 1000 flight hours.
- (iv) Use more effective filters that catch 99.9% of particulates instead of inferior filters that only catch 50% of particulates.

Until airlines adopt these measures (if ever!) we humble passengers will continue to be forced to breathe polluted, dry, disease-ridden air.

What passengers can do:

There are ten things we can all do to protect ourselves, as shown on the next page ►

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Ten Ways To Combat Cabin Air Pollution

1. Wear A Mask

2. Avoid Proximity

3. Sit Towards Front

4. Use Air Purifier

5. Minimise Air Flow

6. Use Humidifier

7. Drink Water

8. Avoid Rubbing Eyes With Bare Hands

9. Keep Your Immunity Strong

10. Complain

1. WEAR A MASK

- Use a flying respirator mask. This may sound ridiculous, but increasing numbers of passengers are doing this to protect their health, even on short flights. A flying respirator mask costs little (about \$10-\$20) and is very small and lightweight to pack. The mask is quick and easy to put on and take off and just fits around the head with a rubber band. It is similar to a surgical mask in size and appearance and, according to the Aviation Health Institute in the UK, will keep out up to 98% of viruses, bacteria, and air pollutants, including tuberculosis.



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- Typically, you would use the mask after about 20 minutes into the flight. Many passengers use the mask after eating or whenever sleeping. If you are sitting next to a stranger and feel embarrassed about using the mask, say something like *'I'm using the mask because I find it helps to keep me well'*. Masks work both ways (they stop you getting infected and they stop you infecting other people). Use the mask immediately if spraying is carried out (and to hell with feeling embarrassed!).
- The flying respirator mask is made by the Aviation Health Institute specifically for the purpose of protecting airline passengers. They do not interfere with breathing and are re-usable. Good quality surgical masks can also be used for this purpose. Increasing numbers of passengers are using protective masks on airlines so you will very likely not be the only one using a mask.
- You can obtain a surgical mask from any good medical supplier. To order the flying respirator mask see *'Aviation Health Institute'* in Google.
- The *Inquiry Into The Aircraft Cabin Environment* (House Of Lords Select Committee on Science and Technology, November 2000, UK) stated that *'We cannot see how these [respirator masks] would be of any practical use unless the wearer happened to be sitting directly next to someone with an active bacteriological infection (and there was also a good fit of the mask to the face).'* This strange conclusion seems to contradict

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the Inquiry's own assertion that up to 50% of air (including infectious agents) is re-circulated to all passengers. Here are three good reasons for using a respirator mask, even if only on an ad hoc basis:

- **FEWER POLLUTANTS.** By using a mask you will breathe in fewer air pollutants than otherwise. This is so even if the mask is ill fitting or if the mask is not worn all the time. Going part of the way is better than going no way at all.
- **FEWER GERMS.** By using a mask you will breathe in fewer viruses and bacteria, giving your body a greater chance of fighting back. Some of these germs get caught and repelled by the minute hairs in your nose and by the epithelial mucosal cells lining your nose and throat. Also, the germs that do succeed in getting inside you will galvanise your antibodies into action to kill off the invading germs. If the mask is ill fitting or not worn all the time, this is much better than not wearing a mask at all, because it reduces the amount of germs that get into your body, giving your antibodies a better chance of fighting back.
- **DIFFERENT AIR MIX.** As the cabin air is re-circulated and gets stale, it will build up a cocktail of pollutants, viruses and bacteria. The cocktail 'air mix' will change from time to time because it's being gradually replaced with fresh air from outside. This means that at any one moment in time the type of

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infections or pollutants in the air will be different, depending on who has sneezed, how long ago the sneeze took place, which air packs have been switched on or off by the pilot, and so on. *The same virus will not be present throughout the journey.* By using a mask, even if it is ill fitting or only used occasionally, you will be avoiding the 'air mix' applicable at that moment in time.

2. AVOID PROXIMITY. Although air pollution comes from the ventilation system rather than from the passengers sitting next to you, it makes sense to put some space between you and other passengers if the plane is not too crowded. So, although it may be anti-social, move away from other passengers and sit alone somewhere. Another option is to choose a seat that you have to pass to get to the emergency exit. Such seats are usually more spaced out. Realise that in Economy seats are less spaced out (giving more passengers per cubic metre of air) compared to business class and first class. This is one of the reasons why air pollution is worse in economy.

3. SIT TOWARDS FRONT. Fresh air is taken in at the front of the plane, treated and pumped through the cabin to the back via every other passenger's lungs. By the time it reaches passengers sitting in the rear seats of economy, the air is an unappetising cocktail of carbon dioxide, germs, perfume, and god knows what else. The biggest single

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reason for flying first class is that you get better air. If flying economy, chose a seat as far to the front as possible.

4. USE AIR PURIFIER. Buy an air purifier. This is a device that hangs around your neck and weighs less than 2 ounces. It works by drawing in contaminated air which is filtered and the resulting purified air is then directed upwards toward your mouth and nose. An air purifier available from Magellan, USA (designed for airline passengers) is said to be capable of destroying viruses, bacteria, chemical contaminants, and other impurities in the air. It is very small and lightweight, cots about US \$145 (UK £100) and operates on a small battery. For contact details see appendix 4 under ‘Magellan’s International’.

5. MINIMISE AIR FLOW. Avoid a window seat where airflow is greatest (air mostly travels along the walls and ceiling of the cabin). Also, turn off your air ventilation nozzle. The air may feel fresh because it is blowing hard, nevertheless it will still be the same old stale air, going round and round the ventilation system. By reducing the airflow into your face you will not reduce the amount of polluted air you breathe, but you will reduce the *force* of the air shooting into your nose and mouth. This in turn will (i) help your nose trap air pollutants more effectively, and (ii) help to keep your nose and throat from getting too dry. NOTE: Blow your nose frequently.

6. USE HUMIDIFIER

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- The personal humidifier referred to previously has the double benefit of increasing the oxygen you breathe and reducing air pollution. The microscopic droplets of water that humidify the air help your nose to trap and stop pollutants more effectively. Although you can physically use the humidifier and surgical mask at the same time, realise that the mask would filter out some of the humidity that you are creating! The advice, therefore, is to use the humidifier whenever you're not using the mask.
- If you don't have a humidifier, take a water spray and use it on your nose and mouth every 20 – 30 minutes. You can buy a small inconspicuous water spray from any perfumery (they are sold to women as atomisers for perfume).

7. DRINK WATER. Make sure you drink clean or bottled water regularly throughout the flight. Preventing dehydration will help you to stay well and combat the polluted air that you're forced to breathe. Also, by keeping your body well watered, it will help to keep your upper respiratory system moist, and this in turn will help your nose and airways to trap and eliminate invading organisms. Take a two-litre bottle of still drinking water in your hand luggage and make sure it's finished by the end of the flight.

8. AVOID RUBBING EYES WITH BARE HANDS. The microscopic bugs and polluting chemicals in the

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recycled air will end up covering nearly all the surfaces in the cabin, particularly hair and human skin. The biggest way to catch an infection is to breathe it in. The second biggest way is to rub it in, from your hands to your eyes. The eyes will then quickly transport the bugs down the eye ducts into your body.

It is therefore important to wash your hands whenever you have the opportunity. Do this even if your hands seem to be clean. Avoid rubbing your eyes, unless using washed hands. Alternatively, quickly lick your finger and dry it thoroughly with a clean tissue/handkerchief/napkin before rubbing your eyes with your bare finger.

9. KEEP YOUR IMMUNITY STRONG. In our everyday lives we often come into contact with viruses and bacteria, but we usually only get infected and ill when our immunity is low. The best way to avoid infection and illness from an air flight is to keep the body's immunity strong. Do this as follows:

- (i) **Avoid alcohol during the flight.** Alcohol dehydrates your body at a time when your body is screaming to be hydrated because of the dry air. Also, alcohol 'pollutes' your bloodstream, preventing it from fighting infection.
- (ii) **Avoid stress.** It is universally accepted that stress can have a direct effect on your body's immunity. You can help your body fight infection by avoiding or

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reducing your level of stress while inflight. See “Dealing With Inflight Stress” chapter.

10. COMPLAIN. If you think the cabin air seems stuffy or stale address the following question to a cabin attendant:

‘The air seems to be getting very stuffy. Can you please ask the captain if he has turned off any air packs? I think we would all benefit from some fresh air. Anything you can do is much appreciated’.

- Although airlines deny it, it is known that some pilots turn off one of the three air packs drawing in outside air until, and unless, passengers complain. It is thought that pilots switch packs off after a meal, when people are more likely to put their sleepiness down to a full stomach and be less likely to notice the stale air.
- Do not be afraid to complain; if it is done in a friendly manner the cabin attendants will not mind and may indeed appreciate the opportunity to get better air for themselves. A cabin attendant once told me that she wishes passengers would complain more often about the air, as until somebody complains, she cannot do anything about it. (Consider briefing a fellow passenger to also complain around the same time that you do). Given the outrageous quality of air that passengers have to put up with, it is surprising that passengers do not complain more often.

