The Newsletter of the International Society for Mountain Medicine

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International Society for Mountain Medicine

The International Society for Mountain Medicine, founded in 1985, has the following goals: to bring together physicians, scientists and allied professionals interested in mountain medicine; to encourage research on all aspects of mountains, mountain peoples and mountaineers; to organize and co-organize international scientific meetings and publish a newsletter to spread scientific and practical information about mountain medicine around the world.

FROM THE EDITOR

This is the final edition of the ISMM Newsletter for this millennium and has been put together for you from the new editorial location in Vancouver, Canada. Please note the new mailing, fax and email addresses on the cover of this newsletter, which should be used for your submissions in to 2000!

Please note that all communication with the Society about membership and subscription issues should be directed to Bruno Durrer, address also on the front cover of the newsletter. Please check the back page of this edition of the Newsletter where Bruno has listed some of the members of the ISMM who are missing from the membership address list. We would like to get them back for the millennium and would be grateful for your help in tracking down these individuals. Please also encourage your colleagues who are interested in mountain medicine to join the ISMM and contribute to the Newsletter in the new millennium.

This edition of the Newsletter contains some varied articles covering pressing issues in mountain medicine including water disinfection and hypoxic interval training. I hope you continue to enjoy receiving the Newsletter. So much effort goes in to getting it to you from the moment an author somewhere in the world writes their first word to the day the print run begins in Paris. Please let us know if the newsletter provides what you want, if you agree or disagree with the content and if you think you have a suggestion for a topic to be covered or a case to discuss. Just get in touch.

AJP

FROM THE PRESIDENT

As stated on the front page of each newsletter, one of the goals of ISMM is to spread scientific and practical information around the world. This newsletter demonstrates again, as any of the previous ones, that our editor and his authors do an excellent job providing most interesting and stimulating articles about both scientific and practical aspects of mountain medicine.

At present, there are only 450 copies of each newsletter sent out. This number is embarassingly low considering the effort put in, by the authors, in the quality of the information and the size of the international community that we would like to reach. An underestimating approximation of the size of this community can be derived from the number of members of the national societies of mountain medicine known to me.

Country	**Members**
Austria:	1150
France:	520
Germany:	180
Italy:	100
Japan:	350
Spain:	70
Switzerland:	280

To this total of 2650 members we have to add a probably smaller portion of the 4000 members of the Wilderness Medical Society in North America and members of national societies which may not be known to us.

At the beginning of last year we tried to recruit by a special newsletter new members among [illegible] we only recruited about a 100 new members. We suspected that most members of national societies like to get information on mountain medicine in their native language. Thus, the potential for recruiting additional members from this group is small. As these national societies profit considerably from the newsletter of ISMM and often pass on this information in their national bulletins, the executive committee of ISMM agreed to submit the following proposals to national societies of mountain medicine: National societies are invited to obtain a special status of institutional membership with ISMM at a price of about 5% of their annual income from membership fees. In return, the societies would obtain the right to:

a) use the ISMM logo (‘label‘)
b) gather and translate whatever information they want from the newsletter
c) have a section with news from the respective country in the ISMM newsletter (on an optional basis from their part)
d) obtain representation in the executive committee of ISMM if they are not already represented by a ”constitutional” member.

Representatives from the various national societies responded positively to these proposals and indicated that they would propose and support the concept of institutional membership with ISMM to their members at the next general assembly. Thus I hope that these national societies will acknowledge and support the work of ISMM to bring together physicians, scientists and allied professionals interested in mountain medicine by joining us as [illegible]

WATER DISINFECTION METHODS EMPLOYED BY MOUNTAINEERS VISITING THE EVEREST AREA OF NEPAL

Is there a correlation between those using unsafe methods and those contracting diarrhoea?

Introduction

Water disinfection can be difficult for mountaineers and, as trekking in Nepal becomes more popular, the risk of selecting contaminated water increases. Avoiding gastrointestinal (G.I.) infection, however, is of huge importance to mountaineers. Studies have indicated that mountaineers may suffer an altered immune system and impaired host defences when exposed to high altitude, making them more prone to infection [Meehan, 1987]. Diarrhoeal infection can also have a number of important adverse consequences at altitude. G.I. infection has been linked with an increased incidence of acute mountain sickness (AMS) [Murdoch, 1995] and is also known to increase dehydration. Dehydration, in turn can be linked with increased risks of hypothermia, frostbite, accidents [Wilkerson,1992] and risk of blood clotting at altitude [Peacock, 1997].

The aims of this small-scale study were twofold; firstly to establish which methods of water disinfection are being used by mountaineers visiting this area. Secondly, to determine if there is a correlation between those using unsafe methods of disinfection and those contracting diarrhoea.

Which methods of water disinfection are safe for these Mountaineers?

Boiling

Boiling is regarded as a reliable method of disinfection. Although water boils at a lower temperature at higher altitudes, the boiling temperature and the time required to reach that temperature, should be adequate to kill disease producing micro-organisms, including parasitic cysts, bacteria and viruses [Wilkerson, 1992; Neumann, 1997; Backer, 1996].

However, some problems with boiling do exist. Backer [1996] for example, recognises that there is concern over Hepatitis A virus (HAV) as it has increased thermal resistance. Consequently, some centres are still recommending boiling for one minute to allow for an extra margin of safety. Cyclospora has also been found in Nepal and are said to be heat stable [Philipp,1992]. Any mountaineers that visit shortly after the monsoon, up until November, will need to take extra precautions with their water (see advice for mountaineers later).

