

**MEDICAL GUIDELINES**  
**FOR**  
**AIRLINE PASSENGERS**

**AEROSPACE MEDICAL ASSOCIATION**  
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## **Introduction**

Approximately 1 billion people travel each year by air on the many domestic and international airlines. On U.S. air carriers alone, it has been predicted that in the coming two decades, the number of passengers will double. A global increase in air travel, as well as a growing aged population in many countries, makes it reasonable to assume that there will be a significant increase in older passengers and passengers with illness.

Because of a growing interest by the public of health issues associated with commercial flying, the Aerospace Medical Association prepared this monograph for interested air travelers. It is informational only and should not be interpreted by the reader as prescriptive. If the traveler has any questions about fitness to fly, it is recommended that he or she consult a physician. The authors sincerely hope that this publication will educate the traveler and contribute to safe and comfortable flight for passengers.

## **Stresses of Flight**

Modern commercial aircraft are very safe and, in most cases, reasonably comfortable. However, all flights, short and long haul, impose stresses on all passengers. Preflight, these include airport tumult (e.g., carrying baggage, walking long distances, and flight delays). Inflight stresses include lowered barometric and oxygen pressure, noise and vibration (including turbulence), cigarette smoking (banned on most airlines today), erratic temperatures, low humidity, jet lag, and cramped seating. Nevertheless, healthy passengers endure these stresses which, for the most part, are quickly forgotten once the destination is reached. In general, passengers with stable medical conditions usually arrive at the destination airport none the worse. However, there is always the potential that some passengers, particularly those with unstable illness, may become ill during or postflight due to these stresses. A brief review of these stresses follows.

The primary difference between the aircraft environment and the ground environment relates to the atmosphere. Contrary to popular belief, modern aircraft are not pressurized to sea level pressure. Indeed, on most flights the cabin altitude will be between 6,000 and 8,000 ft. (1,828m and 2,438m) even though the aircraft is flying at much higher altitudes. In other words, on most flights, it is as if you are on top of a hill or small mountain. This imposes two stresses on the body: less oxygen; and, expansion of gases in the body cavities.

First, with a reduced barometric pressure, there is a decrease in oxygen pressure. However, because of the characteristics of hemoglobin, the chemical in the blood that carries oxygen throughout the body, it remains 90% saturated with oxygen even at the cruising cabin altitude. (At sea level it is about 97% saturated.) Although most passengers can normally compensate for this small

decrease in saturation, this may not be true for individuals with heart, lung, or certain blood diseases.

Furthermore, an increase in cabin altitude will cause gases in our body cavities (abdomen, middle ear behind the ear drum, sinuses) to expand as much as 25%. This can cause problems in the abdomen (bloating or stomach cramps), ears (a crackling sensation or ear block), and respiratory tract/sinuses that will be described later.

Although there is always some degree of vibration and aircraft turbulence, it is usually very mild. Nevertheless, passengers are always well advised to keep their seat belts secured because there is always the chance of moderate or severe turbulence that could cause injury. Severe turbulence is sometimes unpredictable and may be encountered even on clear days in excellent weather.

The hazards of cigarette smoking, active and passive, are well known and need not be recounted here. Unfortunately, some airlines still permit it although the trend is in the opposite direction. There is a worldwide movement to ban inflight smoking with the International Civil Aviation Organization (ICAO) asking all member states to comply. On U.S. air carriers, smoking is prohibited on all flights. As a result, there has been a vast improvement in cabin air quality and thus passenger comfort.

Today's airplanes have very low cabin humidity, usually ranging from 5-15%. This is unavoidable because air is drawn into the cabin from the outside and at high altitude it is completely devoid of moisture. As a result, there can be a drying effect on airway passages, the eyes (particularly under contact lenses), and the skin. However, the body's protective mechanisms prevent dehydration and there is no harm to health.

Jet lag occurs when crossing multiple time zones. Our body clock, which controls hormone levels, is synchronized to the day/night cycle where we started. When we travel long distances in a matter of hours, we will arrive in another time zone, yet our body is still functioning as if it were in the time zone at the point of origin. This results in symptoms, such as fatigue and sleep disturbances that are well known to travelers. Crossing time zones may not only be an annoyance for well passengers, but it can also complicate the timing of medication dosages such as insulin (See Jet Lag and Diabetes sections).