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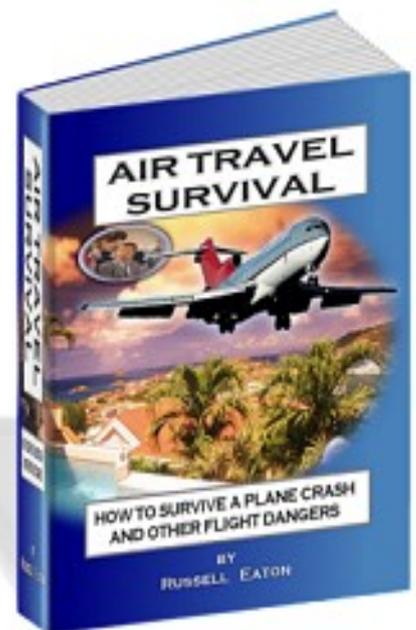
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Dealing With Inflight Stress

The human species was not designed for air travel and it is hardly surprising that most people become anxious about being trapped in a pressurised cabin high up in the skies, for several hours at a time.

Whether we like to admit it or not, virtually everybody who flies has occasional feelings of anxiety and stress during air trips. Even crewmembers and frequent fliers suffer such moments. Numerous studies on flight crewmembers and passengers show that nobody escapes a degree of stress during air flight, but the levels of stress vary enormously from person to person.

Dealing with IFS (In Flight Stress) is particularly important because, unlike other forms of stress, you cannot take ‘fight or flight’ action. That is, you cannot take physical action such as walking off or doing some other activity to resolve the stress, as you have to stay seated and virtually immobile. You even have to remain outwardly calm in the face of stress because of your proximity to other people. You are, in effect, forced to bottle up the stress because of the ‘unnatural’ and confined circumstances.

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When stress is bottled up instead of being released, it causes harmful effects inside the body, making you more vulnerable to infection and illness. In particular, stress causes the body to produce cortisol, a hormone designed to galvanise your body into action to deal with whatever threats are causing the stress. But with IFS you cannot respond the way nature intended and as a result the cortisol stays circulating in the blood instead of being used up and dispersed to fight the threat.

Several studies show that in such situations cortisol harms the body in many ways. According to Dr. Sapolsky of Rockefeller University, New York, studies on this subject clearly show that stress induced cortisol is associated with ulcers, heart disease, diabetes, reduced immunity, infections, arthritis, strokes, psychosis, psoriasis, Parkinson's disease, multiple sclerosis, Alzheimer's disease, stunted growth, acne, alcoholism, and obesity, to name a few! So by avoiding IFS you avoid cortisol and its harmful effects.

With regard to air travel, here are five good reasons for avoiding IFS (Inflight Stress) – see next page:

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Five Dangers Of Inflight Stress

1. Polluted Air

2. Oxygen Shortage

3. Blood Clots

4. Jetlag

5. Aircraft Emergency

- 1. POLLUTED AIR.** The stale cabin air is constantly recycling viruses and bacteria from other passengers. IFS lowers your resistance to infection making you more vulnerable to the polluted air that you cannot avoid. Also, your body will be more vulnerable to harmful chemicals in the cabin air arising from hydraulic fluid fumes in the air ventilation system and from aircraft sprays used by cleaners.
- 2. OXYGEN SHORTAGE.** The effects of oxygen shortage in the cabin air will be aggravated by IFS. When you are under stress it causes increases in blood pressure, sweating, and more rapid breathing, all of which use up precious oxygen from the air you breathe. Hence, any discomfort or illness caused by oxygen shortage will be made worse by IFS.
- 3. BLOOD CLOTS.** Cortisol increases blood pressure and the oxygenation of the blood as a means of helping body cells to burn fuel for emergency energy. But this also has the effect of increasing the risk of blood clots

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in air travellers sitting in cramped conditions and breathing dry oxygen-poor air.

4. **JETLAG.** As we have seen, the avoidance of jetlag very much depends on your ability to adopt the new time zone sleeping pattern *during* the air flight. IFS will greatly impede your ability to sleep soundly when you need to (or even to benefit from rest). Also, the avoidance of jetlag involves staying well as any kind of illness will greatly aggravate jetlag on arrival. But if you are under stress, you will be much more likely to become ill.
5. **AIRCRAFT EMERGENCY.** If faced with an emergency you are more likely to panic or not think clearly if suffering from IFS before the emergency arose. Stress affects the mind and the body and it can leave you feeling confused, distressed, lethargic and exhausted. Studies have identified three stages of stress: alarm, resistance, and exhaustion. When stress sends cortisol into the bloodstream, if the stress is not dealt with (as in the case of IFS) it results in exhaustion: cortisol makes the body burn up energy to galvanise the muscles into action to deal with the stress. But when we just continue to sit there doing nothing, the burnt up energy goes to waste, and as the blood sugar is used up we feel exhausted. A combination of exhaustion and panic is the worst

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possible condition to be in if faced by a plane crash or some other air emergency.

The Solution

To deal effectively with IFS there are five strategies you can adopt, and these are given below.

Five Ways To Combat Inflight Stress:

1. Minimise The Fear Of Flying

2. Avoid Drugs And Alcohol

3. Be Fully Prepared

4. Be Physically Comfortable

5. Take Inflight Exercise

1. MINIMISE THE FEAR OF FLYING. Fear of flying is caused by the natural fear of falling and crashing. As a passenger, you are confined inside the closed space of a cabin, facing the possibility of falling from a great height and crashing, and you do not feel in control (the pilot is in control, you hope!). The fear or excitement of air flight never completely disappears, however much you travel, and this is just as well as otherwise we can become careless and unprepared. Dealing with fear from flying is important because it will reduce your level of stress, make your air trips more enjoyable, and help you be better prepared in case of emergency. This is how you can minimise the fear of flying:

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* **ADMIT THE FEAR.** Realise that everybody is fearful of flying; even pilots and hardened cabin attendants will have their moments of fear. Naturally, crewmembers get used to flying and learn to subjugate their fear and not show it. Also, crewmembers become familiar with the aircraft's behaviour, noises and mechanical sounds which pose no danger but which can sometimes alarm passengers. So do not be ashamed of your fear of flying; instead, admit the fear to yourself and understand why you are fearful and how you can deal with it.

* **STUDY THE AIRCRAFT.** Become familiar with the mechanics of aircraft flight. Find out what model aircraft you will be flying on and ask the airline to send you any literature on that particular model. Airlines are normally very happy to oblige, particularly if you say you are nervous about flying and you want to know more about the aircraft. You can also research the particular model at a public library. Sometimes, the aircraft manufacturer can send you information. Find out things like number of jet engines, altitude and cruising speed, location of cargo bay, number of passenger seats, etc. For example, a Boeing 747 requires a thrust of 200,000 lbs from its four jet engines, a speed of 180 mph and a runway distance of 8,500 ft to become airborne. By becoming familiar with the aircraft you will be less fearful of flying.

* **AIRCRAFT BEHAVIOUR.**

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- Understand the mechanical sounds and movements of the aircraft. For example, the main door of a 747 thumps as it shuts on the runway, the engines start with a whine, and the cabin light will dim as each generator is checked. The engine noise gets louder as it races towards take off, and it screams at its loudest at the point of takeoff. Normal takeoff is about 30 - 50 seconds and soon after the wing flaps come up making the aircraft sink slightly. As it climbs there will be a sudden hush as the engines are throttled back for the noise –abatement procedure. At the top of the climb there will be a further reduction in engine noise. Before landing you will hear the noise of the landing gear (the wheels) being lowered, and when the aircraft touches ground there will be a jolt as the wheels make contact. This is followed by a loud shuddering howling noise as the engines put on the brakes with a reverse thrust to slow the aircraft down.
- The landing gear or undercarriage on modern aircraft has a big safety margin: it is capable of withstanding three times the loaded capacity of the aircraft. The wings of aircraft are designed to be flexible and can typically flap 10 ft up or down, more than enough for even the strongest winds. The fuselage is stronger than steel yet very lightweight, allowing a jet aircraft to glide to a landing if it had to.
- Realise that each type of aircraft will have its own particular symphony of sounds, and try to remember

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them when you fly. By becoming familiar with the flying behaviour and sounds of aircraft you will do a great deal to dispel the fear of flying.

*** USING VIRTUAL FEAR.**

- Psychologists in the USA are using virtual reality to help patients overcome their fear of flying. Patients pay a visit to their nearest Virtually Better clinic, where they enter a virtual environment designed to simulate a flight. The patient sits on a similar seat to those found on commercial airlines, and puts on a VR headset that immediately transforms their surroundings into an airplane cabin.
- On takeoff, landing and during flight the seat vibrates to simulate the experience of flying. The relatively low cost (about UK £110 or US \$150) per 45-minute therapy session means that patients can have one-to-one treatment in sessions spread over several weeks.
- The biggest advantage is that every flight can be individually tailored to suit the patient. For example, the first time they dare to venture onto the virtual plane, the clinic can guarantee they have smooth flight and a perfect landing. As they become braver, the clinic slowly introduces turbulence and bumpy landings. For more information see their website:
www.virtuallybetter.com.

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* **USING THE MIND.** Entertain yourself during the flight (when not resting or sleeping). Take interesting things to read or do while seated. Enjoy the in-flight entertainment and movies, or get engaged in conversation with other passengers if you wish to. Also, take time to reflect on your own life (think about how your life is going, your objectives and plans for the future) – we do not often get time to do this in our busy lives so exploit the opportunity for some quiet reflection and introspection. By keeping your mind occupied you will enjoy the flight and not dwell so much on your fear of flying.