Other recognised problems with boiling are not with its safety but its inconvenience and time consuming nature. Fuel must be carried, and if wood is used in the huts, this is obviously going to have effects on the local resources. One kilogram of wood is required to boil one litre of water [Chaudhuri, Saltar, 1990]. Even more wood may be required at altitude.

Chemical treatments

Chlorine has been seen by many authors to be unreliable in a wilderness environment [Wilkerson, 1992; Ongerth, 1989; Garelick, 1992; Kahn, Visscher, 1975].

Silver is seen as less effective than other chemicals [Nomad pharmacy, 1996].

Iodine is often recommended as it is less affected by the pH and organic content of the water than chlorine. As with most chemical reactions, however, iodine's activity is slower in cold water. Contact time or concentration needs to be increased both in this case and also if the water is cloudy or coloured to compensate for the binding of the disinfectant to organic compounds [Wilkerson, 1992]. It seems apparent that further studies are needed on cold temperature use. Currently, recommendations on dosages and contact time vary, and it is impossible to detect if the water is potable after treatment in the wilderness.

There is also concern about the effects of continued iodine use on expeditions. In a large scale study cited by Wilkerson [1992] only those with previous thyroid problems were adversely affected. However, most of these study subjects were ingesting much lower doses of iodine than a mountaineer would, relying on this as the main method of water treatment on an expedition.

Unfortunately, little information is available on iodine's effects on Cyclospora. Cyclospora is, however, said to be resistant to iodine [Howarth, 1995]. Fortunately, mountaineers miss the worst of these pathogens, which are more prevalent in the lowlands from May to November. The mountaineering season may over lap slightly with the end of this risk period when the numbers of pathogens are likely to be decreasing. Iodine, if used with extra care e.g. filtering for murky water and during the high risk months, is regarded as a safe disinfectant.

Filtering

Used in combination with a chemical disinfectant (preferably iodine), filters are beneficial, but are not generally recommended as a single step process. Filter manufacturers often make claims that have not

1997]. It is also difficult to recognise when filters are damaged and no longer functioning effectively. As King [1992] stated, no uniform, objective, agreed, standards exist for such devises, and external safeguards are generally lacking. Filter pores are often too large to remove viruses. Although filters are improving, a healthy skepticism over manufacturers claims should be maintained.

DESIGN AND IMPLEMENTATION

Twenty two mountain guides and independent mountaineers (i.e. those not on an organised climb with a trekking company) that had visited the Everest area of Nepal were sent a questionnaire. Four mountaineers / trekkers that had climbed some of the lower peaks above base camp height, 19 000 ft. were also interviewed over the phone using the same questionnaire (two of these were on organised treks.) Mountaineers were asked to answer the questions with regard to their most recent visit to the area. The sample was selected by two professional guides.

Results

In total 26 mountaineers were questionaired and 19 responses were obtained (73% response rate.)

What methods of water disinfection are used by mountaineers to the Everest area?

One mountaineer stated that he did not treat any water in any way and relied totally on purchased drinks and did not suffer with watery diarrhoea that occurred more than three times a day.

Boiling

All of the other mountaineers (18) said that they had at some stage, boiled water to treat it.

On the trek in, a majority, 10 of the 18, claimed that they allowed their water to boil for a minute or more. Some mountaineers in this group, 4 in total, said they boiled their water for 5 minutes or more. Only 5 of the 18 (28%) simply brought their water to the boil (see Figure 1).

On the mountain peaks however, water disinfection methods were possibly more relaxed. Four of the mountaineers (22%) simply melted the snow and ice rather than allowing it to boil. Seven of the 18 mountaineers (39%) relied totally on boiling as their method of disinfecting the water. They did not carry chemical treatments or filters.

Chemical treatments

Eleven mountaineers (61%) also used chemical treatment methods. Only one person used a filter to back up this treatment. No mountaineers' stated that they used a filter as a single step treatment (see Figure 2).

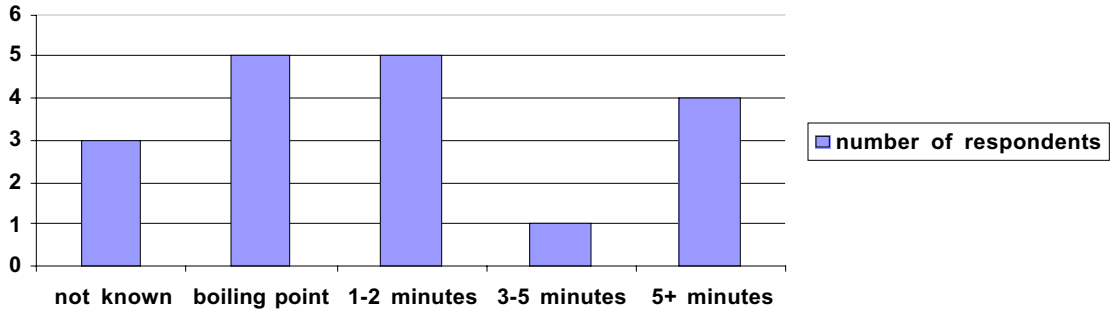
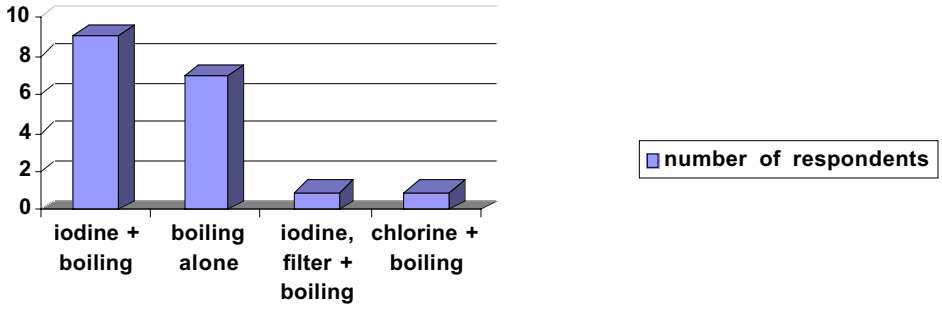


Figure 1: Boiling times used by the mountaineers on the trek in.



