

A Comparison of Medications Used to Prevent High-Altitude Pulmonary Edema

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The full report is titled “Both Tadalafil and Dexamethasone May Reduce the Incidence of High-Altitude Pulmonary Edema. A Randomized Trial.” It is in the 3 October 2006 issue of *Annals of Internal Medicine* (volume 145, pages 497-506). The authors are M. Maggiorini, H.-P. Brunner-La Rocca, S. Peth, M. Fischler, T. Böhm, A. Bernheim, S. Kiencke, K.E. Bloch, C. Dehnert, R. Naeije, T. Lehmann, P. Bärtsch, and H. Mairbäurl.

What is the problem and what is known about it so far?

There is less oxygen in the air at high altitude than at sea level. Many people who live at sea level travel to high altitude for recreational purposes. Some people become ill shortly after arriving at high altitude. Illness at high altitude is caused by the effects of low oxygen levels on the blood vessels, lungs, and brain. About 50% of people who ascend rapidly to high altitude develop acute mountain sickness (AMS), characterized by headache, nausea, fatigue, lightheadedness, and insomnia. Four percent of people develop a life-threatening illness, high-altitude pulmonary edema (HAPE), characterized by fluid accumulation in the lungs that blocks oxygen uptake, causing shortness of breath and even death if effective therapy is not provided. Doctors treat both AMS and HAPE with extra oxygen to breathe. People with AMS are also given a cortisone-like drug known as dexamethasone, and those with HAPE are given nifedipine. More recently, researchers have suggested using tadalafil (a medicine often used to treat erectile dysfunction). Beyond treating these illnesses, it would be useful to know which medications are most effective in preventing HAPE.

Why did the researchers do this particular study?

To find out whether dexamethasone or tadalafil was more effective in preventing HAPE.

Who was studied?

29 adults (4 women and 25 men) with at least 1 previous episode of HAPE.

How was the study done?

Persons were first examined while they were at sea level. Each participant was randomly assigned (completely by chance) to receive dexamethasone, tadalafil, or placebo (a pill that looked like the others but had no medical effect). Medication was begun on the day before participants were brought to an altitude of 4559 meters (about 14,000 feet) for a 2-day stay. Neither the participants nor the examining physicians knew which medication was being taken. On each day of the participants' high-altitude stay, the researchers examined and questioned them for the occurrence of AMS and took chest x-rays to detect the presence of HAPE.

What did the researchers find?

Two participants taking tadalafil dropped out after developing severe AMS on the evening of arrival at altitude. High-altitude pulmonary edema developed in 7 of the 9 participants taking placebo and in 1 of the remaining 8 participants taking tadalafil but in none of the 10 participants taking dexamethasone. Acute mountain sickness occurred in 8 of 9 participants taking placebo and in 7 of 10 taking tadalafil but in only 3 of 10 taking dexamethasone.

What are the limitations of the study?

The researchers were not able to recruit as many participants as they had planned. The study did not evaluate the adverse side effects of each medication.

What are the implications of the study?

Both dexamethasone and tadalafil decrease the occurrence of HAPE, but dexamethasone appears to be more effective and is better than tadalafil in preventing AMS.

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