On most flights, regardless of aircraft type, some passengers may be seated in a small, cramped space. This can be uncomfortable and it also reduces the opportunity to get up, stretch, and walk about the cabin. Sitting for long periods is tolerable for most passengers, but for some there is the potential for ankle swelling, cramps, and other circulatory problems. Of particular concern is blood clot formation causing deep venous thrombosis, although there is no

evidence that this condition is caused by cramped seating. (See Deep Venous Thrombosis section.)

## **Medical Evaluation**

As stated above, the vast majority of travelers can fly quite safely. If a passenger has significant preexisting illness or an unstable medical condition, a physician should be consulted before planning to travel by air. This is particularly true for those with heart or lung disease including angina pectoris, congestive heart failure, myocardial infarction (heart attack), asthma, and emphysema. Other significant illnesses would include a history of deep venous thrombosis (blood clots), seizure disorder, stroke, and diabetes. In such cases, your physician might want to do a preflight evaluation. Vaccination and other travel health requirements should also be checked well in advance of travel abroad.

If the physician has fully reviewed the prospective traveler's condition and there is any question regarding the suitability to fly or any special requests for assistance, the airline should be contacted well ahead of travel.

## **Airline Special Services**

With increased attention to passengers with disabilities, many special services are offered on major air carriers. For example, special meals are generally available. In addition, wheel chairs and trolley service within the airport can be requested. Finally, early boarding is usually available to passengers with ambulatory difficulties.

As more passengers use air travel for business or leisure purposes, a growing demand for inflight medical oxygen can be expected. Some airlines will provide oxygen (for a fee), while others will not. The availability and costs will vary from airline to airline worldwide, each subject to its own national and company policies. Hence, passengers who require medical oxygen should contact the airline as far in advance of their journey as possible in order to make proper arrangements. Passengers should be cautioned that those airlines that do provide oxygen usually only do so inflight. If oxygen is also required in the airport preflight or while waiting for connections, arrangements can sometimes be made with oxygen vendors. Therefore, a traveler cannot always count on having oxygen continuously available from point of origin to destination.

Passengers must also be aware that in many countries, airlines volunteering to provide this service are required to provide the oxygen for safety and security purposes. Passengers are prohibited from bringing on board their own oxygen supply procured from an outside source. Use of the emergency drop-down masks for medical oxygen is also prohibited by most airlines, as these are only to be used for inflight emergencies, such as loss of cabin pressurization.

(Some airlines do carry a very limited supply of oxygen for use in the event of an unexpected inflight medical emergency.)

With respect to use of stretchers for ill passengers, each airline has its own policy. Those that provide this service may require the purchase of as many as eight seats and that an attendant travel with the passenger. Most airlines, if not all, require use of their own stretchers in order to conform with regulatory safety specifications.

## **Inflight Medical Care**

Every airline in the world has some capability to render emergency medical care inflight. All have medical kits of varying sophistication and flight attendants with varying training who should be capable of rendering first-aid and basic cardiopulmonary resuscitation (CPR). Policy regarding contents of the medical kit, training of the crew, and treatment of passengers is at the discretion of each nation and its airline(s). U.S. commercial carriers operating under Federal Aviation Administration (FAA) regulations carry a required first-aid kit and a medical kit (with a small number of medications). On international flights, an expanded medical kit may be available with additional medications. It cannot be overemphasized that these medical kits are only for emergency use and not for routine medical care.

Defibrillators (AEDs) form part of the chain of treatment of cardiac arrest. They will be required on all U.S. air carriers by July, 2004. (Many airlines are already carrying AEDs.) A growing number of airlines around the world are also already carrying onboard AEDs to treat passengers who develop cardiac arrest.

Commercial air carriers train their flight attendants to recognize common symptoms of distress and to respond to medical emergencies with first-aid, basic resuscitation techniques, and the use of emergency medical oxygen. The cabin crews may ask for assistance from onboard medical providers and will release the medical kit to providers with appropriate credentials.