* **BREATHING.** Practice breathing techniques to help you stay calm during the flight. Breathing fast and shallow is a symptom of stress, so by breathing normally you will immediately reduce the stress. Do this by breathing more slowly and deeply. Breathe in and out through your nose instead of your mouth, and let the air inflate your tummy rather than your chest. Say to yourself: *‘since no one can see my tummy, I’ll just let it inflate like a balloon every time I breathe’*. This kind of breathing should be your normal breathing whenever seated anywhere. If feeling stressed, pause for two seconds after each time that you breathe in (do this 5 or 10 times in succession).

* **RELAXATION.** Practice relaxation techniques to help you stay calm during the flight. Tense muscles are a symptom of stress, so by relaxing the body you will

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immediately reduce the stress. Do this by using ‘conscious relaxation’ techniques.

- First, make sure you are seated comfortably with each arm resting on your thighs (do not use arm rests). Your hands should be resting loosely on your lap, or on your thighs about halfway between your knees and your stomach. Starting from the top of your head, work your way downwards to your neck, shoulders, arms, hands, chest, stomach, buttocks, legs and feet.
- As you concentrate on each part of your body, tense that part of the body and then let go, leaving it relaxed. As you work your way down your body, feel your whole body relaxing and getting heavier and sinking into the seat. With practice you will be able to do this whole exercise within 30 seconds, putting your whole body into a state of relaxation. This will greatly help you dispel stress and prepare you for resting or sleeping.

2. AVOID DRUGS AND ALCOHOL. Avoid drugs, alcohol, tranquillisers, amphetamines, beta-blockers, sleeping pills, melatonin, and any kind of medication unless prescribed by a health professional and essential for the trip. Remember that alcohol is not only dehydrating, but is also a depressant. Alcohol does nothing to enhance or improve performance and well being, and any feeling of relaxation it may engender is temporary to say the least. Even the consumption of tea and coffee should be minimised as they contain caffeine which disturb your

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ability to rest and sleep, and they stimulate the body to lose precious water. Treat your air flight as a substance-free zone. That way your mind stays clear and you stay in control. Realise that cabin pressurisation increases the potency and effect of such substances, with the following consequences:

- They will do little to reduce inflight stress, and may indeed aggravate the stress by making you feel dizzy and out of control.
- They affect your judgment and ability to respond to an emergency situation, and could make the difference between life and death in the event of a plane crash. Although beta-blockers are meant to prevent the symptoms of stress and are non-addictive, they should be avoided as they can impair judgment and reaction time.
- The dangers of combining tranquillisers with alcohol can be accentuated in a pressurised cabin, causing dizziness and memory loss at the very least.
- Alcohol robs your body of precious water and oxygen at a time when you most need it. This in turn will make you feel worse and more stressful.
- Exception: If you are a smoker and you are not in the process of giving up, do not smoke on the aircraft. Instead, use a suitable smoking substitute such as nicotine patches, stop-smoking gum or nicotine inhalers. Alternatively, use Zyban (also known as bupropion SR),

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a drug that suppresses the desire to smoke. This will help to minimise the frustration of not smoking and reduce stress.

2. REDUCE STRESS BY BEING PREPARED. Be prepared for the possibility of an emergency during the flight. By *knowing* you are fully prepared you will be less fearful of flying and less stressed. To find out more about how to survive an airline calamity see Air Travel Survival (www.airtravelsurvival.com).

4. BE PHYSICALLY COMFORTABLE. Not being physically comfortable is a major contributor to inflight stress. Remember that cabin pressurization makes your body and internal organs swell significantly. Furthermore, if you are not *physically* comfortable you will not be *mentally* comfortable. Physical discomfort causes more IFS than the fear of flying and it should not be underestimated. Here is a list of ways to be physically comfortable:

- **Oxygen shortage.** The oxygen shortage forced on you by the cabin pressurisation and dry air is a major factor in discomfort. Apply the strategies to combat oxygen shortage described in this book. Remember that if you get frantic you can ask a cabin attendant for additional oxygen and you will be given a small oxygen cylinder and mask.
- **Moisturiser.** The extremely dry air will make your skin and lips go dry. Make sure you take moisturiser

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cream and lip balm in your hand luggage and apply it freely during the journey. Stress goes up considerably when you feel uncomfortable from dry skin and lips.

- **Clothing.** Wear loose fitting clothing, as your body will swell due to cabin pressurisation. Loosen any tightness caused by clothing or waist belts. Natural fibres are better than synthetic fibres as they breathe more easily. Also, natural fibre clothing will protect your body better in the event of a fire. Avoid contact lenses, as the dry air will make them feel uncomfortable.
- **Inflatable Neck pillow.** Use your inflated neck pillow for resting and sleeping to make yourself more comfortable. Alternatively, it can be used as a lumbar support or armrest. But remember not to sleep too often or too long as (i) it may promote Deep Vein Thrombosis, and (ii) it may delay your reactions to an emergency.
- **Shoes.** Take your shoes off or loosen your shoelaces, as your feet will swell due to cabin pressurisation. Take a thick pair of long socks to keep your feet warm when you sleep.
- **Eating and drinking.** Eat sparingly or not at all. If you must eat, do so at the meal times applicable to your new time zone. Remember two things:

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- 1) The digestion process uses up precious oxygen and energy, aggravating your oxygen shortage and making you feel lethargic and uncomfortable.
- 2) Cabin pressurisation causes gases to expand by 25% - 35%. So avoid gassy drinks and foods hard to digest such as cheese, beans and fatty foods. Also avoid bread rolls and pastry, as the yeast will expand inside you, causing even more bloating.
 - Drink as much still water as possible (about a glassful every half an hour). This will help to oxygenate your body, combat invading organisms, minimise jetlag, and keep you well.
- **Pillow & blanket.** Make sure you have a cabin pillow and blanket for extra comfort. If not, ask a cabin attendant for these items and use them for extra support.
- **Bladder.** Don't be physically uncomfortable by delaying going to the toilet (go as often as you need to). Remember that every time you go you will also benefit from stretching your legs.

5. TAKE INFLIGHT EXERCISE

Sitting is relaxing, but after a while it becomes uncomfortable particularly if there is limited space. Most economy class seating on airlines is very cramped and this is aggravated when you take into account that your whole body swells because of the pressurised cabin. The dangers

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to health posed by cramped airline seating, such as blood clots, have already been examined in this book. Inflight exercise is very beneficial for several reasons (see next page).

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Seven Benefits Of Inflight Exercise

- 1. Oxygenates The Body*
- 2. Minimises Blood Clot Risk*
- 3. Helps Combat Infection*
- 4. Makes You Feel Better Physically*
- 5. Helps You Stay Calm And Stress Free*
- 6. Reduces Harmful Cortisol Produced By Stress*
- 7. Helps You Rest And Sleep More Soundly*

Apart from the dangers to health, restricted seating also increases levels of stress. The solution, of course, is to get out of your seat and stretch your legs with a little walking. Unfortunately, this is usually not enough. You cannot escape from your seat very often because aisles may not be free, seatbelt restrictions may apply, or meal trays or other passengers may block you. To get round these obstacles you can do exercises while seated, and whenever you can get up you can do other types of exercise.

From the list of exercises given below choose just those you feel like doing. Do not feel you have to do all of them every time you fly! *Note:* Some of the larger airlines now show exercise videos on long haul flights. Be sure to take advantage of these videos, however ridiculous they may seem. You won't regret it. If you are not used to

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exercising, practice the exercises at home first. Then, when you fly you will be more comfortable doing them.

CABIN EXERCISES YOU CAN DO WHEN SEATED:

- Close your hands into fists and hold the fists for about 5 seconds before letting go. Do both hands at the same time, and repeat for about 10 times. This exercise may be done with your arms bent or straight.
- Keep the balls of your feet planted and raise your legs using your calf muscles (as if tip-toeing). If this is too easy press down on your knees with your hands as you raise your legs (this will also exercise your tummy muscles). Repeat for about 10 times or until tired.
- Keep your heels planted and raise your toes as high as possible. Hold for five seconds, relax and continue until tired. Then, keeping your toes on the floor, lift your heels as far as you can as if you were tip-toeing. Hold for five seconds, relax and continue until tired.
- Place your hands firmly on your armrests and raise your knees slowly (together is harder than one at a time) up toward your chin. Lower them slowly and continue until tired.
- Cross your legs. Rotate the dangling foot in as wide a circle as possible until tired. Then do the same with the other leg.
- Stretch your neck by keeping your chin close to your throat and tilting your head forward. Roll your head

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gently from one shoulder to the other as if you were trying to get your ear to touch your shoulder. Do not over-exert and avoid tilting head backward.

- With arms to sides or in your lap, lower your shoulders. Then raise your shoulders up towards your ears into a shrug, hold for five seconds, let go and repeat until tired.
- Contract and release your calf (thigh) muscles 20 times. Rest for 30 seconds, then repeat. Alternatively, move your knees apart and bring your feet together, then move your feet apart and bring your knees together. Each time you do this lift your thighs to help blood circulation.
- Take a deep breath in, stretching your arms above your head, clasping your hands together and pushing your palms to the ceiling as you breathe out.
- Take a deep breath in, clasp your hands together and push them out in front of you, palms facing away from your body. As you breathe out, let your shoulders come forward and feel the stretch in the muscles of your back.
- Arch your torso gently backward and forward like a cat.
- Tighten your buttocks while at the same time drawing in your tummy. Repeat about ten times or until tired.

CABIN EXERCISES YOU CAN DO WHEN NOT SEATED:

- Walk around the cabin or up and down the aisle a couple of times. While walking take the opportunity to stretch your arms and body generally (space allowing!).

