

How does having **asthma** affect diving and the possibility of diving?

Asthma is a chronic disorder of the lungs in which there is a tendency for the muscles surrounding the bronchi (breathing tubes) to contract excessively. This causes a narrowing, or bronchoconstriction, with a resulting increase in breathing resistance, particularly during exhalation, which may manifest as wheezing, chest “tightness”, coughing or breathlessness. Learn about the effects of asthma and diving including the effects of asthma medication and diving, and how to determine if you’re fit to dive with asthma. This article is a stepping stone to help asthmatic divers try and manage this chronic disorder.

Many factors may trigger an episode of asthma or bronchial constriction including exposure to allergens, noxious fumes, cold air, exercise or respiratory infections such as “colds” or flu. The increase in breathing resistance due to narrowing of the airways may be aggravated by the collection of mucus within the airways. As far as diving is concerned, there are basically three issues that make scuba diving risky for asthmatics:

1. increased breathing resistance with build-up of carbon dioxide,
2. increased risk for lung overpressure injuries, and
3. effects of the medication on diving.

INCREASED BREATHING RESISTANCE

As soon as the human body is immersed in water, there is an increased resistance to breathing due to the mechanical and antigravity effects of being in water. In addition, there may be greater oxygen consumption and carbon dioxide production due to exercise as this requires a greater exchange of air and more breathing effort. There is also the effect of depth on gas density: with greater density of gas comes a further increase in breathing resistance. In an individual with breathing difficulties due to asthma, these additional demands on the body may be sufficient to lead to a critical build-up of carbon dioxide with panic or loss of consciousness.

The Asthmatic Diver

By DAN Medical team



Image by Cormac McCreesh

LUNG OVERPRESSURE INJURIES

Narrowing of the airways and mucus production impairs the ability to exhale easily. As a result, air trapping may occur during ascent, particularly in an emergency ascent due to panic or breathlessness. This predisposes the diver to pulmonary trauma leading to pneumothorax, pneumomediastinum and/or cerebral arterial gas embolism.

EFFECTS OF THE MEDICATION ON DIVING

The “reliever” pumps can lead to a tremor and anxiety, which may predispose to loss of dexterity and diving accidents. A further theoretical concern is that some of the medications also lead to dilation of the blood vessels in the lungs, which may cause a loss of effectiveness in filtering out small bubbles commonly formed during decompression. This increases the risk of paradoxical embolism (i.e. gas embolism not caused by pulmonary barotrauma). The risk is obviously difficult to quantify or prove.

DETERMINING FITNESS TO DIVE IN DIVERS WITH ASTHMA

To avoid risks related to impaired breathing and pulmonary overpressure, divers with asthma must have unimpaired lung functions that remain stable during the normal exposures related to diving. Divers who experience persistent or regular asthma attacks in response to exercise, cold or “stress” are discouraged to dive. Diving should obviously be avoided during and up to 48 hours after an asthma attack or any upper respiratory tract infection causing pulmonary symptoms (i.e. coughing or wheezing).

Previously the only asthmatics that were considered fit for recreational diving were

those whose symptoms were completely controlled on inhaled cortisone. The use of a short-acting bronchodilator, also called “rescue” or “reliever” medication (e.g. Ventolin[®] or Venteze[®]) was not considered appropriate as its effects were unpredictable and short-lived. With more modern long acting bronchodilators (e.g. Serevent[®]) or combination bronchodilator/cortisone combinations (e.g. Seretide[®]) – also called “controller medication” – some divers are now permitted to dive if their symptoms are controlled completely and their lung function remains stable and unimpaired.

However, the asthma should be stable for at least three months after starting the medication.

The following would indicate the need for reassessment of medical fitness to dive:

1. any deterioration in pulmonary function, wheezing
2. or regular early morning coughing;
3. any intercurrent asthma attack or need for “rescue” or “reliever” medication in addition to the long acting medication; and
4. any significant chest infection (i.e. symptoms lasting more than a week).

Asthma is known for its tendency to wax and wane. Symptoms appear with a chest cold and remain for several weeks thereafter. Autumn and spring may bring exposure to allergens that provoke attacks. As a result, fitness to dive cannot be assumed and it must be assessed consciously by the diver prior to each dive. Diving is not recommended unless the diver is completely free of respiratory symptoms before each dive. Indeed, most diving medical experts agree that asthmatics should not dive within 48 hours of using “rescue” or “reliever”

medication and experiencing complete relief of symptoms. If an asthmatic has an attack, spirometry (a common pulmonary function test measuring lung function) should be done to assess the severity and need for treatment.

The individual should not dive until the airway function returns to normal. Mild to moderate asthmatics with normal screening spirometry can be considered candidates for diving if their exhaled volume of air in one second (i.e. FEV1) is at least 75% of the full volume of exhaled gas (i.e. FVC). The risk of diving is probably acceptable if the diving candidate, with a history of asthma, shows no deterioration in lung function after strenuous exercise.

However, divers must be made aware that they are facing an increased risk of an adverse event related to diving and no diver with asthma should be diving without restrictions.

The minimum restrictions needed for diving are:

1. the diver should follow a personal testing protocol; and
2. diving should be adapted to account for possible problems

ADAPTED DIVING PRACTICES

As depth increases so does the density and risk. Asthmatic divers should refrain from doing deep dives (i.e. no deeper 30 m). Deeper dives typically require decompression stops which a diver with asthma may not be able to complete if problems arise. Diving in areas where medical facilities are not available would also be a risk to consider

PERSONAL TESTING PROTOCOL:

The first step is to ensure that your asthma is well controlled. This is done in collaboration with your treating physician. The control required for diving means that you should never, or very rarely, wheeze if on “controlling” medication or have to use your “reliever” medication.

The severity of attacks is also an important factor and persons who have needed hospitalisation for their asthma within the past five years should not dive. If the asthma is well controlled, the diver should be seen by a doctor specifically trained in diving medicine. The objective is to assess the lung function values and to determine whether enough reserve capacity exists.

Many divers may then need to see a specialist pulmonologist for further evaluation. After being cleared by the diving doctor, the diver should buy him or herself a peak flow meter (available at large pharmacies). Follow the instructions carefully to ensure that you perform the measurements correctly. The diver needs to perform a number of measurements per day for a period of at least two weeks. These measurements can be used to determine the “normal” peak flow values for the person. The person then performs a peak flow the day before diving and on the day of the dive. If the peak flow has decreased by more than 10% of the normal maximum value, the person should not dive until 48 hours after returning to normal.

Example: The value of the early morning peak flow of the diver was 650 ml. A 10% drop in the value would mean that a value of less than 585 ml (650 ml – 65 ml) on the day of diving indicates that it is probably not safe for that person to dive.

