

## ASTHMA AND DIVING

### What is Asthma?

Asthma is a long-term disease which can be controlled with proper treatment. Unfortunately it cannot be cured. It affects as many as 1 in 5 children and 1 in 10 adults in Australia. It is the cause of many lost school days and a lot of time off work. People with asthma have episodes of shortness of breath which may be brought on or made worse by certain trigger factors. Shortness of breath is due to narrowing of the small airways within the lungs as a result of inflammation and muscle spasm.

### How Do The Lungs Work?

Every breath you take draws air into the windpipe or trachea. The windpipe splits into two further tubes called the bronchi, which then divide into smaller and smaller airways called bronchioles, eventually leading to small air sacs called alveoli. It is here in the alveoli that oxygen in the air passes into the bloodstream. At the same time, carbon dioxide produced in the tissues of the body moves from the blood into the air sacs and then out of the body.

### What Happens During An Asthma Attack?

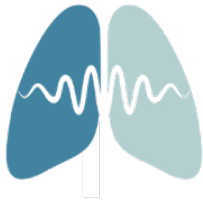
Asthma is due to constriction and inflammation of the small airways. In asthma, there is a special type of inflammation which narrows the small airways and makes them 'twitchy' and very sensitive to any environmental changes. The airways also become blocked with sticky mucus, and this blockage can come on very quickly. During an asthma attack breathing becomes harder, even at rest. There may be a cough or wheezing, which is a musical noise when you breathe. Asthma can also occur at night during sleep. Asthma can vary in severity from mild chest tightness with cough and wheeze during exertion, to a life-threatening attack of severe breathlessness requiring urgent medical attention.

### What is Scuba?

Scuba means Self Contained Underwater Breathing Apparatus. Developed by Jacques Costeau, scuba has opened up a whole new world of underwater exploration, without the heavy diving gear with air pipes to the surface. In the last 20 years there has been a tremendous increase in the use of scuba equipment for recreational purposes, particularly in Australia with its unique Great Barrier Reef. Opportunities now abound for tourists to experience the beauty of the underwater environment including corals and exotic fish.

### What Are The Dangers Of Scuba Diving?

Many sporting activities have risks and scuba is no exception. The chance of dying while scuba diving is somewhat higher than boxing and over 40 times higher than playing football or water-skiing. Many of the dangers are to do with pressure. A diver breathes air into his/her lungs at a pressure the same as that of the depth of water in which the diver is swimming. Pressure increases rapidly under water, and at 10 metres (30ft) depth, pressure is double that at the surface. If the diver inhales into his/her lungs from a scuba cylinder whilst at 10 metre depth and then comes to the surface, the air in the chest expands as the air pressure falls. The expanding air will need to escape, usually through the mouth or nose, bubbling its way to the surface. If any of the air passages become closed (as can happen in asthma), the air cannot escape and will expand within the lungs, eventually causing the lung to burst. The consequences can be life threatening. Air can escape from the burst lung into the chest cavity (a condition called pneumothorax) causing breathing trouble, chest pain and sometimes death,



or escape into blood vessels, carrying bubbles to the heart and brain (a condition known as air embolism), which is often fatal. These two events are known as barotrauma.

### **Why Is Scuba Diving So Dangerous For Asthmatics?**

Scuba diving is a particular risk for people with asthma. Some of the typical trigger factors of asthma are present in scuba diving. Use of any other underwater breathing system also carries the same risks. Breathing cool dry air is very irritating to asthmatic airways. Diving gas is dry and when released through a small valve, causes a cooling effect. Thus a diver inhales a cold and dry air mixture which is potentially very dangerous for people with asthma to breathe. Heavy physical exercise such as swimming against a current with a heavy tank on the back can produce breathlessness and even exercise induced asthma. Accidental inhalation of salt or fresh water can produce coughing and a fine mist of sea water can cause the airways to narrow by direct airway irritation.