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- If forced to stop every so often, stand on one leg while bending the other leg at the knee. Do this a few times while waiting to continue walking or while waiting to get into the toilet. Other standing still exercises are: (i) stretch your torso backwards, with hands on hips, (ii) clasp your hands above your head, then stretch your arms up and down keeping your hands together.
- If space allows, do lunge exercises: take a big step forward and gently lower yourself as far as you can go, while keeping torso upright and back leg straight at the knee. Return to standing by either stepping forward with the rear foot or stepping backward with the front foot. Repeat several times alternating between legs.
- Stand with arms stretched forward and feet about 1 or 2 feet apart. Then squat down and stand up, repeating the exercise about ten times. Keep your arms stretched forward at all times. Keep feet fully planted on floor at all times (do not lift your heel or balance momentarily on the front of your feet). If you find it difficult to balance, make your bottom stick out more as you squat down. Alternatively, hold onto the side of a seat as you squat. This is an excellent exercise for the legs and tummy muscles. Do this exercise gently and carefully if you are not used to it.
- Look for an empty hallway, usually near the toilets, and perform stretches against the wall. Stand, facing the wall about 2 or 3 ft away. Place hands on wall about the

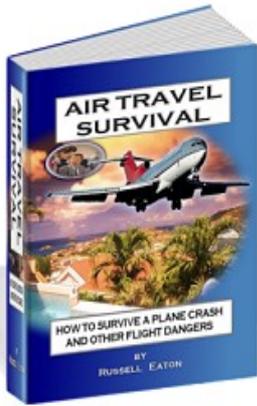
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same level as your face and lean forwards and backwards against wall as if doing press-ups while standing up.

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Air Travel Survival

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MYTH: The emergency bracing position advocated by airlines is the best position to adopt in the event of a plane crash.

REALITY: There is a different bracing position that passengers can adopt which is much safer than the emergency bracing position advocated by airlines. Learn this secret and you will greatly increase your chances of avoiding injury and death in the event of an aircrash or hard landing. Air Travel Survival is the only publication in the world that reveals this special emergency brace position - you owe it to yourself to find out more. To find out more go to:

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Tips For Women Passengers

Both women and men face similar air travel issues in terms of general health and safety. However, some issues are more relevant to women, and bear repeating and emphasizing in this chapter. So here is an A-Z list of the most important tips for women air travellers:

ALCOHOL. Be aware that the potency effect of alcohol (for both men and women) can be much greater when consumed in a pressurised cabin because of dehydration. When you add to this the fact that alcohol tolerance is in general lower in women compared to men, women should be extra cautious about drinking alcohol during an air flight.

Three Reasons Why Alcohol Affects Women More Than Men

1. **LESS WATER:** The greater the amount of water in your body the greater the dilution of the alcohol that you drink.

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MORE WATER IN YOUR BODY =
MORE ALCOHOL DILUTION =
LESS ALCOHOLIC EFFECTS

But the average woman has more body fat and less muscle tissue compared to the average man. As muscle tissue contains much more water than body fat, it means that on average the male body contains more water. Therefore, women air travellers who drink alcohol should drink extra amounts of water. Ideally, avoid alcohol altogether.

2. LESS ADH: ADH (Alcohol Dehydrogenase) is an enzyme in the stomach, which breaks down alcohol so that it can be absorbed into the bloodstream, reducing the effects of drunkenness and blood poisoning. Scientists have discovered that women have much less ADH than men, making women more susceptible to the effects of alcohol.

3. SMALLER LIVER: Alcohol is broken down (i.e. got rid of) by the liver. As women have smaller livers than men, alcohol stays circulating in the blood of women for a longer period.

PREGNANCY

The following section gives advise to women travellers who are pregnant.

- **MISCARRIAGE.** Women who fly in the first three months of pregnancy should avoid taking aspirin as a means of reducing the risk of a blood clot. The latest research shows that taking aspirin in early pregnancy

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may trigger a miscarriage. Indeed, doctors should not prescribe any kind of low-dose aspirin to pregnant women during the first 12 weeks of pregnancy (whether flying or not), particularly as there are other safer forms of painkillers such as paracetamol. A Danish study published in the British Medical Journal shows that the risk of a miscarriage increased between two and seven times in women who took aspirin in the first 12 week of pregnancy. The Royal College of Obstetricians and Gynaecologists in the United Kingdom advises women that until more is known *'it would be better if women who knew they were pregnant avoided aspirin'*. (Source: Risk of Adverse Birth Outcome...Nielsen, et al, British Medical Journal, 2001;322:266-270, 3 February 2001). In another study published by the *Kaiser Foundation Research Institute in California* (British Medical Journal, 16 August 2003) it was found that aspirin can double the risk of losing a baby in the early months of pregnancy. **Note:** As mentioned in a previous chapter, taking two spoonfuls of omega 3 oil (e.g. flax seed oil) on the day of air travel is much better and safer than taking an aspirin, and is perfectly safe to take for a woman who is pregnant.

- **ADVERSE BIRTH.** In another British study it was found that taking a low dose aspirin during pregnancy caused no adverse birth outcomes. Researchers found that birth complications (particularly those associated with high blood pressure) were reduced as a result of

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taking aspirin. This Study does not contradict the previous paragraph; it simply shows that taking a low dose aspirin in *later* pregnancy may reduce the risk of stillbirth, pre-mature birth and other birth complications. Whereas the Danish and Californian Studies shows that aspirin in the *early* weeks of pregnancy may increase the risk of a miscarriage, the British Study shows that aspirin in the *later* stages of pregnancy helps to prevent birth complications. So the advice is to avoid aspirin in early pregnancy, but take it in the later stages of pregnancy *if advised to do so by a medical professional*. (Source: Antiplatelet Drugs For Prevention...Dudly, et al, British Medical Journal, 2001;322:329-333, 10 February 2001).

Should you take aspirin if flying when over 12 weeks pregnant? The answer is no:

- Ideally, you should not fly at all when pregnant, and you should not take aspirin whenever you fly. If you must fly when pregnant, months 5, 6 and 7 are safest.
- Taking omega-3 oil is the perfect alternative to aspirin in the context of passenger airline flying.

CABIN PRESSURISATION & PREGNANCY. Do not fly during the first 12 weeks of pregnancy because there is a risk that prolonged cabin pressurisation and oxygen shortage, such as during a long haul flight, can harm the foetus in its formative weeks. Babies born to women living at high altitude do not suffer from such dangers because (i) the oxygen shortage and dry air is much worse

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in an aircraft, and (ii) because women living at altitude have fully acclimatised their bodies before becoming pregnant. Remember that most airlines do not let crewmembers fly if pregnant (consider doing the same). If you must fly while pregnant, here are some further tips:

- Wear the seat belt around the pelvis, avoiding the baby.
- During the flight, ask to be given supplemental oxygen, however well you feel. This is important for the foetus. You may need to order the oxygen from the airline in advance.
- Avoid flying in the 8th and 9th months of pregnancy because cabin pressurisation can induce labour.
- Ask for an aisle seat near a toilet in a non-smoking area.
- Avoid carbonated drinks and foods that produce gas like beans and curries. The gas expansion internally can cause discomfort. Remember that when you fly, both you and the unborn baby get bloated and you don't want to make things worse by overindulging in food and drink.

CLOTHES & SHOES. Women in particular should remember to wear clothing suitable for air flights. Here are some tips:

- Wear clothing made of natural fibres rather than synthetic fibres. Such clothing won't burn so easily, thus protecting you in the event of a fire. Also, a natural fibre

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garment soaked with water will protect you much better than a synthetic garment soaked with water.

- Wear loose fitting clothing as cabin pressurisation will make you feel bloated. Any tight garments, such as a tight bra, will feel tighter during the flight.
- Wear shoes with flat heels and buckles or laces. Sandals, slip-ons, and high heels will impair a quick escape in the event of an aircraft emergency and afford little protection against fire.
- Wear trousers rather than a dress or skirt. This will help to protect your skin in the event of a cabin fire. It will also help you to escape more quickly in the event of a plane crash (you may have walk over seats to escape).

CONTRACEPTIVE PILL. If you are travelling to another time zone remember that you need to continue to take the pill without interruption. If you are going to a new time zone temporarily, continue to take the pill based on your home time zone. If you will be adopting a new time zone, take the pill on your old time zone the first day of arrival then switch to the new time zone for taking the pill on your second day of arrival.

Also realise that some contraceptive pills can increase the risk of blood clots. As explained in the chapter “Avoiding Blood Clots”, the Pill can increase the chances of getting a blood clot by up to twenty times! If you are taking the Pill *and* flying long-haul *it is critical to take measures* to

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minimize the risk of a blood clot as explained in the chapter “Avoiding Blood Clots”.

If you are overweight, over 35 and/or smoke, the risk of a blood clot from flight travel can be at least doubled.

COSMETICS & TRAVELING. Organizing a cosmetics case for travel is never easy—every trip has different needs, not to mention the luxuries worth lugging halfway around the world. Gloss.com is a website that can help you plan your cosmetics for every trip: http://www.gloss.com/module/Gloss/templates/tools/what_to_pack.jhtml

DOWNS SYNDROME. If you are a crewmember or a frequent flyer and if you are pregnant you should have your unborn baby checked for possible Downs Syndrome. This is because there is a significantly higher incidence of Downs Syndrome among babies born to women who have flown frequently in the past or who may still be flying while pregnant. The good news is that you no longer have to have an amniocentesis test, which involves inserting a long needle through your womb into the baby’s amniotic sac. A new test has been devised which merely involves using a regular small needle to extract a tiny blood sample from the mother’s arm. This new test works because the baby’s DNA pattern (which denotes whether the baby has Downs Syndrome) is present in the mother’s blood while pregnant.