In those circumstances when a medical provider is not available, many commercial carriers have the capability to contact emergency medical support through air-to-ground communications. The ground medical support may be provided through airline personnel or by contract to a medical consultant. In this way, medical guidance may be relayed to the onboard physician or cabin crew. On occasion, a seriously ill passenger necessitates the need to divert to an alternate airport for an unscheduled landing. Some carriers maintain a database of medical facilities available at a variety of domestic and international landing sites and can recommend the nearest appropriate emergency facility. The carrier will usually arrange for medical support to meet the aircraft on landing.

Although there are no established databases providing information on the frequency of inflight medical emergencies or deaths, various studies indicate they are uncommon, especially in the context of the millions of passengers who fly annually. Nevertheless, the airlines are mindful of the potential for inflight illness and are taking reasonable precautions.

## **Infectious Diseases**

Because the aircraft cabin is a confined space and flights may be of many hours duration, there is the risk of a contagious disease being passed from one passenger to another. This can occur when an infected passenger releases organisms into the air by breathing, coughing or sneezing. The risk of such person-to-person contact of course is much greater for those passengers sitting next to or very near the passenger with the illness. Therefore, the risk of transmission of illness in an aircraft is no different from in any confined space including a room, office, train, or bus.

There is no evidence that organisms pass from one person to another through the aircraft ventilation system. Although in newer aircraft 50% of the air in the cabin is recirculated (the other 50% is outside air), it passes through highly efficient filters that remove bacteria, fungi, and most viruses.

Passengers are further protected because of the design features of the ventilation system. Inflow and outflow ducts are located in every row (in the ceiling and floor) thereby avoiding the mixing of air throughout the cabin. This is called radial air flow. Therefore, if a passenger does have a contagious disease, only passengers in the immediate vicinity would potentially be at risk. Other passengers would be protected because of effective filtration and radial air flow of the ventilation system.

Nevertheless, there have been some incidents of disease transmission inflight. These include the flu, measles, and tuberculosis (TB). All were thought due to person-to-person transmission. Because the airlines cannot be expected to screen passengers for illness, the best prevention is postponement of air travel for anyone with a contagious disease, particularly a serious one such as TB. Therefore, out of consideration for others, passengers with illness should defer travel in any mode of public transport until well. If there is any question, a physician should be consulted.

## **Cabin Air Quality**

Today's modern aircraft require fuels, hydraulic fluids, oils, and other chemicals in order to operate. Most of these chemicals can cause a wide array of symptoms if exposures are in high enough concentrations for a long enough time. Because passengers and crew have complained of symptoms that they

attribute to these substances, a number of studies have been conducted over the past 10-15 years.

In general, these studies have consistently revealed levels of organic substances, carbon monoxide, carbon dioxide, and airborne particles in the cabin air well below regulatory standards and below those encountered in offices, the street, or subway.

One exception is ozone, a substance found naturally in the atmosphere at altitudes where most commercial aircraft fly. It enters the cabin with outside air that is used for cabin ventilation. Ozone is a respiratory system irritant and can cause chest tightness, coughing, and shortness of breath if exposure occurs at high enough concentrations. In general, low levels have been found in aircraft cabins although, in several instances, levels were measured slightly exceeding regulatory standards. Most aircraft flying at altitudes and latitudes where high ozone concentrations are encountered now have ozone converters which break down the ozone before it reaches the cabin.

In summary, studies to date show no evidence that aircraft cabin air quality is unhealthy nor is there any epidemiological evidence linking cabin air quality with illness.

## **Deep Venous Thrombosis (Blood Clots)**

As a result of expanding worldwide air travel, hospitals close to international airports occasionally receive patients with symptoms typical of deep venous thrombosis (DVT) that may have started before flight, inflight, on arrival, or even days after arrival. This is a blood clot, usually in the leg, that can cause pain and swelling. Clots in the legs are not serious in themselves, but occasionally they break off and travel to the lungs (called pulmonary embolism) causing chest pain and shortness of breath. This is not a common occurrence, but when it does happen, it can be life threatening. One of the causes of DVT is believed to be prolonged immobilization, such as sitting for many hours at a time, particularly in an individual with preexisting risk factors.

