Once again on a recent night flight to Hong Kong, I found myself persistently disturbed by a co-passenger, who kept getting up to go for a walk. She apologised and confessed that she was terrified of developing a blood clot. In light of much press coverage, which has both educated and terrified passengers about economy class syndrome, it's not surprising people are taking heed.

In October 2003 doctors in the U.K. ruled that the death of airline passenger and bride-to-be, Emma Christofferson had been caused by deep vein thrombosis, a condition that can be precipitated by sitting in cramped spaces such as airline seats on long haul flights. Deep-vein thrombosis, or the formation of a blood clot, has been dubbed "economy class syndrome" because it results from long hours of minimal movement or cramped conditions - an all-too-familiar experience for airline passengers jammed into the increasingly small seats in the back of the plane. The immobility can trigger a blood clot in the leg which may break off and travel to the heart or lungs. Sudden death is a possibility.

Although everyone has a slight risk of a DVT, it is important to identify if you are at 'higher-risk' of developing one. However there is no reason why even the highest-risk passengers cannot fly if the necessary precautions are taken. A whole range of factors increase the risk of DVT. These include smoking, taking the Pill, hormone replacement therapy, obesity and pregnancy.

People at high risk are the elderly, tall people and those with varicose veins or cancer. Those with a history of leg clots, recent surgery or a leg injury are at particular risk. There are of course genetic risk factors that can come into play and a small proportion of the population is genetically predisposed to developing blood clots in the leg. When combined with environmental risk factors such as having surgery or being cramped up a clot can develop. While there are genetic tests to see if you have these risk genes, they are expensive and not accurate predictors. Passengers with any concerns should seek medical advice, particularly if there is a family history.

Long periods of immobility prevent the calf muscles squeezing blood away from the legs, made worse whether the set edge can press on the vein behind the knee. If the blood moves too slowly, clots may form in the veins. If these clots are not broken down quickly, they can become dislodged and travel to the lungs which can be fatal.

DVT was first highlighted in 1954 when a doctor developed a clot after a 14-hour flight. Little appeared in the press for the next 30 years with thrombosis caused by flying almost being unheard of. If it has been around for so long why didn't we know about it before?

The term "economy class syndrome" was coined by two researchers but in truth it is incorrect since it can occur after any being motionless or in a cramped condition. Similar conditions to air travel were experienced in air raid shelters during the Blitz when it was noted that there was a six-fold increase in the risk of pulmonary embolism. The same kind of immobility today affects lorry drivers, taxi drivers, and tourists travelling long distances on trains and coaches and in cars.

When former Vice President Dan Quayle was treated for a blood clot that reached his lungs in 1994, doctors suspected long plane rides were the source. And he wasn't a regular in the back of the plane!

About 1% of long-distance air travellers are likely to suffer symptoms caused by "economy class syndrome", and symptomless DVT may occur in up to 10% of long-haul fliers. Deep vein thrombosis claims the life of at least one airline passenger a month at Heathrow from a blood clot within minutes of landing at Heathrow - Britain's biggest
airport, Research by the Aviation Health Institute has found that, out of the 85 DVT related deaths in the past three years, one in five occurred after a short-haul flight. The Institute estimates that 30,000 Britons may be affected by flight-induced blood clots every year. Many die within minutes of landing at the airport, says Dr John Belstead, a consultant at Ashford hospital, Middlesex.

Experts are divided about the extent to which air travel heightens the danger of deep-vein thrombosis. The risk is attributed predominantly to immobility, although other factors such as low oxygen tension, low humidity, low cabin pressure and excessive consumption of coffee and alcohol also contribute through venous stasis and dehydration.

A UK parliamentary committee has recommended that airlines should warn passengers of the health risks associated with long-distance flights.

BA was first to introduce education and advises its passengers to exercise during flights to improve circulation by moving their legs and feet. BA like many other airlines believes that the condition is not specifically linked to flying and can occur anywhere where people are immobile for lengthy periods, but say they want passengers to be fully informed on what they can do to minimise the risk.

Now many more carriers do offer advice and some run in-flight aerobics videos on long-haul flights, Virtually all the major carriers now recommend passengers to get up and stretch and drink water every two hours.

Despite the publicity many passengers don't know about the simple steps they can take to reduce their chances of suffering from blood clots and their potentially fatal complications. The key factor is remaining immobile for long periods of time. It does not matter if this is on an aircraft or a coach or in a car. You need to stretch and move.

**Compression stockings**

Full length compression stockings, have been shown to be beneficial and can reduce the risk of thrombosis. They are now available in below knee lengths for the lower risk traveller and look and feels great.

This stockings are designed to improve the flow of blood in the legs back to the heart. Compression hosiery is knitted in a variety of regular materials: nylon, nylon and cotton, cotton only, etc. Unique to these stockings is the addition of elastic thread that works to apply a precise amount of pressure to defined areas of the leg. Compression stockings exert maximum pressure at the ankles and gradually reduce that pressure up the length of the stocking. This graduated compression gently squeezes blood from the veins near the skin into the deeper veins and so back into the upper body and heart. This prevents blood from pooling in the leg veins.

Graduated compression hosiery is available in various compression categories or strengths, each designed for specific conditions and rated by the amount of pressure applied at the ankle and measured in millimetres of Mercury (mmHg). “mmHg” is an industry-wide standard.

Generally, men's over-the-calf socks or women’s below-the-knee or sheer stockings will cover the critical part of the legs where DVT most often develops. For those with existing leg problems or venous disease, it may be advisable to consult a physician to determine if a longer style product would provide more protection.
For protection from Deep Vein Thrombosis, hosiery rated at 15 to 20 mmHg is routinely recommended.

While there is no guarantee that any support socks can prevent economy class syndrome (DVT or embolism) from occurring during an airline flight (no product can make such a guarantee), so always follow as many of the avoidance tips as you can.

