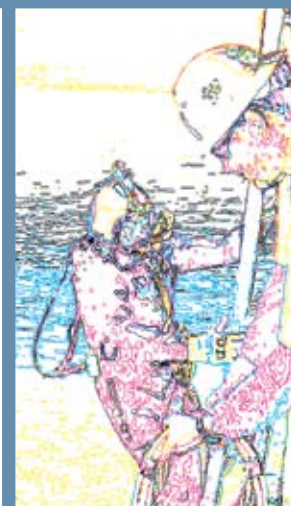


Are Your Lungs Fit to Dive?

Tony Alleman, MD MPH, and Joseph Serio, MD, tackle pertinent issues concerning today's commercial diver in each issue of **UW**. If you have a medical diving question for the good doctors, email it to talleman@occmcd-sl.com.



The most important decision a diving medical officer must make is the determination of a diver's fitness for duty. This process involves careful review of all the organ systems of the body.

While a complete discussion of gas exchange in the lung would be burdensome and beyond the scope of this publication, suffice it to say that the pulmonary system is one of the most important organ systems necessary for diving. The lung is the only vehicle the body has of decreasing the body's burden of unwanted gases, namely nitrogen.

This article focuses on the conditions that may be considered disqualifying to the commercial diver. As with any medical condition, the decision to declare a diver fit for duty rests entirely on the medical examiner. The medical examiner must feel comfortable clearing a diver with any potentially disqualifying condition identified that may adversely affect the diver or any rescuers.

There are two commonly used tests in the evaluation of a diver's pulmonary status: the pulmonary function test and the chest x-ray. In addition to the physical examination, both of these tests give the medical examiner more information about the lungs in order to make a determination of fitness for duty. The medical examiner will use these two tests, the physical examination, and the medical history in making a determination of fitness to dive.

Pneumothorax

Commonly known as a collapsed lung, and sometimes the result of barotrauma, a pneumothorax, when determined to be spontaneous (without a specific cause) will disqualify a diver from diving.

The typical subject with a spontaneous collapsed lung is a tall, thin male, usually between 20 and 30 years of age, who smokes cigarettes. Blebs (large pockets in the lungs) are usually responsible for this condition, although other underlying lung conditions could also be responsible.

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The chances for recurrence of a collapsed lung after the initial event are increased up to 40%. If a diver experiences a pneumothorax while underwater at any considerable depth, it could be fatal.

Collapsed lungs that occur for specific reasons, such as trauma or with medical procedures near the lung, are not disqualifying but require a considerable time of healing before diving.

Obstructive Pulmonary Diseases

There are a variety of conditions that cause airway obstruction in the lung. These include asthma, chronic bronchitis, and emphysema. Any obstructive lung disease increases a diver's risk for arterial gas em-

bolism, a condition where a bubble of gas travels through the arteries and may end up in the brain or another crucial organ.

Cigarette smoking is the primary contributing factor in the cause of many obstructive lung diseases, with the exception of asthma; therefore divers should not smoke.

When these conditions are symptomatic, medications, typically bronchodilators may be required to keep the airways open. When medications are required there is usually evidence of lung disease either on the chest x-ray or the pulmonary function test. The medical examiner will use both of these tests to determine a diver's fitness for duty.

Asthma is a condition that generally is

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considered as an airway obstruction in response to an external stimulus. The stimulus could be an allergy to anything in the air, sensitization to chemicals or fumes, or even exercise.

Asthma originally was considered automatically disqualifying, unless there was a history of childhood asthma before the age of five. There has been recent medical literature supporting the recommendation to allow divers with asthma to be considered fit to dive only if they have normal pulmonary function tests. Again, it is the medical examiner's decision whether or not to declare any diver fit for diving. Most conservative physicians still consider asthma as a disqualifying condition.