Prolonged immobilization can occur not only in an airplane, but also in a car, train, or bus (or in an office or theater for that matter). There is no scientific evidence of a particular link with air travel itself. Consequently, the illness is best referred to as traveler's thrombosis.

It should be understood that passengers may be immobilized for long periods whether in economy, business, or first-class sections. Although healthy individuals may develop DVT, those with underlying risk factors such as cancer, coronary artery disease, certain blood diseases, a history of blood clot formation, and pregnancy are at higher risk.

In order to minimize the risk of traveler's thrombosis, the following is recommended for all travelers:

- Do not place baggage underneath the seat in front of you because that reduces the ability to move the legs.
- Exercise the legs by flexing and extending the ankles at regular intervals while seated.
- Walk about the cabin periodically on longer duration flights and when flight conditions permit.
- Do not sleep in a cramped position and avoid the use of sleep aids.
- Drink adequate amounts of water and fruit juices to maintain good hydration. Avoid or minimize dehydrating drinks such as alcohol or caffeinated beverages.

If there are risk factors as mentioned above, other preventive measures as well should be considered for you by your physician. This might include compression stockings and/or anticoagulant (blood thinners) medication.

## **Obstetrics And Pediatrics**

The commercial aircraft environment is not generally considered hazardous to the normal pregnancy. Furthermore, there are no data to suggest that the commercial flight environment increases miscarriage risk. At normal operating altitudes, there is adequate oxygen for the pregnant traveler as well as her fetus.

However, certain precautions are advisable. With increasing altitude, there is gas expansion in the abdomen that could cause discomfort such as bloating. For this reason, it is prudent to avoid gas producing foods a few days before a scheduled flight. In addition, air travel can cause motion sickness. Consequently, the nausea and vomiting that occasionally occur in early pregnancy may be increased during flight. The managing physician may prescribe medication for those with such difficulties.

Aircraft often encounter turbulent air, sometimes unexpectedly. Pregnant travelers, therefore, should keep their seat belts fastened continuously while seated. The belt should be worn snugly over the pelvis or upper thighs, thus reducing the potential for injury of abdominal contents. Walking about the cabin inflight should be done with some caution to avoid falling or injury.

As described in the Deep Venous Thrombosis section, pregnancy is a risk factor for blood clots. Therefore, it is particularly vital that pregnant passengers exercise the lower limbs and walk (with extra care) about the cabin every hour or two. Tight clothing is to be avoided; however, support stockings and comfortable supporting shoes would be helpful. It may also be beneficial to request an aisle or bulkhead seat to facilitate getting up and for leg exercises.

For women with a completely normal pregnancy, it is still advisable not to travel by air after the 36<sup>th</sup> week. This is just precautionary in case the due date was miscalculated or labor begins prematurely. The airplane is not the place for a delivery. If a pregnant woman decides to travel after 36 weeks, most airlines require a note from the managing obstetrician attesting that the patient is not in labor and has no complications. Pregnant women with complications such as bleeding, pain, or a history of premature delivery should not fly.

The aircraft environment is generally not a problem for healthy children. However, as the aircraft ascends and descends, there can be pain in the ears due to pressure changes causing crying. To minimize this, it is helpful to have a baby nurse a bottle, breast, or suck on a pacifier particularly during descent. This will help equalize the air pressure in the middle ear. Children with upper respiratory infections and congestion should avoid flying, but if they must, they may be given nasal decongestants, as prescribed, 30 minutes prior to descent.

## **Decompression Sickness (Bends)**

Scuba diving has become a popular sport with thousands of people taking diving vacations. Because most divers return home by air, the relationship between diving and flying must be appreciated. Decompression sickness is caused by nitrogen bubbles forming in the blood or body fluids whenever one goes from a high pressure environment to a low pressure environment. This can happen when surfacing from a dive or going to altitude in an airplane. The risk of decompression sickness is greatly increased if one flies too soon after diving.

The most common symptoms are joint and/or muscle pain (commonly known as bends). However, these bubbles can cause much more serious illness with symptoms of stroke and collapse of the cardiovascular system. Because the latter are potentially fatal, it is advisable to reduce the risk by avoiding flying as a passenger for 12-24 hours after the last scuba dive.

