

## CORRESPONDENCE

**Basic Medical Advice for Travelers to High Altitudes**

by Dr. med. Kai Schommer, Prof. Dr. med. Peter Bärtsch in volume 49/2011

**Visiting High Altitudes Is Possible**

We wish to make an additional comment with regard to treatment with implantable cardioverter defibrillators (ICDs). The summary in the *Box* suggests that patients with ICDs should categorically be advised not to travel to altitudes higher than 2000 meters. This means that, in addition to physical activity in the mountains, such patients should also be advised against air travel, since cabin pressure is usually similar to that of outside pressure at an altitude of 1500–2500 meters.

A low rate of arrhythmias at altitudes higher than 2000 meters (even without acclimatization) does not support the idea of a substantial risk of arrhythmias in patients with ICDs (1). Assessment of a patient's altitude fitness is therefore based primarily on the patient's underlying disease, which often limits what patients should be advised to do. The presence of an ICD alone should, however, not constitute a reason not to travel to high altitudes.

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**Critical Remarks**

The authors did not give any search criteria for the selective literature search (key words, databases). The listing is not based on recommendations from international medical specialty societies (1). Altitude headache is not “migraine-like” but diffuse and thudding. Categorically advising against travel to altitudes higher than 2000 meters in various conditions

is not differentiated enough. The deciding factor is the current function, for example after myocardial infarction (size, localization, effects [ejection fraction], complications, single-/multivessel disease, stent/aorto-coronary venous bypass [ACVB] graft, early acute recanalization, residual stenosis). Without these data, assessment is not possible in the individual case scenario. Alpine medical questions also remain unanswered (experience of mountaineering, economy of movement).

An ICD patient in stable condition is principally fit to travel to high altitude. What is more important is the underlying disease. The same holds true for venous thrombosis or pulmonary embolism: a patient who is stable and whose fluid balance is also stable is fit to travel to high altitudes.

In relation to patients with cardiopulmonary disorders, the oxygen diffusion impairment in interstitial lung disease was not mentioned.

Older patients and obese patients should be asked about snoring (screening for sleep apnea).

One of the cited studies has methodological weaknesses (2). A coauthor reported that the planned pre-acclimatization could not be realized because of significantly scattered data resulting from a deviation from the study protocol, owing to external circumstances (weather). No consensus exists regarding the protocol for pre-acclimatization in isobaric hypoxia, although there is no doubt that this is possible.

Administering 2×125 mg/d acetazolamide results in fewer adverse effects while the effectiveness remains the same (3). Tadalafil has been recommended, although the data are scarce and substantial side effects at high altitudes have been reported.

We cannot but agree wholeheartedly with the authors in that nifedipine and dexamethasone are essentials in a mountain guide's emergency kit. We would make this a requirement for every mountaineer at high altitude.

Summarized, these critical remarks intended to point out some limitations of the article, and it should be used with care for the purposes of CME.

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Professor Löllgen has received honoraria for acting as an adviser from Actavis and ESA. Drs Küpper and Gieseler declare that no conflict of interest exists.

**In Reply:**

We thank our correspondents for their comments and critical remarks, which enable us to explain the most important points raised in some more detail. We were asked to provide a review article that enables general practitioners to grasp the basics of altitude medicine, and not a systematic review; this would not have been feasible in view of the available space. Our recommendations are based on studies that are methodologically sound and in case of scarce data on experts' opinions, which we referenced.

Our recommendation of a fixed time period of three months after acute events, such as myocardial infarction, stroke, thromboembolism, and/or after implantation of a cardioverter defibrillator came in for criticism. Our recommendation is shared with experts on altitude medicine (1). We thought that such expert opinions were useful for a non-specialized target audience. Whether the latency period may be shortened in some selected cases, if the conditions stipulated for a visit to altitudes between 2000 meters and 3000 meters are met (*Box*), is up for discussion. These conditions are of course determined by the type and severity of the illness, as emphasized by our correspondents.

When criticizing our comparison with migraine, Küpper and colleagues may have missed the fact that we were talking about acute altitude sickness and not headache. In acute altitude sickness, the headache is often intensified by physical exertion; nausea and vomiting are often present. This has been confirmed by a study of 1285 mountaineers, by using the Kiel Headache Questionnaire (*Kieler Kopfschmerzfragebogen*). In pronounced acute altitude sickness, at 4559 meters, the diagnostic criteria for migraine were met in 65% of cases (2).

We would like to point out to Küpper et al that all “deviations from the study protocol” in our publication (reference 2 of your letter) were explicitly mentioned—however, they did not affect the negative result. We think it is highly improbable that repeated short-term exposures to hypoxia, such as is nowadays offered by fitness studios, can achieve clinically

relevant prevention of acute altitude sickness in rapid ascents to altitudes higher than 4000 meters.

The study cited by Küpper et al (reference 3 in your letter) for the prophylaxis of acute altitude sickness with 2×125 mg acetazolamide was conducted in a highly selected study cohort at low risk of acute altitude sickness during trekking at altitudes between 4200 and 4900 meters. The findings cannot be generalized beyond this special setting, especially since a meta-analysis (3) and a study on Kilimanjaro (4) question even the effectiveness of 2×250 mg. We therefore continue to recommend 2×250 mg for non-acclimatized individuals living at or near sea level, who have to or want to rapidly ascend to altitudes beyond 4000 meters.

In conclusion, we would like to point out that tadalafil is also recommended for the prevention of altitude pulmonary edema by the experts whom Küpper et al cite in their reference 1, and that we do not think that nifedipine and dexamethasone should be essential in any mountaineer's backpack. These drugs should be given only to mountaineers who, on the basis of their medical history, are at particularly high risk, who have been trained accordingly, and who are able to handle these drugs responsibly.

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