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DRY AIR. The extra dry air of a pressurised cabin will dry out your eyes and make contact lenses feel uncomfortable. It is best to avoid contact lenses on air trips and use spectacles instead. Also, use minimum or no makeup so that you can be generous with moisturiser cream on your face instead. The dry air quickly makes faces, hands and lips feel uncomfortable.

HOLDING CHILDREN. As mentioned in the chapter “Avoiding Blood Clots” never fall asleep while holding a baby or child in your lap. The increased weight will put pressure on your legs, and this in turn will squeeze the calf veins under your thighs, increasing the risk of a blood clot. Whenever, holding a child in your lap, have frequent moments of ‘freedom’ by standing up or moving around in your seat and exercising every ten minutes or so.

I.U.D. An intrauterine device can become dislodged during a flight due to gas expansion caused by cabin pressurisation. On arrival check the IUD, and if in doubt see a gynaecologist.

MEDICATION. Women air travellers who use medication to assist with sleeping or relaxation should be aware of the following: If there is any possibility that you could be pregnant, avoid using Dramamine, scopolamine ear patches, and any type of antihistamine. Research shows that such drugs can be passed to a baby in utero and result in birth defects. Remember this if you are taking medication for a cold or an allergy.

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MENSTRUATION. Your period can be made heavier if you fly on the first day of menstruation and this should be avoided if you can. Also, a time zone change can affect the menstrual cycle, particularly if you are a frequent flyer. Some women report that constant time zone changes cause irregular and more painful periods.

MISCARRIAGE. If you have miscarried before and you are flying while pregnant, be aware that a long haul flight in a pressurised cabin can precipitate a miscarriage. If you are in this situation, consult a gynaecologist before flying.

RADIATION & PREGNANCY.

You are also strongly urged to read the chapter titled “High Altitude Radiation Avoidance” because the unborn embryo can be affected by high altitude radiation. Here are the key points:

- Women who fly in the early stages of pregnancy can be at higher risk of miscarriage. As explained in the chapter “High Altitude Radiation Avoidance” high altitude radiation can expose passengers to harmful levels of free radicals. But pregnant women are particularly vulnerable.
- According to an Australian study, when you fly for several hours high altitude radiation gives your *whole* body the equivalent of an X-ray. Dr Francesca Naish who headed the study said that just one lower body X-ray could have an effect on miscarriage rates for up to three years. She said ‘*women in the early stages of*

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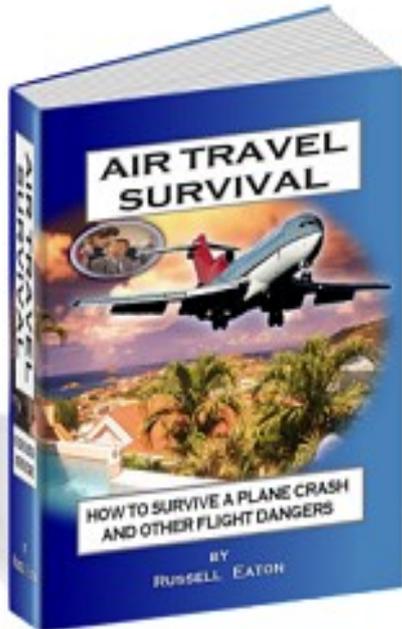
pregnancy were particularly vulnerable to radiation because that was when their baby's organ systems were developing. I would not recommend flying from three months before conception to three months after.'

(Source: Announcement of 17 April 2001 by Dr. Francesca Naish, The Jocelyn Centre For Natural Fertility Management, Australia, published in The Daily Mail, UK, 18 April 2001).

VARICOSE VEINS. Women with varicose veins should be aware that this makes them more susceptible to blood clots during flight. To combat this be sure to follow the advice given in "Avoiding Blood Clots" chapter. Also, take exercise during the flight as explained in the chapter "Dealing With Inflight Stress".

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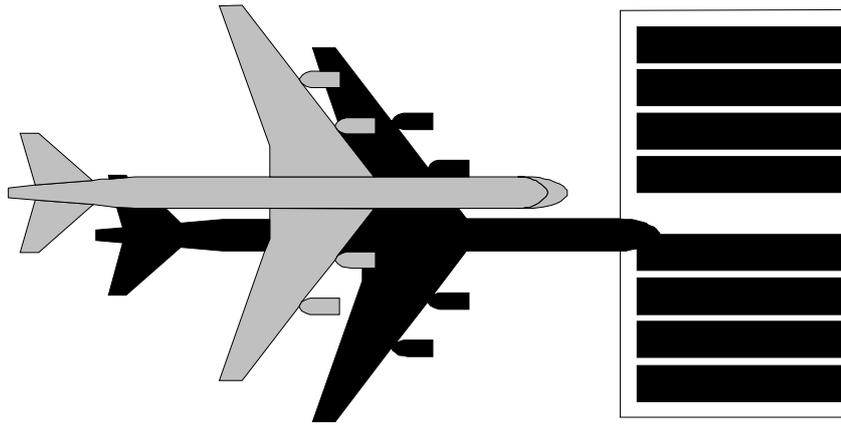
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Child Passengers

If not planned properly, flying with children can be frustrating, stressful, and even dangerous for the child. By taking certain precautions, however, the air trip can be a fun and rewarding experience for all concerned. What follows is a list of issues to consider and suggested solutions.

1. THE LAP CHILD

You need to decide in advance whether and how you plan to restrain your child in the airline seat. If your child is aged under two most airlines will allow the child to travel free (or 10% of cost) provided you carry the child in your lap while seated (referred to as a 'lap child'). The airline will usually give you a harness that secures the child to the standard lap belt that you will be wearing. Alternatively, you can buy and use your own baby harness. Here are two sources:

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1. 'Baby Bair' from www.americasbaby.com doubles as a harness and as a garment, and is approved by the FAA (US Federal Aviation Authority).
2. 'Baby Air flight Vest' from www.urchin.co.uk (Tel: 0870 7200709) acts as a harness and leaves the hands free. It is fully approved by the FAA.

DO NOT PUT YOUR OWN SEATBELT AROUND THE BABY. Always contact the airline you are travelling with and find out their policy for travelling with children. In particular, find out if they will provide you with a lap child harness free of charge, and make sure this is reserved for you in advance.

You can also consider taking a child restraint seat (CRS) with you, so that the baby does not have to sit in your lap all the time. In this situation you can either pay to have a seat next to you for the CRS, or you can take a gamble. The gamble is this: you can take a CRS with you, without having booked a seat next to you for the CRS. Then, when you check in, find out how full the plane will be. If not full, ask to be allowed to take the CRS on board in case you can use it in an empty seat next to you. If the answer is NO, or if the plane is full, you will have to let the CRS travel on the plane with you as 'unaccompanied luggage'. If the gamble pays off you don't pay extra for the seat next to you and you get to use the CRS. If the gamble doesn't pay off the child will have to stay on your lap during the journey and your CRS travels separately.

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2. CHILD RESTRAINTS

The FAA makes the following comments in regard to child restraints:

Although it is legal to carry children under two on your lap, the FAA strongly recommends that all children who fly, regardless of their age, be protected by an approved child restraint system (CRS) that is appropriate to the child's size and weight. Proper use of an approved child restraint system enhances child safety in the event of an accident. A CRS also provides protection for a child during turbulence.

Banned Child Restraint Systems

The FAA on June 4, 1996 issued a rule to ban the use of booster seats as well as harness and vest-type child restraint systems aboard all U.S. air carriers. Previously, the use of supplemental lap restraints (belly belts) was banned from use in aircraft.

Approved Child Restraint Systems

The National highway Traffic Safety Administration, which is responsible for approving child restraint systems for automobiles and aircraft issued a companion rule that would label approved child restraint systems as certified for use in motor vehicles and aircraft. Based on tests performed by the FAA's Civil Aeromedical Institute, the FAA recommends that:

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- *Children under 20 pounds (9.1 kilos) should be restrained in an approved rear facing CRS*
- *Children weighing 20 to 40 pounds (9.1 to 18.1 kilos) should be restrained in an approved forward facing CRS*
- *Children weighing over 40 pounds (18.1 kilos) should use the standard lap belt that is attached to all airline seats.*

For a complete list of safety recommendations for air travel with children, please call the FAA's consumer information hotline at 1-800-FAA-SURE (1-800-322-7873).

Planning Tips For Child Restraint Systems

(Source: Fly Smart Air Traveler's Checklist, Federal Aviation Administration, USA)

- *Check with the airline to find their busiest days and times. By avoiding these times you are more likely to be on a flight with an empty seat next to a parent. In many cases airlines will allow you to seat your child less than two years of age in a CRS (i.e. child seat certified for use in a car or aircraft known as Child Restraint System) in the empty seat at no extra charge. Note that you have to bring your own CRS. Ask your airline for its policy regarding an empty seat.*
- *Ask the airline if they offer a discounted fare for a child travelling in a CRS. When you buy a ticket*

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(whether it be discounted or full fare) for your child, you are guaranteed that they will have a seat and that you will be able to use the CRS.