The general stress and anxiety of diving may add to the situation, setting the scene for a very serious attack of asthma. Picture the scene for a person with asthma who develops an asthma attack underwater. Using a reliever puffer is obviously out of the question. When the diver tries to return to the surface, there may be some areas of the lung which are blocked off due to closure of asthmatic airways, and the expanding air in these areas will no longer have anywhere to escape. The person with asthma is thus at much greater risk of barotrauma.

### **What Might Be The Scenario?**

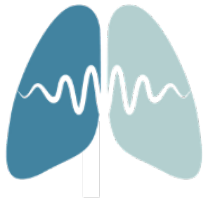
The following example occurs all too frequently in Australian waters. Jenny Morris, a 32 year old merchant banker with otherwise mild asthma, is a very fit swimmer, who has been diving without problems for a few months. Then one day, after 20 minutes at 18 metres depth, without any warning she indicates to her diving buddy that she is having some difficulty with breathing and heads rapidly for the surface. On arrival at the surface she is breathless and confused. Within a few minutes she becomes paralysed down the left side of her body and becomes unconscious. She is taken ashore, treated fully for asthma and eventually placed in a recompression chamber reduce the size of any air bubbles blocking the blood supply to her brain. After three days of intensive treatment, her condition deteriorates and she dies without ever having gained consciousness. At autopsy, there is a torn lung from which air has travelled through the blood via the heart to her brain. A coroner would find that she had died of air embolism and asthma.

### **Are People With Asthma Allowed To Dive?**

People with asthma are at risk of developing asthma at any time, but more so when trigger factors are likely to be present, as in scuba diving. The risks are now so well known that no reputable diving company would allow a known asthmatic to dive. This is one of the many reasons for insistence on a diving medical examination prior to enrolment on a diving course. Asthma is the most common reason for a person to fail a diving medical. Many people with asthma are not aware of the high risks which diving poses for them; and for such people, having these risks pointed out during a diving medical can be a life-saver. Those who attempt to conceal their asthma do so in reckless disregard not only for their own lives, but also for those who might be called upon to rescue them.

### **Does This Mean A Person With Asthma Can Never Dive?**

Not always. Although the majority of people with asthma are troubled by asthma at least sometimes throughout their lives, some really do appear to grow out of it; and for them, scuba diving may be no more risky than for the general population. Most diving medical experts



agree that if a person has had no symptoms or signs whatsoever of asthma for at least five years and has required absolutely no antiasthma medication for this period, and has a normal diving medical examination including breathing tests, then they should be allowed to dive, after explanation of the risks.

### **Can Adults With Childhood Asthma Be Sure That Asthma Will Not Recur During Diving?**

Although one can never be 100% sure that asthma will not recur, it is possible to undergo a hypertonic saline challenge test. This test, which can be performed in most specialist lung function laboratories, involves breathing a salt water mist from an ultrasonic nebuliser, with breathing tests to determine whether bronchial narrowing results. If it does, then the person is still susceptible to an acute asthma attack while underwater, and should not dive. A negative test provides additional reassurance that the person is unlikely to develop asthma while diving.

### **Is Snorkel Diving Also Dangerous For People With Asthma?**

Snorkel diving is much less risky for people with asthma than scuba diving. The main reason for the difference is that snorkellers do not take air in while at depth, and thus there is much less risk of bursting the lung during ascent. Common sense dictates, however, that one's asthma should be stable and controlled before snorkelling as accidental aspiration of water and exercise associated with swimming against a current can also lead to an asthma attack. Some of the best underwater videos and films have been made by divers using a snorkel, goggles and a hand-held camera.

### **Further Information**

For more information about asthma and diving, talk to your doctor, your pharmacist, or local Asthma Foundation.

**Please Note:** This information is intended by The Australian Lung Foundation to be used as a guide only and is not an authoritative statement. Please consult your family doctor or specialist respiratory physician if you have further questions relating to the information provided here.