Out of the 11 people using chemicals (See Figure 3), one used iodine crystals, two used iodine tablets, eight used iodine liquid, one used chlorine. (One person was included twice in the above figures as he had used both iodine tablets and liquid).

Is there a correlation between unsafe methods of water disinfection and those suffering with diarrhoea in these mountaineers?

It was apparent that statistically, the sample was too small to make any statements on such a correlation. Some mountaineers had to be omitted from the calculations as they had used methods that were borderline between the safe and unsafe groups, others were not sure on the exact time and dosage used.
Four mountaineers were using unsafe methods (although many others guessed at unsafe regimes). The incidence of diarrhoea that occurred in this group while or just after they had treated the water was only 1 out of the 4 or, 25 % of this group.

The incidence of diarrhoea in the group using safe methods of disinfection was 50%, 4 out of the 8 were affected.

Out of all of the 19 mountaineers questioned, 47%, contracted travellers diarrhoea (TD, defined as watery diarrhoea that occurred more than three times a day). Five of those contracting TD commenced with their symptoms while in Kathmandu. Of this group, 4 had diarrhoea on arrival to the country, when only 2 were treating their own water (safe methods), the other two were relying on urchased drinks. Only 4 of the 9 had TD that started on the trek in or on the peaks.

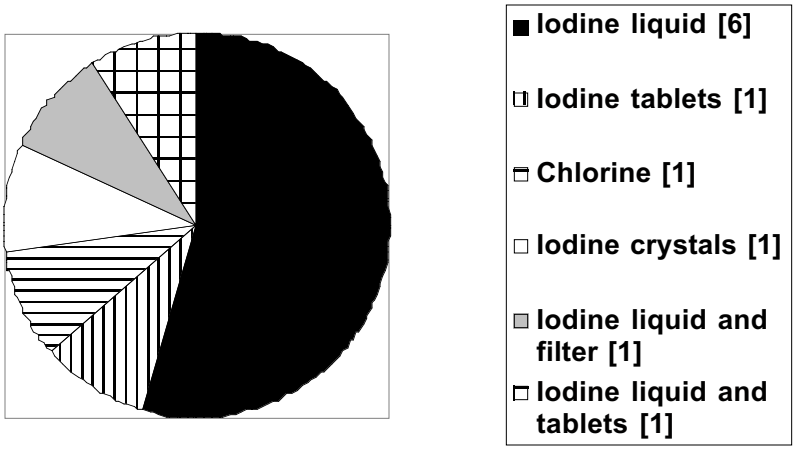


Figure 3: The chemical disinfectants used by the mountaineers

Discussion and Recommendations
The mountaineers in this study are mostly very experienced, their methods of water disinfection may not represent those used by a wider group of mountaineers. They may be using safer methods due to experience. They may also have stopped using chemicals for concerns over the continued, frequent use of these disinfectants. However, the results of the study show some interesting points to be highlighted.
Surprisingly, a large number of mountaineers (39% of this group) relied totally on boiling. This may be due to the concerns over long term, continued, chemical treatment use. However, boiling alone can be inconvenient and time consuming especially for large quantities of water. Above 4,600-4900m fluid requirements often exceed 4 litres per day [Wilkerson, 1992], it could be questioned whether these low temperatures at altitude, this treatment would take some considerable time and much fuel must be carried and used. Four of the mountaineers actually stated that they boiled their water for 5 minutes or more, this must take up allot of fuel for this quantity of water.
Iodine was used by many of the mountaineers, 10 out of the 18 (55%). Liquid iodine was by far the most popular choice. Mountaineers, it seems, are aware that iodine is the safest of the chemical treatments. However, this popular choice of liquid iodine may not have been the best. Two studies have shown that the tincture of iodine is slower than the crystals and tablets at inactivating Giardia cysts [Ongerth, 1989; Jarroll *et al*, 1980]. A few authors have also stated that the tincture of iodine actually imparts more taste to the water than the other two options [Wilkerson, 1992]. It seems that the crystals have the least

mountaineers used this method. Crystals supposedly last longer and are therefore cheaper, than the other iodine treatments. They supposedly impart less taste to the water than the tincture and produce a less stinging solution for wound cleansing [Wilkerson, 1992]. It is apparent that mountaineers could benefit from further information on these crystals.