- *If you purchase a ticket for your child, reserve adjoining seats. A CRS should be placed in a window seat so it will not block the escape path in an emergency. A CRS may not be placed in an exit row.*
- *Check the width of your CRS. While child seats vary in width, a CRS no wider than 16 inches (40.6 cm) should fit in most coach seats. A CRS wider than 16 inches (40.6 cm) is unlikely to fit. Even if the armrests are moved out of the way, a wide CRS will not fit properly into the frame of the aircraft seat.*
- *If you need to change planes to make a connecting flight, request that the airline arrange for assistance in your connecting city, particularly if you have to carry a CRS.*

The thing to realize is that airlines do not provide child restraint systems, except for a lap child harness which is usually loaned out free of charge. A lap child harness is simply a kind of belt that holds the child in your lap, fixed to the adult's regular lap belt. If you want your child to occupy a separate seat (instead of being on your lap all the time) you have two options:

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OPTION ONE: Allow the child to occupy its own seat in the normal way. Airlines typically give fare reductions for children aged 2 to 11, with discounts ranging from 33% to 50%.

OPTION TWO: Same as OPTION ONE, except that you can take aboard a CRS (child restraint seat). Since this will be your own CRS, airlines do not charge extra for using a CRS. So using a CRS makes no difference to the child's airfare. However, consider carefully the extra hassle of carrying a CRS on an air trip. According to the AirSafe Journal – Issue 1, most parents who take a CRS on an air trip only ever do it once. Consider the following:

The CRS will typically be some kind of car seat, and as such, it will be difficult to carry. Car child seats are not designed for frequent carrying, with no convenient handles or rollers. How will you carry the car seat in addition to your other luggage? How will you take the car seat to and from the airport? Will it fit properly into the airline seat? What about carrying the seat with you if you have to change planes? If traveling alone with the child how will you cope with your hand luggage plus child plus car seat when boarding and getting off the aircraft?

Because of the hassles of traveling with a CRS, most people tend to ignore official advice. In practice, most people use a lap child harness if the child is under two, or a

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regular airline seat if the child is over two. Also, realize that some airlines may not allow you to take a CRS aboard unless it is specifically designed for aircraft seating (enquire with the airline beforehand). In the USA the FAA promotes the use of safety seats, but until and unless it becomes a legal requirement you are advised to carry a copy of the FAA policy that states you have the right to place your child in a restraining device. Otherwise you run the risk that you will not be allowed to use your CRS whether or not it was designed for aircraft! You can get a copy of this FAA policy from Internet at www.faa.gov or by telephoning 800/322 7873.

Here is a summary of the child seat options available (see next page):

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See KEY A to F below table		
Age of child	Official advice	Alternative action
0 – 12 days	B	A
13 days – 2 years	B	C
Over 2 years and weight under 40 pounds (18.1 kilos)	D	E
Over 2 years and weight over 40 pounds (18.1 kilos)	F	F

Note: This publication is not urging you to take or not take the above alternative action. The purpose here is to give you the facts so that you can make an informed choice.

KEY:

A= Baby should not travel by air at all before 12 days of age. The air pockets in the lungs may not be fully expanded and the hypoxic atmosphere (i.e. pressurization) in the cabin may cause respiratory

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distress. For the same reasons, long haul flights with babies under 4 weeks are best avoided.

B= The child may travel free if using a child lap harness (straps that secure child to parent's lap belt). However, it is recommended that you bring your own car child seat instead of using a child lap harness. This will, of course, mean that you have to buy an additional separate airline seat (you may be able to obtain a child fare discount). Note that the child seat should be rear facing if the child weighs under 20 pounds (9.1 kilos).

C= Use child lap harness (straps that secure child to parent's lap belt). The airline will provide the child lap harness free of charge but you should reserve it. Alternatively, bring your own child lap harness by buying a commercial equivalent. The child must sit on parent's lap during journey if plane is full. However, if plane is not full, the cabin staff may on request allow the child to sit in an empty seat next to parent and use the airline lap belt as if an adult (this is more feasible with large two year olds). Alternatively, bring a child car seat (in addition to reserving a free child lap harness) in case the plane is not full. If plane is not full you may be allowed to take car seat into cabin and use it free of charge. If plane is full you will have to consign the car seat to go in the aircraft cargo bay.

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D= You must buy a separate airline seat as child is over 2 years old (you can usually obtain a child fare discount). It is recommended that you bring your own car child seat. Note that the child seat should be rear facing if the child weighs under 20 pounds (9.1 kilos).

E= You must buy a separate airline seat as child is over 2 years old (you can usually obtain a child fare discount). Whatever the child weighs, do not bother with a child seat. Instead, just let the child use the standard airline lap belt, as if an adult.

F= You must buy a separate airline seat as child is over 2 years old (you can usually obtain a child fare discount). The child must use the airline lap belt, as if an adult, if not using a child seat.

3. TOILETS. Aircraft toilets contain a variety of shelves, levers, and compartments that curious hands can get into. Never let unsupervised children under eight go into the toilets. Also, remember that children must never drink water from the taps in toilets as such water is not meant for drinking and may contain harmful germs such a cholera. For this reason always dry the child's hands *thoroughly* after washing in the toilet. Whenever you go to the toilet, consider taking the child with you (if young enough!) even if the child does not need to go. This gives the child a bit of exercise and a break in the monotony of the journey.

4. CABIN PRESSURIZATION. Children's ears are vulnerable to changes in cabin pressure during take off and

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landing. For children under 4 you can give them a dummy or pacifier as the chewing, sucking and swallowing will help to equalize the pressure and relieve sudden pressure changes. Older children can be given chewing gum or a sweet at these times. For children over 8 (and some adults!), have them clear their ears on descent by closing their mouths, pinching their nostrils, and swallowing.

5. DEHYDRATION. Children's bodies have higher percentage water content than adult bodies and are more sensitive to water loss. Because of dehydration caused by oxygen shortage and extra dry cabin air, it is important to give children small regular amounts of water. For babies, have a bottle of water available throughout the flight.

6. WANDERING OFF. Never let a child under 8 wander off on its own. An aircraft inflight can be a dangerous place for and unsupervised toddler and cabin attendants may be too busy to notice what is happening. There have been aircraft instances of young children falling down stairs, getting knocked over, getting trapped in toilets, and getting hurt by other children on board. In one incident a toddler who was allergic to nuts was given a chocolate with nuts to eat and became violently ill. If you are the only adult looking after the child and you wish to sleep, make sure you tie yourself to your child before you sleep. Take a 2-meter cord or length of rope with you specifically for this purpose (**caution: tie the child to you**

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only, do not tie the child to the seat as this could be dangerous).

7. AVOID GIVING AISLE SEAT TO CHILD. Young children like to reach out and move about, but if they are in an aisle seat they could get hurt as their arms get bumped into by passing people and serving trolleys. Ideally, two adults responsible for the child should sit either side. Alternatively, if there is only one adult, this adult should take the aisle seat with the child next to the adult.

8. EMERGENCY OXYGEN. If emergency oxygen masks are deployed, put yours on *first*, then help the child with their mask. This ensures that you don't pass out or get confused from lack of oxygen before helping your child.

9. KEEP CHILD BELTED UP AT ALL TIMES. Whichever kind of restraint you are using for your child, it should be kept on whenever occupying the seat (not just when seatbelt sign is on). Turbulence can happen at any time and without warning, so keep your child belted up at all times. However, if the seatbelt sign is off and your child wants to move around on the seat you can do two things: (i) loosen the restraint temporarily to allow this, and (ii) if the child wants to stand up in front of the seat, allow this under your constant supervision.

10. TOYS. Bring along one or two favorite toys, but avoid toys that are sharp, heavy, or that break easily. If the child has an electronic game, only allow its use during the

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cruise portions of the flight, as such games may interfere with the aircraft's navigational system at other times.

11. CHILD EMERGENCIES. Make sure you are aware of emergency procedures applicable to children:

- Before the flight inform the airline of any special needs or medical conditions applicable to the child. Then, during the flight inform the cabin attendants.
- Ask a cabin attendant if the aircraft has emergency equipment like life preservers specifically designed for small children.
- Pay attention to the standard preflight emergency briefing, particularly in aspects relating to children.

12. CARRY-ON LUGGAGE FOR CHILD. Take all essential things for the child in a separate cabin bag. Plan for every possible contingency. Assume the aircraft will be full, that the airline will not serve suitable food for the child, that the toilets will not have changing tables, that you will be delayed several hours on departure and on arrival, that any consigned luggage will be lost, that your child loses its back pack. Carry all the child's essentials, particularly any dietary or medical items.

13. CHILD AIRSICKNESS. Airsickness is caused when the sense of balance is affected (i.e. when the fluid in the middle ear is out of balance and causes a mismatch of signals between the inner ear and the eyes). Babies and toddlers tend not to be affected by airsickness because

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their balance systems are insufficiently developed. Airsickness in children is most common between the ages of eight to thirteen. Here are some tips to help prevent child airsickness (these tips also apply to adults):

- **EAT BEFOREHAND.** Don't travel on an empty stomach. Eat something 2 to 4 hours before the flight that contains both carbohydrates (for energy) and fat (which delays stomach emptying). For example, a pre-travel snack can be any of the following: a bowl of cereal with milk, a cheese sandwich, a full fat fruit yogurt, buttered toast and fresh fruit.
- **USE EARPLUGS.** Earplugs help to stop the fluid in the middle ear from getting out of balance (and, hence, prevent air sickness). They usually only need to be used on take-offs and landings when air pressure is suddenly changed. The best earplugs that we know of are called 'earplanes'. They have been tested by the US Navy and are specifically designed to make take-off and landing easier on the ear by regulating air pressure with their microscopic filters. **Earplanes** cost about US \$7 (UK £4) and can be purchased at drugstores and pharmacies in the USA and Europe.
- **LOOK STRAIGHT AHEAD.** Don't try to read during the flight if you are prone to airsickness. For the same reason, avoid electronic games. The child will be less prone to airsickness if he or she can sit high enough to see over the seat in front and stare at a

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fixed point further down the cabin. Watching in-flight movies can help as they may distract the mind from airsickness.