Restrictive Lung Diseases

There are other lung diseases that are known as restrictive lung diseases, and are less common than the obstructive types. Restrictive lung diseases, by definition, are those that reduce the volume of the lung. These may occur from exposure to certain dusts such as cotton, silica, coal, or asbestos. Exposures to

If a diver experiences a pneumothorax while underwater at any considerable depth, it could be **fatal.**

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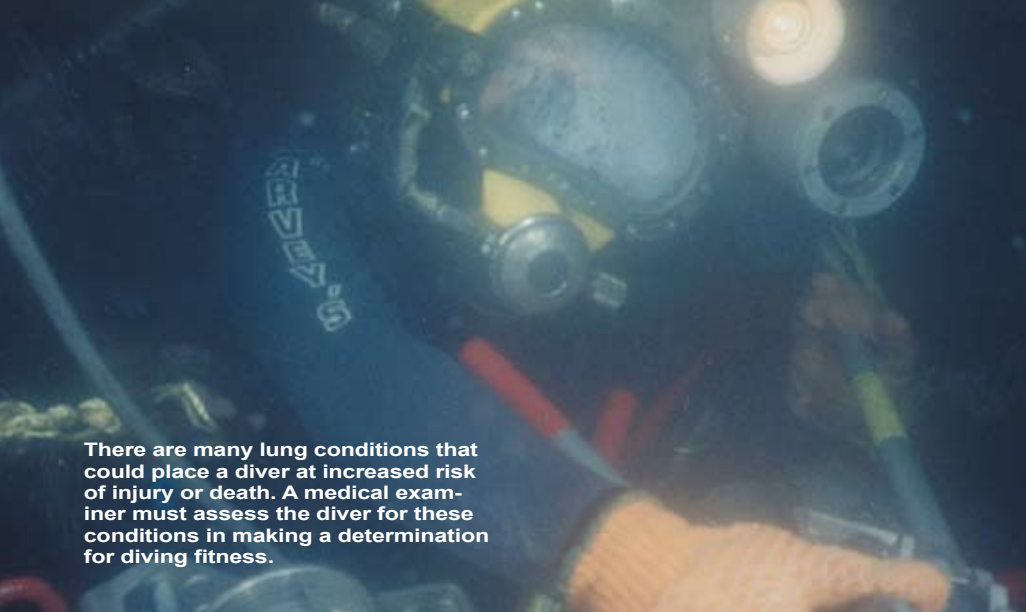
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There are many lung conditions that could place a diver at increased risk of injury or death. A medical examiner must assess the diver for these conditions in making a determination for diving fitness.

About the Authors

Dr. Serio has been practicing hyperbaric medicine for 40 years. He is nationally known to the diving community and provides medical support for diving injuries to many diving contractors in Louisiana. Since hurricane Katrina he currently practices in Lafayette, LA at the Occupational Medicine Clinics of South Louisiana.

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dusts may take years to develop noticeable findings in the lung either on chest x-ray or pulmonary function testing.

There is a paucity of medical literature concerning restrictive lung disease and fitness for diving, but there have been reports of arterial gas embolism occurring in divers with this condition. As with the obstructive lung diseases, any restrictive lung disease that presents with a significant decrease in pulmonary function or as changes detected on chest x-ray should be a disqualification for commercial diving.

Prior Lung Surgery

There are numerous reasons for an individual to undergo surgery involving the lungs and are too many to list. Removal of non-cancerous tumors, removal of tissue from the lung for diagnostic purposes, and drainage of pulmonary abscesses are just some of the reasons for having surgery involving the lung.

Any surgery involving the lungs may cause air trapping and mimic the obstructive lung diseases. So for the same reason as the obstructive lung diseases, any history of prior surgery involving the lung should be disqualifying to a diver.

Summary

There are many conditions of the lungs that could place a diver at increased risk for injury or death. The medical examiner must assess the diver for these conditions in making a determination for diving fitness.

The medical history is critical to the medical examiner in making a decision. Testing commonly used in conjunction with medical history and physical examination are the chest x-ray and the pulmonary function test.

Any knowledgeable medical examiner understands the implications of disqualifying a commercial diver. Conservative physicians may disqualify some conditions more than others, but would divers want their physicians placing them at increased risk of injury or death? **uw**

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