Type of Chemical used	***Method***
Iodine crystals (1 person)	Followed the instructions and thinks that he waited the recommended time but could not remember the time given or the dosage.
Iodine tablets (2)	1 used 1 tablet and left it for 20 minutes, 1 used 2 tablets and left it for 20 minutes.
Iodine liquid (8)	1 used 3-4 drops for 30 minutes, 1 used 5 drops for 20 minutes, 1 used 4 drops and left it 1 hour, 2 used 5 drops for 30 minutes, Three could not remember fully:- 1 used 1 drop for 20 minutes (but was not sure) 1 used 2-3 drops and waited the recommended time yet could not remember how long this was, 1 followed the dosage instructions but did not wait the recommended time, he did however, use a filter with silver (MSR waterworks)
chlorine (1)	Used 1 steretab for 30 minutes.

One significant concern that is highlighted from the mountaineers descriptions is the apparent lack of clear advice on the contact times and dosages needed to disinfect cold water. This problem is likely to affect a larger group of mountaineers. Nearly all of the group had used different regimes. More importantly, the results suggest that many of those using iodine were not doing so safely according to the recommendations for cold water [Garelick, 1992; Wilkerson, 1992; Neumann, 1997; Walker, 1997]. Of the seven that had remembered the dosage and contact time used, only 2 had at least doubled either the contact time or the dosage to compensate for the cold temperature of the water. More available, clear, information is obviously needed for these travellers' on chemically treating cold water.

The fact that only one of these mountaineers had used a filter with the chemical treatments was also surprising. This may be due to the filters receiving bad publicity from various travel medicine experts. A quality filter should be able to remove the parasitic cysts. These tend to be quite resistant to the iodine at small doses or short contact times. The two together, a filter and iodine, are certainly seen as an effective disinfection regime.

The study failed to achieve its second aim, investigating if there is a correlation between unsafe water and T.D. in this group. In this small sample, certainly no correlation was seen. However, due to the small sample size, these findings are not statistically significant.

Other findings not related to the aims and objectives can be found. The incidence of diarrhoea in this group was 47%. However, 60% of the cases of diarrhoea commenced during the stay in Kathmandu. Although some of these six mountaineers were disinfecting their water at this time, they were all using what would appear to be safe methods. It is more likely then that they picked up an enteric pathogen from a source other than their treated water.

Significantly, two had climbed with constant symptoms of infection, so at least some mountaineers were not aware of the available and effective treatments. Again, these were experienced people who were more likely to know about treatments than novices to the sport. Even one days worth of ciprofloxacin is said to greatly reduce GI infections [Neumann, 1996]. Although in normal circumstances it is not recommended to take antibiotics for TD, when troublesome symptoms persist for a long time antibiotics could be a sensible idea. This is especially so considering the additional risks to mountaineers of dehydration and infection. The common enteric pathogens in Nepal are all treatable by ciprofloxacin or metronidazole. [Neumann, 1996].

Recommendations for mountaineers visiting Nepal.

Boiling can be recommended to intending visitors to the area. However, it can be inconvenient and time consuming for large quantities of water especially when climbing. Another method to use when boiling is not practical or convenient, is chemical disinfection by iodine. Crystalline iodine appears to be the most satisfactory of the various iodine options. Mountaineers must be aware that they need to at least double the standard contact times or dosage for cold water. Using a quality filter with this treatment is worthwhile, especially for murky water. Professional mountaineers or people relying on treated water regularly may be rightfully concerned about the effects of long term iodine use. Partially heating their water and /or filter use may allow these mountaineers to save fuel and reduce their iodine intake.

Mountaineers visiting Nepal between May and November should be aware of Cyclospora. Extra care with water disinfection should be recommended. Selecting running water rather than water from pools or mountain lakes and, using filters to remove particles is sensible.

With the risks to mountaineers of infection and dehydration being quite high, antibiotics are a sensible treatment option for troublesome, lasting, symptoms. Ciprofloxacin or Metronidazole would treat the majority of the pathogens prevalent in this area. Obtaining adequate verbal and written information on the use of these medications prior to the expedition is recommended. Mountaineers should be aware of the problems of infections and dehydration at altitude. Finally, as many of the mountaineers seem to contract TD in Kathmandu, warnings that extra precautions are needed here would be worthwhile. Discussion on the other factors that can cause TD would be useful.

Summary

In a small group of experienced British mountaineers it was found that many (39%) are relying on boiling totally, to disinfect their water. Many of those mountaineers that also used chemical disinfection methods were not using sufficient contact times and dosages to treat the cold water. Further information is indicated for these mountaineers on the recommended contact times and dosages, the long term effects of regular iodine use, and the most effective yet convenient chemical treatment (possibly iodine crystals). The study failed to find a correlation between TD and those using unsafe methods of water disinfection. Limitations in the study's design and size however, suggest that these findings are not statistically significant. The results did suggest that mountaineers would benefit from more information on the use of antibiotics to treat troublesome GI infections.

Lynda Bramham, UK

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BAD WEATHER

February 1999. It's snowing again outside. The headlines mention that some 100.000 people are blocked in mountainous areas in Switzerland, Austria and other European Alpine countries. Most of the numerous avalanches are coming down along known paths and are due to exceptionally heavy snowfall and rain, but in several places avalanches choose paths unknown to be avalanche prone and several people are victim to avalanches destroying one hundred year old chalets.

In some places skiers and snow boarders accidentally set off avalanches. A few skiers seen skiing off-piste, even some that did not actually trigger avalanches, are arrested and put to trial. They are considered a threat to others. In an attempt to prevent accidents the government of the Savoy region in France votes a decree that forbids off-piste skiing. The ski resort Chamonix reacts by closing the lifts. It reasons it cannot carry the risks of bringing people up the mountain and not being able to keep them on the groomed runs. The Savoie region then quickly withdraws the decree and Chamonix opens again. Professional mountain guides continue to bring clients outside the groomed runs arguing that they know the environment well enough to adequately judge the risk involved.