- **GINGER.** Many people swear that chewing ginger helps prevent airsickness. Ginger can be obtained as tablets, as ginger biscuits (cookies), and as crystallized ginger sweets.
- **WRIST BANDS.** Acupressure wristbands can help to ease nausea provided they are positioned on the wrists correctly. They may not work on young children who fiddle with them (but they won't cause any harm).
- **SLEEP OFTEN.** Let the child rest and sleep as much as possible (make sure child's thighs are not resting on seat edge when sleeping). (Note: To avoid blood clots, adults should never sleep on air flights unless lying flat). Eat little or nothing during the flight. Sip water often, but do not force yourself to drink water if feeling nauseas. Sometimes, walking up and down the aisle a couple of times can help reset the sense of balance and dispel airsickness. *Adults should never fall asleep with a child in the lap – the weight on the adult's thighs will restrict blood circulation in the legs, increasing the risk of a blood clot.*
- **TRAVEL SICKNESS TABLETS.** You can buy travel sickness tablets specifically for children. They are fast acting (within 30 – 50 minutes) and cause drowsiness. It is best to give such tablets to a child

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only if needed during the flight. Adults should avoid any kind of airsickness medication as it could hinder emergency survival action in the event of a plane crash.

- **FURTHER INFORMATION.** A good website on travel sickness can be found by going to: <http://www.gut-reaction.freeserve.co.uk/motion-sickness.htm>.

14. CHILD SEDATION. Travelling long haul with hyperactive children can be hell as many parents know. A good way of sedating a child during travel is to use Valerian. This is an alcohol-free extract from the passion flower. It is a natural sedative which is safe to give to children over the age of one, and there is no risk of side effects. Valerian extract is usually sold as tincture drops and is widely available wherever herbal remedies are sold. Alternatively, a search on Internet under 'Valerian' will reveal many suppliers.

15. CHILDREN TRAVELING ALONE. If your child is going to travel alone, extra planning is needed:

- Put an ID on the child, showing the child's name, emergency contact details, and warnings of special medical needs or allergies. Also add the name, address and telephone details of the child's destination. The ID can, for example, be put on a card with a ribbon over the child's head. It's also a good idea to give a photocopy of the child's birth certificate to the child in

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case the authorities require it. For International flights, the child's passport must be given to the airline escort.

- Ask the airline to escort the child onto the aircraft (airlines are used to this and will know what to do). Ask the escort to show the child how to summon a cabin attendant from the airline seat. Some airlines will allow the parent to escort their child aboard and then leave the aircraft. Make sure that the child's hand luggage or backpack is not too heavy.
- Make sure that the person escorting the child aboard tells the flight attendant that the child is traveling alone.
- Even though the child will be given in-flight food, it is still wise to give the child a sandwich or snack in case the child cannot eat the airline food. Also, consider packing a book or favorite game that is light enough for the child's backpack.
- Make it clear to the child that they should speak to a cabin attendant if they need anything or have any problems. Tell the child how to recognize a cabin attendant.
- If the child has to change planes, make arrangements for the child to be escorted between gates or between planes. This usually costs extra and is required for small children. For older children (even those old enough to do it on their own), an escort is

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recommended in case they cannot cope with the potential problems of a large and busy airport.

- Generally, children aged 5 to 11 pay the regular adult fare and can travel alone as unaccompanied minors. However, some airlines will not allow unaccompanied children if aged under 15, so check with the airline well before making arrangements. Children aged over 14 are considered as adults for airline travel purposes. Normally, unaccompanied children will not be allowed on flights with international connections, the last flight of the day, or standby flights. An adult guardian must be available at both ends of the flight.
- Give the child emergency money. Also make sure the child knows how to make a 'collect telephone call' (i.e. a call with reverse charges through the telephone operator). Take the child to a public telephone and rehearse the procedure a few days before departure.

15. OTHER TIPS: When you make your reservations try to avoid a full flight if possible. When choosing a seat location for you and your baby, if you are traveling economy go for a bulkhead seat (located behind the bulkhead that separates economy from first class) as this will give you extra space. If you have to change planes be sure to schedule enough time for the connection. Remember that flight attendants can warm food and bottles for you. It's a good idea to bring small snacks that your baby or child can nibble on and play with. Check in early

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so that you can get the baby settled before others board the plane. Consider taking a baby stroller (also known as a fold-up buggy) as you can take it into the cabin with you and it will be a godsend for walking about airport terminals. For babies, use an ultra-absorbent diaper (nappy) or use a double-diaper layer. When changing the baby on the plane you can use the fold down table in the toilet and use an airsickness bag for disposal.

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Appendix 1: Top Ten Airline Safety Tips

These are tips that are generally recommended by airlines:

1. Fly on Non-stop Routings

Most accidents occur during the takeoff, climb, descent, and landing phase of flights so flying non-stop would reduce exposure to these most accident prone phases of flight.

2. Choose Larger Aircraft

Currently, aircraft with more than 30 passenger seats were all designed and certified under the strictest regulations. Also, in the unlikely event of a serious accident, larger aircraft provide a better opportunity for passenger survival.

3. Pay Attention to the Pre-flight Briefing

Although the information seems repetitious, the locations of the closest emergency exits may be different depending on the aircraft that you fly on and the seat you are in.

4. Keep the Overhead Storage Bin Free of Heavy Articles

Overhead storage bins may not be able to hold very heavy

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objects during turbulence, so if you or another passenger have trouble lifting an article into the bin, have it stored elsewhere.

5. Keep Your Seat Belt Fastened While You are Seated

Keeping the belt on when you are seated provides that extra protection you might need if the plane hits unexpected turbulence.

6. Listen to the Flight Attendants

The primary reason flight attendants are on an aircraft is for safety, so if one of them asks you to do something like fasten your seat belt, do it first and ask questions later.

7. Don't Bring Any Hazardous Material

There are rather long lists of hazardous materials that are not allowed, but common sense should tell you that you shouldn't bring gasoline, corrosives, poisonous gases, and other such items on the aircraft unless they were allowed by the airline and shipped in a proper container.

8. Let the Flight Attendant Pour Your Hot Drinks

Flight attendants are trained to handle hot drinks like coffee or tea in a crowded aisle on a moving aircraft, so allow them to pour the drink and hand it to you.

1. Don't Drink Too Much

The atmosphere in an airliner cabin is pressurized to about the same altitude as Denver, USA (about one mile from sea level), so any alcohol you consume will affect you

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more strongly than at sea level. Moderation is a good policy at any altitude.

2. Keep Your Wits About You

In the unlikely event that you are involved in an emergency situation such as a precautionary emergency evacuation, follow the directions of the flight attendants and flight crew and exit the aircraft as quickly as possible.

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Appendix 2: Airline Q & A's

Shows *airline* answers to the most common questions

1. **Where is the safest place to sit on an airplane?**

The short answer is there is no safest seat. In an aircraft accident where the plane is seriously damaged or one or more occupants are injured or killed, the severity of the injuries depends on many factors, some of which may not be apparent until an accident occurs. For example, there have been many accidents involving heavy smoke or fire where survival depended on the ability of the passengers to not panic and to quickly remove themselves and others from the aircraft after landing.

2. **Which is the safest airline to fly?**

Clearly there are some major airlines such as Southwest of the USA, which have not had a passenger die in an accident and others such as Pan Am, and Eastern, which have had several fatal events. Those facts don't make one airline automatically safer

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than the other although it does affect the public's perception of safety. The most important indicator of the overall safety of an airline is how its nation's civil aviation authority regulates it. Airlines operating large capacity (over 30 seats) aircraft in the major industrialized countries have to follow the strictest safety regulations. While the airlines operating smaller capacity aircraft have the choice of operating under the same rules, these smaller aircraft are not certified to the same standards as larger ones. Just as importantly, the airports and air traffic control system have to adhere to similarly high standards. Beyond that, use your good common sense. If an airline is notorious for poor on-time performance, lots of passenger complaints, and severe financial problems, then perhaps it is time to find an alternative airline.

3. Which aircraft model is the safest?

In general, all aircraft in a particular class have to adhere to the same set of standards. When safety concerns arise because of one or more accidents associated with a particular model, the civil aviation authorities of the major industrialized countries will usually require that the issue be addressed in all relevant aircraft models. For example, fatal airline accidents due to wind shear in the 1970s and 1980s in the U.S. led to a number of innovations in aircraft and ground wind shear detection systems and also inflight

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crew training which has led to a reduction in the risk of accidents due to that weather phenomena.

4. What kind of emergency am I most likely to face?

For every accident, there are dozens, even hundreds of unusual circumstances that can happen during a flight. For a passenger, the most likely emergency that you will face (where you will have to do something) is an evacuation of the aircraft using the emergency slides or using the emergency oxygen system. In most cases, the evacuation is ordered as a precautionary measure, not because the passengers face imminent danger. Emergency oxygen masks may be deployed automatically or be deployed manually by the flight crew. In most cases, deployment of the masks does not indicate that the passengers are in imminent danger.

