

Drug-food interactions in mountaineering

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According to a recent paper published by the researchers Aritz Urdampilleta-Otegui, PhD in Physical Education and Sports and lecturer in the Department of Physical and Sports Education of the UPV/EHU-University of the Basque Country and at the Government of the Basque Autonomous Community (region), and Saioa Gómez-Zorita, PhD in

Pharmacy and Food Sciences and researcher at the UPV/EHU's Department of Pharmacy and Food Sciences, it is necessary to control the administering of drugs that interact with the foods consumed and which may be detrimental for the health of the mountaineer.

Among the main performance-limiting factors in mountaineering are muscle glycogen depletion and increased protein catabolism, hydroelectrolyte imbalance, and Acute Mountain Sickness (AMS). An optimum diet is essential for withstanding this situation of great stress experienced at [high altitudes](#) and stays in excess of three weeks. Even so, AMS in mountaineers is sometimes inevitable and in these cases drugs are used to tackle this situation, which if this is not done under strict control, the supplementing could endanger the health of the mountaineer owing to the potential interactions that could arise with the food or nutritional ergogenic aids consumed.

More and more tourists head to high mountains or participate in high-altitude trekking. Many of them have not had previous experience in high mountains. These stays lead to great changes in physiological terms like increased heart rate, increased systemic and pulmonary blood pressure, hyperventilation, fluid retention, decreased haemoglobin saturation (SaO₂), among others. Owing to the difficulties involved in hypoxia, intense cold and doing exercise in conditions of little food, climbing up to high altitudes leads to routinely resorting to nutritional ergogenic aids or drugs. So updated information on the scientific evidence relating to pharmacological and nutritional ergogenic aids and potential interactions between them is of crucial importance.

Acute Mountain Sickness

At high altitudes, in particular above 4,000 metres and depending on individual susceptibility to hypoxia, it is normal for the appetite to diminish and for significant weight loss to occur. In particular, when one

sleeps above 4,000 metres it is common to suffer from AMS, which is characterised by the onset of symptoms like headache, dizziness, nausea, insomnia, general fatigue and lack of appetite, among others. This appears in healthy mountaineers who climb high mountains. These symptoms typically develop during the first 6-10 hours of the ascent and register a peak on the second or third day of the stay. The incidence of AMS is variable but relatively high. At altitudes of between 4,000-5,800 metres 67% of the subjects are affected. Failure to properly control AMS can lead to cerebral oedema and risk of death. In this situation the mountaineer is no longer aware, is disoriented and does not coordinate properly, and this may lead to mistakes that could cause a serious accident.

The latest research suggests that preconditioning prior to ascent in intermittent hypoxia with a minimum of 12 sessions (2-4 sessions/week) undertaking aerobic-anaerobic physical activity at above 4,000 metres helps to prevent AMS. Likewise, it has been shown that it is effective training for improving resilience in a range of sports.

The piece of work by the UPV/EHU researchers has studied the nutritional and health situations existing at high altitudes as well as the routinely used nutritional ergogenic and pharmacological aids. After that, an assessment was made of the drug-food interactions that may arise, as well as the risks of these interactions for the health of mountaineers, and the following conclusions were reached:

- At high altitudes the seriousness of AMS affects the appetite and food intake of mountaineers.
- Particular attention needs to be paid to the use of drugs for AMS, as they could conceal the usual symptoms of AMS and, as a result, it is possible to go on climbing up until the moment when the body cannot become acclimatised to the altitude.
- Food supplements containing vitamin E before the stay and the

taking of iron and vitamin C during the mountain-climbing activity is crucial.

- Isotonic beverages, glycerol, caffeine, aaR, omega 3 Fatty Acids and Ginkgo Biloba can be effective as nutritional ergogenic supplements.
- To tackle AMS, supplements (Ginkgo Biloba), diuretics, analgesics and, as a last resort, corticosteroids as well as immunomodulators are used. Acetazolamide has turned out to be the most effective drug for preventing AMS.
- In states of malnourishment, the interactions between nutrients and nutritional ergogenic aids and drugs can be greater, the most dangerous ones being the ones that take place between vasodilator supplements (omega 3, ginkgo biloba, garlic pearls, precursors of nitric oxide and acetyl salicylic acid).
- The mixing of diuretics (acetazolamide) with corticosteroids (prednisone or dexamethasone) is not recommended.

More information: Urdampilleta, A. and Gómez-Zorita, S. (2014) Aspectos ergonutricionales e interacciones fármaco-alimentarias en el alpinismo/Nutritional ergogenics aspects and drug-food interactions in mountaineering. Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte. Pendiente de publicación / In press. [cdeporte.rediris.es/revista/in ... /artaspectos579e.pdf](http://cdeporte.rediris.es/revista/in.../artaspectos579e.pdf)

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