Then 3 men get trapped in a snowstorm somewhere else in the French Alps and survive 8 days in an igloo. A last desperate but well engineered phone call with an empty battery cellular phone gets them rescued by helicopter. The rescue personnel takes risks, but the 3 victims are brought back to civilisation and are heralded as heroes. In France mountain rescue is, strangely enough, still a 'free' service paid for by the taxpayers, although voices are heard that advocate payment by the rescued.

These few lines taken from the media this winter nicely illustrate some aspects of the friction that exists between commerce, public health and individualism. It's all about marketing the quest for adventure. One only has to open a few travel magazines or brochures to see the ads for adventure destinations. Prices are 'all-included', but one thing is forgotten. Risk. We have recently all read about what can happen on a commercial expedition to Mt Everest. But risk is everywhere, also on a ordinary winter holiday in Europe. Can there be something like a safe mountain adventure? People that leave for modern adventure are perhaps not always aware of the possibility of the risk of actually getting into 'real' adventure. Leaving for a week of snowboard camp and getting snowed in and cut off from civilisation by avalanches for several days with no electricity would be an easy example. Being bitten by an angry frothy mouthed dog on a trek somewhere in Tibet 4 days walking of the nearest road head would be a nastier one. Being swept off the mountain by an avalanche while skiing on an open and groomed slope has happened several times.
But isn't this all a problem of risk assessment and risk management? Or is it actually a real problem? What is the comparison to other public health problems? What is more dangerous, going to the mountains by car on a holiday Saturday on the highway from Paris to Chamonix, or actually climbing Mt. Blanc the next day? The latest statistics on car victims in France show the highest numbers ever with more then 20 deaths every day in 1998. That's a lot compared to all other risks, including that of dying in the mountains when skiing with the

family. But attempting to climb some of the 8000+ meter peaks carries a risk of a few percent, which I consider a very high risk to take consciously. So, better public appraisal of risk would help. But perhaps we also need more awareness of what wilderness is about. Wilderness is just what it says that it is, but people very often don't realise it. Information is a means of prevention. In the end we need a balance between individual freedom of choice, even if sometimes foolish, while keeping in mind one's responsibility towards the community as a whole. And information is vital to this end. So what can be our role? Prevention comes by means of information. As professionals in mountain medicine it is our duty not only to treat or rescue but also to inform and prevent. Not just by prescribing acetazolamide, but also by conveying a message. A message on the difficulty of getting our delight from being in the wilderness, without staying there forever. A message of remaining humble towards nature.

Geneva, March 99.
Bengt Kayser

THE CLINICUM LABIORATORIO AUTOMATIZADO FOR STUDIES OF THE RESPIRATORY PHYSIOLOGY OF ANDEAN SMALL MAMMALS.

The Clinicum laboratory is a private facility that contains a clinical laboratory and a research laboratory for the study of Andean small mammals. It is located in Iquique, Chile, by the Pacific Ocean. The research laboratory is equipped with up to date facilities for the study of oxygen consumption and ventilation of four species: Chichilla lanigera, Chinchilla brevicaudata, guninea pig (Cavia porcellus) and the laboratory rat. The research aims at the selection of an animal model for the study of adaptation to high altitude in humans. The standard model for adaptation studies to high altitude is the laboratory rat. This animal is very intolerant to both hypoxia and cold. It is an international model for mechanistic physiology but is of limited value for high altitude adaptation physiology.
The laboratory has low barometric chambers that operate at 22 degrees and at 10 degrees centegrade. The plethismographic equipment operates in hypoxic gradients from 150 Torr down to 35 Torr at 22 degrees and at 5 degrees. The laboratory receives help from a large foundry owned by the director of the laboratory. This large industrial operation helps in the service, design and construction of diverse instruments. There is a dealer in Miami, Florida who facilitates the importation of equipment from the US. Because Iquique is a free port, the importation of equipment can be done quickly and free of import duties.

The protocols that are being used at present study the respiratory parameters in hypoxic and hypothermic gradients before and after acclimatization to hypoxia and to cold for periods of three weeks. The final protocol will expose the animals to both hypoxia and cold and compare the results with those obtained in sea level conditions.

Preliminary results shows that the guinea pig seems to be an ideal animal for studies of adaptation to high altitude. It has Andean origin, hemoglobin of high affinity, it is very resistant to hypoxia and cold and has remarkable uniform ventilation that allows the registration of good plethismographic records.

From Iquique national high altitude parks can be reached by automobile in a few hours drive on excellent roads. This allows the use of terrestrial and aquatic species for research with permission from the park authorities.
It is hoped that scientists interested in comparative high altitude physiology will visit the Clinicum laboratory using its facilities for collaborative studies.

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RECOMMENDED CHANGES IN THE LAKE LOUISE ACUTE MOUNTAIN SICKNESS SCORING SYSTEM.

Introduction

The Lake Louise scoring system has been useful in standardising the collection of information on the key symptoms of acute mountain sickness (AMS). This has enabled data from different studies to be compared. We recommend that the self-assessment section of the questionnaire should be completed at least twice a day to capture changes in clinical features during ascent to high altitude. As a result the question on sleep becomes redundant later in the day. We have also been concerned that better quantitation of central nervous system changes is required, particularly on the useful clinical feature of ataxia which is currently one of the signs in the clinical assessment section. We suggest the rather non-specific question on dizziness be replaced with a more specific question on balance.