## **Disinsection (Debugging)**

In order to minimize the risk of importing disease carrying rodents or insects ( e.g., malaria, yellow fever) or pests that might cause crop damage, a few countries require cabin disinsection of inbound commercial aircraft in accordance with World Health Organization International Health Regulations.

(The U.S. abandoned this practice in the 1970s.) Disinsection is frequently done by spraying the cabin with an aerosol before opening the cabin doors at the destination or by applying a residual solution to the aircraft interior that lasts for several months. In any event, the chemicals commonly employed are in the family of pyrethroids. They efficiently kill insects and are generally nontoxic for human beings. Although it could be possible that exposure to this aerosol could cause an allergic reaction such as a skin rash or wheezing in individuals with sensitive respiratory systems, e.g., asthmatics, there are only rare reports in the medical literature of such events. Consequently, travelers with lung disease or known sensitivity to aerosol sprays going overseas should query the airline regarding disinsection and then discuss it with a physician.

## **Peanut Allergy**

Many people suffer from peanut allergy. In fact, it is one of the most common allergies in the U.S. It can cause mild symptoms such as a rash or itching, but it can also cause severe and even life-threatening reactions with shortness of breath, wheezing, and circulatory collapse. Consequently, individuals with a known peanut allergy should refrain from eating them for life.

Because peanuts are often served to airline passengers, there is concern among the traveling public. Some strongly urge the airlines to stop serving them altogether. However, the actual risk to passengers is believed to be very low for several reasons. First, there are only rare reports in the medical literature describing a passenger reaction inflight. If it were a common problem, more reporting would be expected. Second, allergic reactions to peanuts almost always occur after eating them. It would be highly unlikely (although possible) for a reaction to occur by inhaling airborne peanut dust released from the package of a nearby passenger.

Nevertheless, many airlines no longer serve peanuts, and passengers who have special concerns may be accommodated by some airlines by offering seats in a peanut free row. In any event, no airline can guarantee the flight will be peanut free because some passengers might bring their own.

## **Pulmonary (Lung) Disease**

The decision to travel by air for patients with lung disease is largely based on the type and severity of the disorder and the physician's judgment regarding your tolerance to altitude. This can best be done by the physician with a preflight history, physical examination and, in some cases, laboratory tests. A good, simple measure of fitness to fly is whether or not you can walk 50-100 yards at a normal pace or climb one flight of stairs without becoming severely short of breath. Additional factors to consider are the altitude of the departure and arrival airports, the length of the journey, and history of prior air travel. In some cases, air travel may need to be postponed. In other cases, medical oxygen inflight may

be necessary and should be ordered from the airline well in advance (see Airline Special Services section). Like any medical condition, the final decision must be made by the managing physician's clinical judgment.

Asthma and emphysema require special consideration. Those with asthma that is unpredictable, severe, or which has required recent hospitalization should not travel by air. Any asthmatic who does travel by air should hand carry onboard all asthma medications, particularly inhalers for rapid relief of symptoms. Because the air in commercial aircraft is very dry, it is important to keep well hydrated at all times. Be sure to drink sufficient amounts of water (not alcohol or caffeine-containing beverages) during flight.

Travelers with emphysema may have low blood oxygen levels. Therefore, preflight evaluation as described above is extremely important and will aid the physician in advising you. Medical oxygen therapy during flight may be required. Also, medication should be available in carry-on luggage. In some cases, other means of travel may be advisable.

## **Diabetes**

The great majority of individuals with diabetes, whether treated with oral medication or insulin, and under reasonable control, can travel safely by air as long as a few simple rules are kept in mind with advance planning accordingly. The first step is to order from the airline, in advance, the appropriate diabetic meal (practically all major airlines can accommodate this request). Diabetic travelers should carry all medications (as well as needles, syringes, blood glucose monitors, sugared snacks, and a device to store needles/lances) in carry-on luggage and not in checked luggage. (For security reasons, it is advisable for passengers needing insulin/syringes/needles to have a note from a physician.) Although insulin is usually best kept refrigerated, it will not be degraded at aircraft cabin temperatures even on a long-haul flights. The major challenge is for the diabetic traveler who contemplates a long-haul flight over 6-12 time zones that disrupts meal times and dosaging schedules. Unfortunately, there is not a single established formula for doing this. Rather, there are alternatives from which the physician and patient must choose.