5. How should I prepare to face these two situations?

In the case of evacuation by the emergency slides, the best preparation is to be familiar with the location of the exits, be ready to follow the commands of the flight and cabin crew, and to wear slide friendly clothes. Specifically, high-heeled shoes may cause the slide to rip, so if you have them on, take them off before leaving your seat. In the case of deployment of emergency oxygen, your first priority is to put on your own mask. If the cabin is depressurised, you face the risk of loss of consciousness. Putting on your mask first decreases the risk of your passing out before

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having the opportunity to help your children or other passengers with their oxygen masks.

6. If the plane crashes, don't most people die?

One can argue this question several ways. Based on a review of accidents between 1978 and 1995 with at least one fatality to a passenger, there were a total of 164 fatal accidents involving large jet transports designed in Western Europe or the U.S. In 68 cases, all passengers died and in 15 others between 90% and 100% of the passengers died. In 37 cases less than 10% of the passengers died. Among propeller driven aircraft, there were 178 events involving aircraft designed outside of the former Soviet Union and Eastern Europe. Of those, all were killed in 108 cases, between 90% and 100% in six cases, and less than 10% in nine cases. These are the numbers, you decide.

7. Who decides on what changes are made for safety?

In general, the civil aviation authorities of several key countries, primarily the United States, the United Kingdom, and France, take the lead on making changes in areas such aircraft design, aircraft operation, and pilot training. Other major industrial nations have civil aviation authorities that have regulations and requirements similar to the leading countries. In the rest of the world, the International Civil Aviation Organization plays a similar influential role.

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8. Who investigates airline accidents?

In most cases, formal airline accident investigations are the responsibility of either the nation where the accident occurred or by the nation where the aircraft was registered. Depending on the accident, any number of organizations have a major role in the investigation. Typically in the United States, an accident in U.S. territory involving a U.S. registered aircraft would have the following groups directly involved in the accident investigation and analysis: the U.S. National Transportation Safety Board, the U.S. Federal Aviation Administration, the airline operating the accident aircraft, the aircraft manufacturer, and the engine manufacturer. If the accident involved sabotage or hijacking, the U.S. Federal Bureau of Investigation would also be involved.

9. Is flying getting safer or less safe today compared with 10 or 20 years ago?

In the last 15 years or so, the fatal accident rate for passenger aircraft has not significantly changed. What has changed is the *number* of flights performed around the world, more than doubling during that same time. While the rate has not changed that much, the increase in flight journeys means that the number of fatal accidents has been on the rise. If one measures safety by the accident rate, things have not changed much. If one measures safety by the number of accidents, media

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coverage, and public concern, then flying may seem less safe.

10. How often do airliners crash?

If one considers a crash to be a fatal accident as defined by the civil aviation authorities, then it happens infrequently. According to the U.S. National Transportation Safety Board, in the 11 years spanning 1984 to 1994, there were 49 fatal accidents involving U.S. operators of large capacity (over 30 passenger seats) air carrier aircraft. There was a minimum of one fatal accident in the years 1983 and 1984, and a maximum of 11 in 1989. The fewest people killed in one year was in 1993 (one fatality), and the most was in 1985 (526 fatalities). For smaller U.S. registered aircraft in scheduled service, there were 59 fatal accidents involving fatalities and the fatal accident rate per million flights was always greater than that of the larger aircraft.

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Appendix 3: Top ten things airlines should do

These are the things airlines should do to make air travel safer (listed alphabetically):

- 1. CHANGE THE AIRCRAFT VENTILATION FILTERS EVERY 1,000 HOURS.** Cabin air quickly gets polluted with viruses, bacteria, engine fumes, and harmful chemicals because up to 50% of the air is recycled. As a result, the aircraft filters get clogged up with black, messy pollution and should be changed after every 1,000 hours of flight time (rather than after 1,500 or 2,000 hours, which is common practice). Also, airlines should always use ‘best quality’ air filters that trap 99% of impurities instead of the typical 50% that most airlines use to save money.
- 2. FIT AIR BAGS TO PROTECT PASSENGERS IN A SEATED POSITION.** Air bag technology is now quite advanced, and this technology can easily be transferred from the car industry to the aviation industry. The extra weight is fairly minimal, and the

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cost is also minimal if incorporated into the manufacture of airline seats. Some airlines have started to fit air bags to seat lap belts, so there is hope.

3. SET ALTITUDE CONTROL AT 3,000 FEET.

Airlines normally set the cabin altitude control at 6000 or 8000 feet. This makes the air extremely dry and short of oxygen, causing discomfort and illness to passengers. Airlines can easily fly at, say, 35,000 feet instead of 38,000 feet, thus allowing the cabin altitude control to be set at 3,000 instead of 6,000 feet. The small difference from 6,000 to 3,000 ft. makes a very big difference to the quality and comfort of the cabin air.

4. FORBID LOOSE CARRY-ON OBJECTS.

Overhead bins tend to burst open or collapse on impact, sending heavy or dangerous missiles flying around the cabin, injuring passengers or blocking exits. Make it a requirement that nobody can go aboard if carrying loose objects (e.g. bottles of alcohol, books, airport purchases, cameras, etc.). All such items must be contained inside any kind of carry-on bag that is closable with a strap, zip, or buckle. Passengers should never be allowed to put loose objects in overhead bins unless they are contained inside *closed* bags in the bins. Create one reinforced bin for 'errant' passengers who cannot store items in this manner.

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Only exceptions to be certain soft items such as: garments, jackets, coats, soft hats, and the like.

5. **INSTALL AIR PURITY MONITORS.** Install air-monitoring equipment on all commercial airlines and publish the results on Internet. Also, agree a worldwide standard that forbids airlines from recycling more than 30% of the air. This would make a big difference to the purity and freshness of cabin air, and would benefit crewmembers as much as passengers.
6. **PROVIDE SMOKE HOODS.** Fit smoke hoods to the outside of life vests (using some kind of Velcro pocket). Smoke is a big killer in aircraft accidents. The extra cost and weight is negligible.
7. **RADIATION MONITORS.** All airlines should carry high altitude radiation monitors (a kind of 'black box' that records radiation levels by journey). Publish the radiation recordings on Internet so that experts can analyse the levels of radiation and produce league tables. This will force airlines to take measures to keep high altitude radiation risks to a minimum for the travelling public.
8. **SELL AVIATION RESPIRATOR MASKS ON BOARD.** Airlines do not like to admit that cabin air gets horribly polluted and stale. At the very least, aviation respirator masks should be made available on board as a purchasable item. Such masks cost little

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and are very effective at filtering out over 95% of bugs and other pollution.

9. SOLAR FLARE WARNINGS. Airlines should provide a free *solar flare warning service* at all their check in desks and be willing to offer an alternative flight to any passenger who does not want to travel because of a solar flare warning exceeding a given limit. Solar flares are not very common, but when they occur, they can give passengers a serious dose of harmful radiation at high altitude.

10. STOP SELLING DUTY-FREE SPIRITS ON BOARD. This will help to reduce drunkenness and the risk of air rage incidents. It will also make the cabin environment safer by eliminating the storage of loose bottles (purchased aboard) in overhead bins. Furthermore, they are breakable and flammable in the event of a plane crash.

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Epilogue

With airline passenger traffic becoming ever greater (plus the threat of terrorism in the world today) the chances of being involved in some kind of air calamity or flight illness and injury is no longer a remote possibility. The environment aboard a modern jet airliner can easily seduce travelers into a false sense of security from which we need to be on our guard. Whether or not you travel very often, I hope that *Air Travel Safety Secrets* will make your airline trips more enjoyable and safer.

Naturally, the biggest cause of anxiety for most airline passengers tends to be the fear of an aircraft calamity. This is best dealt with by being as prepared as possible for the journey and by taking sensible precautions. This is less onerous than it sounds. Once you know what to do you will have a “template” so to speak. Then each time you travel by air you will automatically be prepared.

This book has explained several simple precautionary measures you can take when traveling by air, such as how to avoid a blood clot, the importance of having sufficient bottled water to drink, and so on. A lot depends on your

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state of health at the time of travel, your gender, length and route of trip, whether traveling with children and so on.

But you also need to be prepared for the possibility of an aircraft calamity by knowing how to avoid injury and death in the event of an air crash or hard landing, how to escape safely from a smoke-filled cabin, how to avoid whiplash and concussion, and how to know the locations of the safest seats.

By knowing these things you will fly with greater confidence and suffer less stress *whether or not* you are ever faced with an aircraft calamity.

Therefore, to compliment this book, our publication [*Air Travel Survival*](#) is available. It tells you exactly how to avoid injury and death in the event of a serious aircraft incident. For the first time ever, [*Air Travel Survival*](#) reveals a unique emergency brace position that is far superior to the one advocated by airlines. It is simple to apply and this invaluable knowledge will stay with you for life.

[*Air Travel Survival*](#) is truly a “must read” for anybody who travels by air and I urge you to get this book – it’s the ultimate survival aid for any airline passenger. To find out more go to www.airtravelsurvival.com.

Please do contact the publisher with any information and suggestions for improving and updating the contents of this book *Air Travel Safety Secrets*. Any comments are welcome. Please email the publisher at:

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