In this way the number of questions remains the same, whatever time of day is chosen for completion of the questionnaire. However the morning questionnaire is likely to have the sleep question answered, with ataxia not applicable, and vice versa later in the day. A score of three points or more remains the diagnostic threshold for AMS. Some minor changes to the wording of the questions are suggested to reduce ambiguity.

M. Beazley, P. Hillenbrand, PJG Forster, A D Wright, AR Bradwell.
Birmingham, UK

Current

Headache

0 None at all
1 Mild headache
2 Moderate headache
3 Severe headache, incapacitating

Gastrointestinal symptoms

0 Good appetite
1 Poor appetite or nausea
2 Moderate nausea or vomiting
3 Severe, incapacitating nausea and vomiting

Fatigue and/or weakness

0 Not tired or weak
1 Mild fatigue/weakness
2 Moderate fatigue/weakness
3 Severe fatigue/weakness

Dizziness/lightheadedness

0 None
1 Mild
2 Moderate
3 Severe, incapacitating

Difficulty sleeping

0 Slept as well as usual
1 Did not sleep as well as usual
2 Woke many times, poor night's sleep
3 Could not sleep at all

Proposed

Headache

0 No headache
1 Mild headache
2 Moderate headache
3 Severe headache

Appetite

0 Normal appetite
1 Loss of appetite
2 Nausea
3 Vomiting

Energy

0 Normal energy
1 Mild lethargy
2 Moderate lethargy
3 Severe lethargy

Balance

0 No loss of balance
1 Mild unsteadiness
2 Moderate unsteadiness
3 Difficulty standing

Sleep

0 Slept as well as usual
1 Did not sleep as well as usual
2 Woke many times, poor night's sleep
3 Could not sleep at all

HYPOXIC TRAINING: APPROACHES TO ACLIMATIZATION

1. To improve competitive performance
At altitude
At sea level
2 To improve acclimatization for work or play at altitude by decreasing symptoms of mountain sicknesses
3 To treat various illnesses at sea level

1.To improve competitive performance

In many competitive sports a fraction of a second makes the difference, and various methods for training have been studied ever since the Pan American Games in Mexico City in 1956 demonstrated the effects of competing at altitude. Even earlier a large decompression chamber at Kienbaum (1) was used by the East Germans to train athletes for the Olympics.

Some competitors have lived and trained in a mountain environment; others have lived at altitude but trained closer to sea level. The emerging consensus is that one cannot train at maximum performance above 2,000 m, but that sleeping high and training low may improve performance at sea level. Nevertheless, many competitors believe that for competition in endurance sports at either **low or high altitude** they do benefit by living and training near 2000 m. For very short duration exertions, it makes no difference where the athlete trains.

Levine wrote for the Hypoxia Symposium in 1992 (later paraphrased elsewhere (2):
"... Combining high altitude acclimatization with low altitude interval/intense training in well trained competitive runners results in significant improvement in sea level 5,000 meter times above and beyond those achieved by an equivalent sea level or high altitude control."

In 1999 Fulco (3) wrote:

"Training and/or living at altitude can improve altitude exercise performance in athletic events … lasting more than about two minutes.... Controlled studies do not support a beneficial effect of altitude training on subsequent sea level performance... Living at altitude but training at a lower altitude permits the theoretical advantage of both acclimatization and training without reducing exercise intensity. This paradigm appears promising but is till open to question since altitude natives training at altitude with oxygen supplementation (in effect "living high, training low") did not improve maximal work capacity more than altitude natives training at altitude without oxygen supplementation."
Training for competitive sports has been extensively discussed elsewhere and will not be covered here. This paper is directed at "training" or "preparation" for a sojurn at high altitude, such as a short trip to moderate elevation or a longer expedition to much higher altitude.

2.To improve acclimatization for work or play at altitude

More and more people are going to the mountains at 2-3,000 m, and much higher in the Himalayas and Andes. Many are in a hurry and believe they cannot take the time needed to adjust and enjoy whatever they go to do. So they look for ways to speed up the acclimatization process which will protect them from mountain sickness. What choices do they have?

First there are medications that might be called artificial acclimatizers such as acetazolamide (Diamox) and dexamethasone. These are effective and relatively free of side effects, but some mountain lovers don't relish the idea "if you can't take time, take Diamox". Some claim, wrongly, that acetazolamide "dangerously masks the symptoms of mountain illnesses".
A better way is to go up in stages - spending a few days at intermediate altitudes before going to a mountain destination, or taking a week or two to walk from a low valley to a Himalayan base camp. Once at base camp, climbing a few hundred feet higher each day, will acclimatize the climber to move further up the mountain. Such "siege" tactics take time but do minimize the risk of altitude sickness. Siege tactics are a form of "hypoxic training".

Other approaches have been tried for almost a hundred years. In 1886, Oertel (4) recommended a program of walks at gradually increasing elevations for the treatment of *"weak heart muscles, poor pulmonary circulation and obesity"*. During WWII some aircraft pilots were sent to mountain resorts to prepare them better for very high altitude combat. Mining is routinely conducted above 18,000 feet, and several living and work protocols have been studied to make workers more effective and less susceptible to mountain sickness (5). Among these are sleeping in oxygen-enriched rooms at the altitude worksite, staging the ascent, or alternating a week at altitude with a week lower down.
Of current interest is whether **brief** periods at simulated altitude will improve performance and minimize mountain sickness during a subsequent visit to **moderate** altitude. Several methods have been advocated and widely advertised to experience altitude without going to the mountains (6).