One method is to readjust, prior to departure, your daily and nightly patterns (including meals, dosage schedule, activities, and sleep) to conform to that of the destination. For example, set your clock at home to that of the destination and take your meals and medication as if you are already at the destination. This could be done with less inconvenience by moving your clock one hour each day closer to the destination time over a period of, for example 7 days, if you are crossing 7 time zones. In this way, the diabetic traveler's day/night cycle will be in conformity with the destination upon arrival.

Another method is to improvise a day-by-day schedule with the physician to allow a slow transition from day of departure continuing on as long as necessary at the destination. This requires a written schedule with particular attention given to meal times and other activities such as physical exertion.

Diabetic travelers under reasonable control can fly anywhere safely with proper planning. Control enroute as well as at the destination is greatly facilitated not only by the availability of special diets, but also by the capability to self-monitor blood glucose levels.

## **Alcohol**

Use caution if you decide to drink alcoholic beverages when traveling by air. Alcohol can dehydrate you and will interfere with your ability to sleep. It has also been implicated in recent incidents of “air rage.” Consequently, it is most prudent to avoid or at least minimize alcohol consumption during air travel.

## **Motion Sickness**

Although motion sickness is less common with jets than with propeller-driven aircraft, it may occur, particularly in susceptible individuals. If you think you might require medication, consult your physician. For those susceptible to motion sickness:

- Request a seat over the wing.
- Schedule flights on larger airplanes.
- Request a window seat (and gaze at the horizon).
- Direct cool, ventilated air onto the face.
- Avoid excess liquids and gas producing foods.
- Avoid alcohol for 24 hours prior to flight and inflight.

## **Fractures**

Most passengers with treated fractures can travel safely by air. The only potential problem is swelling of the tissues under the cast that can occur due to a decrease in barometric pressure at altitude. This could interfere with healing and cause pain. In general, the risk of swelling is greatest the first 72 hours after the cast is set. It is, therefore, advisable to wait 3 days before traveling. However, if this is not possible, your physician can fix the cast in such a way that it can be loosened (by splitting it along the sides and wrapping with an elastic bandage—called bivalving), if necessary. A bivalved cast will probably have to be replaced at the destination. If a large or bulky cast is necessary that might crowd other passengers, you may be required to purchase two seats.

## **Eye Disease**

Air travel conditions that affect the eye are changes in cabin pressure and dry cabin air. Because of changes in air pressure, individuals having surgery for retinal detachment, cataracts, or lens implantation should delay travel until cleared by the ophthalmologist. Individuals with glaucoma can travel safely as long as they take their medication as directed and are under reasonable control. Some passengers with dryness of the eyes may want to carry artificial tears or lubricating solutions. This helps moisten the eye, particularly for individuals with contact lenses, dry eye conditions, and conjunctivitis.

Turbulence during flight can cause trauma to the eye, particularly for someone who has had eye surgery recently. The risk can be minimized by keeping the seat belt fastened at all times when seated. In addition, the passenger who becomes easily air sick should not travel immediately after intraocular eye surgery, since the straining associated with retching and vomiting could rupture a wound.

## **Immunizations and Malaria**

Immunizations can prevent certain diseases, but we do not have immunizations for every disease that may be a threat. It is important that travelers maintain their currency in immunizations for diseases that can occur worldwide. These include tetanus, pertussis (whooping cough), and diphtheria (usually all three are given together as one shot). Measles, mumps and rubella should be reviewed for currency (also normally given as a combined shot). Polio should be taken again if it has been many years since the initial dose. Check with your doctor regarding your currency on these immunizations.

Routine vaccinations also include Hepatitis A and B. Both are routinely given to children now, but adults may not have ever received these vaccines. Both diseases are quite common in many countries around the world.

Further immunizations may be considered depending upon the destination and length of stay in a country. These may include cholera, meningococcus, Japanese encephalitis (which is not confined to Japan), plague, rabies, typhoid, and yellow fever. Some countries require proof of vaccination for cholera or yellow fever before entry, so check on what you need with your travel medicine clinic or a physician experienced in travel medicine. The Centers for Disease Control and Prevention in Atlanta GA also has valuable travel information (<http://www.cdc.gov>).