### Medications for helping prevent DVT

For travellers at higher-risk of DVT, there are extra steps you can take to reduce the risk of developing a blood clot. In some cases, but only after medical advice, you could start an anti-clotting drugs which thins the blood. The definitive treatment is to thin the blood, but this has risks and should only be undertaken following medical advice. Two common such thinning medicines are Warfarin and Heparin. Asprin, in low dose for three days before flying has been advocated by many experts but again this can have unwanted side effects such as a bleeding tendency, and gastric irritation. More recently there have come onto the market various herbal and hopefully safer, treatments, some of which have undergone clinical trials.

The newly developed Flite Tab is a combined supplement of kinotase, a Japanese ferment-d soya bean extract and Pycnogenol made from the bark of marine pine treeS found on the south-west coast of France. A recent clinical trial has shown this combination to be effective in preventing flight related thrombosis. The kinotase helps prevent DVT by having an anticoagulant effect on the blood, while pycnogenol has an anti-inflammatory effect on the blood vessels in the leg. In a study conducted by DVT specialist Professor Gianni Belcaro at the G. d'Annunzio University in Pescara, Italy, in conjunction with Ealing Hospital in West London, the Flite Tab was shown to be more effective than aspirin in preventing DVT.

The Flite Tab works within two hours of being taken, so passengers can swallow two pills once in the departure lounge and they will be working in time for their flight. For those passengers who refuse to wear compression stockings and do not want to take traditional medicines may find this welcome news as something specific and convenient people to take. Pycnogenol pills can be bought at Holland and Barrett or by going to [www.hollandandbarret.com](http://www.hollandandbarret.com). while Flite-Tabs are available from Nutripharm and costs. The company recommends four tablets are taken per long haul flight: two are taken two hours before the flight and then two more are taken six hours later.

### Tomato extract

British research has revealed that tomatoes contain a particular extract that can be dissolved in water, and seems to inhibit the activity of the body's clotting cells, called platelets. However, you would need to eat huge quantities of tomatoes to get the benefits. Instead, researchers have harvested the blood-thinning component which can be added to soft drinks. The extract is called CardioFlow, it has been tested on more than 100 volunteers, with 80 per cent showing reduced clotting activity in the blood. Bigger trials are underway, to see how effective it might be, and the drink is expected to be available in supermarkets by the end of this year. It hoped airlines will eventually stock the juice on all long-haul flights, to help reduce the dangers of deep-vein thrombosis (DVT).
CardioFlow starts to work after an hour and seems to have maximum impact three hours after being swallowed. But the effects may last up to 18 hours.

For more information go to [www.provexis.com](http://www.provexis.com)

Personally I would not suggest that you throwaway their flight socks yet, and speak to your doctor before taking any tablets. But remember whilst anyone can theoretically develop clots, only a very small percentage of the population develop deep vein thrombosis (DVT). What’s more thrombosis is mostly only an issue if you are flying for four or more hours.

Since we all have to travel the important thing is to be aware, understand your risk, seek appropriate specialist opinion and follow the advice given.

**Pregnant travellers**

Pregnancy puts a an extra special strain on the circulatory system that can leave you susceptible to thrombosis (blood clots) and varicose veins. Flying during pregnancy increases your risk even more. When flying, particularly if you are prone to varicose veins, wearing support stockings when you fly will help keep your circulation moving and relieve swollen veins. For maximum benefit, put on support stockings while you’re still lying down before you get out of bed in the morning and keep them on all day.

There is a slightly increased risk of developing deep vein thrombosis during pregnancy aug just after delivery. Although a link with DVT and long distance travel is still not confirmed, pregnant women should take extra precaution to prevent blood clotting on long journeys. The advice is the same as for all travellers but the is extra special need to consider using support socks for a long journey (these should be measured to fit correctly). The below knee variety are probably more comfortable unless you have varicose veins at the back of your knee. If you have other risk factors for deep vein thrombosis, specialist advice should be sought.

Most airlines will not allow pregnant travellers who are more than 36 weeks along to fly - and they may require a medical certificate of fitness to travel from the 28th week onwards. There are no accurate figures on the risk of travelrelated venous thrombosis in pregnancy. However, logic would suggest that the risk is increased so make sure that they walk, if possible, while on the plane.

The House of Lords Science and Technology Committee’s recent report on air travel and health ([www.parliament.uk/parliamentary-research-offices/parliamentary-research-office-2011012712112101.htm](http://www.parliament.uk/parliamentary-research-offices/parliamentary-research-office-2011012712112101.htm)) recommended that all pregnant women take preflight low-dose aspirin as advised by a doctor. However, the Committee had input from only a small number of experts, and their recommendations were not evidence-based.

In pregnancy, long-haul flights are those over three hours’ duration, excluding taxiing and waiting. Pregnant women are recommended to wear properly fitting elastic compression stockings for long-haul flights or for all flights if
they have additional risk factors. Stockings can be obtained over the counter from a number of manufacturers. Some manufacturers market compression stockings specifically for flight, e.g. Scholl’s Flight Sockss (www.scholl-flightsocks.co.uk), which are said to provide slightly less than class I compression (10mmHg). Many companies also provide compression stockings suitable for maternity wear (e.g. www.yeoman.org.uk).

There is currently no indication for the ‘healthy’ pregnant woman traveller to be reviewed by a medical practitioner or to take any pharmaceutical preventative medicines, if the above advice is followed.

The Aviation Health Institute, is a UK charity that promotes health and the well being of airline passengers worldwide. More info at www.aviation-health.org.

Dr Saggar is a Consultant in Clinical Genetics and General Physician in a major London Teaching Hospital. His responsibilities include seeing patients with a family history of thrombosis.