In 1990 Richalet (7) directed a project called "Everest Turbo", in which five experienced mountaineers were taken for seven days to 4350 m and 4807 m in the mountain environment and then progressively higher for several hours each of the next four days in a decompression chamber. They were then flown from France to Nepal and driven into Tibet, reaching 5200 m on Everest five days later. They immediately started to climb and in four days reached 7800 m but were unable to go higher because of bad weather. Hard data was collected only in France; the experiment was thought a success because the subjects climbed higher faster than an envelope of 305 mountaineers have done on Everest.

way an attempt to prepare climbers for a high altitude expedition.

Acclimatization by exposure to gradually increasing hypoxia has the following effects: increased red blood cell production by release of EPO, increased minute volume of ventilation, temporarily increased cardiac output, decreased sympatho-adrenergic stimulation, decreased exercise capacity, and, depending on the degree of hypoxia, slowed cognitive responses (8).

These responses fit into the General Adaptation Syndrome, or Stress Response described by Selye (9) many years ago. Selye hypothesized that a stressor provoked an "alarm reaction" consisting of physiological changes to mitigate the stress. After some period, dependent on duration and intensity of stress, the organism either adapted by sustaining some of the responses, or deteriorated, ultimately dying. Applying Selye's theory to high altitude, we find that up to a certain point (roughly 5500m), these responses are protective and we call them acclimatization, but after longer exposure to severe hypoxia they are counterproductive and lethal.

Finding other methods of acclimatizing has stimulated several techniques for "hypoxic training" at sea level in low oxygen rooms or tents or in decompression chambers. Some approaches call for an hour or two once or twice a day, others for twenty minutes several times a day, still others for sleeping in the simulated altitude environment. Many Scandinavian hotels have special low oxygen rooms, and in this country several athletic clubs offer either low oxygen rooms or low pressure chambers (10). Different models for home use are on the market. This has become a popular method for getting ready for a visit to a moderate altitude.

Unfortunately little hard data has been collected to indicate whether these various procedures have any beneficial effect. They are expensive and, as is true of many costly products, some of those who use one of the techniques are enthusiastic.

3. For treatment of various illnesses

During the last ten years the Moscow Hypoxia Medical Academyhas collected data during Interval Hypoxic Training (IHT) to treat a variety of medical problems (11). IHT consists of 'courses ' of cyclic repetition of brief normobaric hypoxic episodes and subsequent re-oxygenation. The intensity and duration is customized for specific diseases and individuals. The hypoxic mixture is administered through a mask, from a calibrated machine using a membrane oxygen generator. A variety of illnesses are treated in different 'courses' of varying length.

Researchers at HMA hypothesize (12) why repeated courses of IHT are effective:

*"IHT effectively decreased the response of pulmonary ventilation and heart rate to a physical load (the effect similar to that observed in altitude exposure)... At a load of 150 Watts the double product (heart rate multiplied by systolic blood pressure), an indirect measure of myocardial oxygen consumption, was significantly lower (P< 0.04) in the group of volunteers (sport students) after the IHT course as compared with placebo group. Similar results were obtained in patients with coronary heart disease (stable angina of effort). At a load of 50 Watts the decrease of the double product was accompanied by the increase of physical load tolerance (P< 0.05)". [*When the load was further increased, the benefit attributed to IHT was increased (P<0.01)]. *"The above results suggest the outlook for the therapeutic use of IHT.*

(In preparation for a mountain ascent) *" The placebo controlled study was carried out ... on young healthy volunteers... at the altitude of 3000 m (10,000 feet) in the decompression chamber... [The course of IHT] was shown to retain significantly higher arterial blood oxygen saturation (P< 0.05) than placebo controls. … [There was] a statistically significant 1.7 fold increase in erythropoietin level in blood ... from the fourth IHT session, with the level remaining high during the IHT course".*

To evaluate the therapeutic benefits of interval hypoxic training in the variety of illnesses described by the Moscow group requires further large and carefully controlled studies by other investigators. However, one can say with confidence that the hypotheses and basic physiology on which the treatment rests are sound and the observations so far published are encouraging.

SUMMARY

From the information available today, both anecdotal and hard data, the following conclusions seem reasonably well established:

1. Training to compete at any altitude is best accomplished by sleeping high and training low. There may be a break point around 1500 m, above which this precept weakens.

2.Acclimatization for ascent to very high altitude is best accomplished by exposure to gradually higher altitudes (i.e. to gradually decreasing ambient oxygen pressure).

3. Preventing or minimizing mountain sickness at moderate altitude (2500-3000 m) may be accomplished by medication or by staged ascent. The effect of intermittent exposure to hypoxia in preventing mountain sickness has not been proven.

4. The beneficial effects of intermittent exposure to normobaric hypoxia in accelerating acclimatization are suggestive but require further rigorously controlled study.

5. The beneficial effects of Interval Hypoxic Training in treatment of various illnesses are suggestive but require more well controlled clinical studies.

6. The complex processes of acclimatization include many inter-related changes which are in accord with Hans Selye's General Adaptation (Stress) Syndrome.

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June 1999

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OCTOBER CASE DISCUSSION

This case concerns a male aged 57 in general good health on the 1997 Shara Sura (6300m) expedition, Ladak.