Special consideration should be given to pregnant travelers because some vaccines can be harmful to the fetus. Check with your obstetrician for definitive guidance.

Malaria is transmitted by mosquito bites, usually between sunset and sunrise. It is very common in many countries around the world, and each year thousands of travelers return home with this illness. Malaria is becoming more

difficult to prevent and treat each year as drug resistant strains appear and become more widespread. Although there is no vaccine against malaria, antimalarial drugs can be used for prophylaxis (prevention). Travel medicine clinics maintain the most current information regarding which medications should be taken for a particular area of travel.

Malaria during pregnancy poses great danger to both the mother and fetus, as the baby could be deformed or stillborn. Unfortunately, some of the medications used to prevent malaria should not be taken during pregnancy. For these reasons, pregnant women should not travel to areas with malaria if it can be avoided, particularly to areas where malaria is resistant to treatment. If travel is required, use of long clothing, applying insect repellents to the skin, and avoiding mosquito feeding periods at dusk and dawn can help reduce potential exposure.

## **Neurology and Mental Health**

Persons with uncontrolled or frequent seizures should not travel by commercial airliner if possible. If individuals with infrequent seizures or those susceptible to unconsciousness or fainting for any reason must travel, they should travel with a companion. Take any essential medications in carry-on bags rather than checked luggage so that the medication is available on the flight or in the terminal, if needed. Wearing a medical identification bracelet is advisable.

Persons who have had a recent stroke or near stroke should not travel by air until the acute phase has passed and the condition is stable as determined by the managing physician. However, once stable, travel can be considered. Traveling with a companion is advisable for some. Most airlines will provide assistance for disabled passengers with this condition.

People with psychiatric disorders whose behavior is unpredictable, aggressive, or disruptive clearly should not travel by air. Flying may be considered if the person is stabilized on medications. Also, consider accompaniment by a knowledgeable companion. In some cases, the physician may opt to prescribe a tranquilizer or medication for anxiety.

Persons with Alzheimer's disease or altered mental status are usually more comfortable and calm in familiar surroundings. Removal from familiar surroundings may decrease their ability to function and cause agitation and disorientation. A familiar and reliable companion may be all that is necessary for an uneventful flight, especially if care is taken to complete the flight during daylight hours because traveling at night can further disrupt the person's sense of familiarity. If medications are given before the flight to calm the person, be sure that this medication has been used before and was well tolerated.

Radiation

The Earth is continuously bombarded by radiation from the Sun and other objects in outer space. The atmosphere of the Earth serves as an effective shield for most of this cosmic radiation, but the amount of radiation increases as you go to higher altitude. This is only significant if you are flying very frequently such as multiple times a week, which would be unusual for most travelers. In general, under normal flight operations, measured radiation levels for crew and passengers remain well below recognized health limits.

## **Heart Disease**

Commercial aircraft cabins are usually pressurized to altitudes between 6,000 and 8,000 ft. depending upon the actual altitude of the airplane. The Federal Aviation Administration (FAA) and Joint Aviation Authorities (JAA) allow a maximum of 8,000 ft. At this altitude the oxygen supply in the air is decreased with a corresponding decrease in the oxygen carried in the blood. In general, reasonably healthy individuals can easily tolerate this because the body is able to compensate by increasing the heart rate and respiratory rate. However, this may not be true for those with significant heart disease. This includes frequent angina, heart failure, recent heart attack, and disease of the heart valves. In some cases, air travel may have to be deferred and in others medical oxygen may be required inflight. Consequently, patients with significant heart disease should consult their physician if contemplating air travel. The physician, in turn, must exercise clinical judgment in formulating recommendations.

The following are some specific travel recommendations for heart patients:

- Carry sufficient quantities of cardiac medications for the entire trip and keep in carry-on luggage.
- Keep a separate list of medications including name of prescribing physician with phone number, dosing intervals, and tablet size in the event that medications are lost.
- Adjust dosing intervals in order to maintain dosing frequency if crossing time zones.
- Be sure all medications are taken on schedule.
- Carry a copy of most recent ECG.
- Carry a pacemaker card if a pacemaker patient.
- Contact the airline concerning needs for special diet, medical oxygen, or a wheelchair
- Consider curbside baggage check-in.
- Limit walking around, especially at altitude.

## **Ear Nose And Throat**

Passengers traveling by aircraft experience changes in air pressure during flight. Before takeoff, cabin pressure equals the air pressure at ground level. After

takeoff and during climb to cruising altitude, the cabin pressure in commercial airliners is allowed to drop until it reaches the equivalent of the air pressure at 8,000 feet (2432 meters). Cabin pressure is maintained at this level, even if the aircraft flies at a much higher cruising altitude. When the aircraft descends, cabin pressure rises until landing when it again equals the pressure on the ground.

As a result of these pressure changes during ascent, air must be able to flow freely from the middle ear (the space behind the ear drum) to the outside by way of the eustachian tube and from the sinuses to the outside by way of passageways to the nose. On descent, the opposite must occur with air flowing in the reverse direction from the outside into the middle ear and sinuses. In short, this is necessary in order to equalize the air pressure in the body with that of the surrounding air. If the air pressure in the middle ear and sinuses becomes much higher or lower than the surrounding air pressure, pain, bleeding and ear drum rupture can occur.

Problems with this important air exchange are caused by a blockage of any of the passageways. Infection, such as a bad cold, allergy, bleeding, and even a tumor can cause blockage. Although problems can occur during climb to altitude, problems tend to be much more common and severe during descent to landing.

In order to avoid problems, air travel should be postponed if you have a severe allergy or respiratory infection. Further, all air travel passengers should ask their physician to teach them the techniques for equalizing sinus and middle ear air pressures. This is called a Valsalva maneuver (holding your nose shut with your fingers while forcefully exhaling against a closed mouth). It is better learned by demonstration rather than by written explanation. Chewing gum and swallowing may also help. The purpose of this is to help open all of the passageways permitting normal flow of air.

Do not forget that flying can cause air pressure equalization problems for up to several hours after the flight. Passengers may later develop pain, ear block, and general discomfort sometimes being awakened from sleep. This is virtually always due to failure to fully equalize sinus or middle ear pressures during descent and landing. In such cases, it may be necessary to see a physician.

Another problem of air travel is related to the very low humidity in the aircraft cabin. Because of the drying effects of cabin air, many air travelers may benefit from use of moisturizing nose sprays or drops.

## **Surgical Conditions**

Air travel following surgery is becoming more common due to increases in the number and types of surgical procedures done as an outpatient. Furthermore, patients increasingly travel by air for care in medical facilities far

from home. There are several considerations for patients and their physicians to consider when making decisions about air travel following surgery.

For example, general anesthesia rapidly wears off by the time of discharge from the hospital and, therefore, should present no problem. However, spinal anesthesia can cause a moderate to severe headache. Prolonged sitting or standing following surgery increases the risk as does exposure to lowered air pressure as occurs in flight. Spinal headache has been reported during air travel up to 7 days following spinal anesthesia. Even when not considering flight, bed rest is usually recommended for at least 24 hours following all spinal anesthesia with gradual return to full activities. Additional caution, therefore, is recommended before traveling by air.

The lower air pressure of aircraft cabins allows intestinal gas to expand. Flying after gastrointestinal surgery is to be avoided because gas expansion could cause bleeding and pain. Therefore, air travel is not recommended until the gas is reabsorbed as determined by the surgeon. This could take 7-14 days. Travelers with colostomies are not at increased risk during air travel but may have an increase in fecal output. Therefore, the use of a large colostomy bag is recommended. If a small bag is used, frequent changes may be necessary.

In general, after any surgical procedure, the managing physician should ensure that there are no complications, that recovery is smooth and reasonably complete, and that special needs such as pain control are attended.

## **General Advice**

- Have all medication in carry-on luggage and be sure it is in its original container with the prescription label.
- If you have significant medical problems, carry an abbreviated copy of your medical records.
- Alert airlines in advance of special requirements.
- Wear loose comfortable clothing.
- Allow extra time.
- Consider buying insurance which includes provision for air evacuation home in event of any medical condition.