The subject had no previous clinical history of haemorrhage or diagnosis of peptic ulcers or oesophageal regurgitation. He had little physical training and underwent a short period of acclimatization. He occasionally used aspirin.

The subject departed from Delhi by plane and arrived in Leh (3550 m.). After 3 days, the expedition travelled by jeep to lake Tsomorari (4200 m.). This was followed by a full day's walk under a cold drizzle, and a night in a tent.

The following day after loading the horses, under a cold and constant rain, the team headed on foot for the base camp (5100 m.) arriving after 8 hours. Almost all members of the Expedition were extremely tired nauseated and had headaches. Three days later, the team started to climb to the summit. The weather cleared and they realized they were too far from the foot of the mountain, and so decided to change the base camp. Most of the team members began to feel better, but the subject lost his appetite. He used up his emergency supplies (hard cheese, dry biscuits, and prunes). August 13 at 5,30. The first episode of melaena, not noticed, with a feeling of tightness in the legs. He asked for a sleeping pill (refused). His companions suggest drinking, and then resting. At 8 a.m a further episode of melaena occurs, this time noticed. Blood pressure 120/ 70 mmHg.

The patient is pale and sweating. All members of the Expedition agree to transfer the patient to Karzok (on the Lake) and then to Leh by jeep (one day). The patient feels very very cold and drinks a lot, but there is no further overt bleeding. He arrives in Leh late in the evening. At 2,30 a.m. on August 14 there is a new discharge of melaena with partial loss of consciousness, heavy sweating, and paleness. A drip is put up (Ringer 3000 ml.). Blood pressure is 105/ 70 mm. Hg. The cardiac frequency is 90. At 7,30 a.m. the patient is transferred to the Hospital. Haemoglobin is 6,50 g/dl. A saline-glucose drip is given. Nothing else is available. Ranitidine and Omeprazole (20 X 2) are given by mouth. The patient improves and the melaena stops. The blood pressure improves (140/ 70 mmHg). The patient is discharged after two days. The treatment continues in the Hotel, with omeprazole (20 x 2), and the patient is given a diet of boiled potatoes, tomatoes, hard cheese, and vegetable puré. After return to Italy the patient refused to undergo an endoscopy.

Case Supplied by Luciano Pasquali M.D. (Expedition Doctor) and Giancelso Agazzi M.D. (Translation) "Italian Alpine Club" I.S.M.M. Permission was sought from the patient for publication.

Paul Pritchard, UK
This guy certainly had a rough time but at first impression there does not seem much new here. They ascended rather quickly to base camp at 5100m: the last 1550m in 3 days and some of this by motor transport so not surprising that most of the expedition developed AMS symptoms (it is not specified what was meant by " A short period of acclimatization".)

He likely bled from an upper GI ulcer particularly as he seemed to respond to omeprazole/ranitidine. Had he used aspirin/NSAID for his AMS headache? Though there is no mention of abdominal pain and he was still eating so I guess a haemangioma of other vessel abnormality possible though no previous known occurrences of bleeding. Varices? - no haematamesis documented. Without endoscopy it is

difficult to say, and even this of course may not help if it is distal to the duodenum.

However it does demonstrate, as we found on the 1998 Kangchenjnga medical expedition that carriage of IV fluids on remote expeditions can be life saving and might be worth including for this alone.
This chap could easily have died.

Buddha Basnyat, Nepal
The most likely possibility in this 57 year old gentleman is that he has had an upper GI bleed as evidenced by his malaena and the low hemoglobin. This scenario has been noted by us a couple of times in our Himalayan trekkers and climbers. The good thing is that he was given omeprazole and not just ranitidine. There is some good data from the subcontinent to show that using omeprazole significantly cuts down on surgery for active GI bleed. A take home lesson perhaps would be that Omeprazole is the drug to pack for someone with a history of upper GI bleed (I know this patient had no such history) who wishes to climb or trek in remote areas. Of course an endoscopy would have been highly advisable. He must have been one of those tough, stubborn mountaineers!!

Ken Zafren, US
This is a 57 year old male who experienced gastrointestinal hemorrhage at altitude after what was clearly a miserable approach march with a rather rapid ascent to altitude. It's not surprising that most members of the expedition had AMS. The patient experienced significant upper gastrointestinal hemorrhage. Only limited treatment was available. Fortunately the bleeding was not fatal and eventually stopped. Since the patient was unwilling to undergo endoscopy, the exact diagnosis will never be known.
After hearing about patients on Denali and at Pheriche who had to be evacuated due to gastrointestinal hemorrhage, I did a literature search on the subject of GI bleeding at altitude and turned up only some epidemiologic studies from the Peruvian Andes. This would be a possible area for further research.

David Syme, UK
1. Did he take aspirin or other NSAID for headache? This is a common cause of GI bleeding.
2. It would be interesting to know how long ago this happened. I would only be happy that a "full recovery" had been made in someone of this age, with the additional knowledge that an endoscopy was normal.

Gustavo Zubieta Jr, Bolivia
Sounds like a typical stress-related, Upper Gastro-intestinal bleed, possibly from ulcers. Two aspects are noteworthy of discussion: First: The differential diagnosis of whether this is a disorder attributed to high altitude hypoxia or a common melaena from ulcers. Most physicians with little experience in high altitude may think this is altitude related. Actually, this happens circumstantially, as with many diseases that can occur even when travelling at sea level. Second: It is however important not to disregard the significance of bleeding at high altitude. This implies an important decrease of the oxygen carrying capacity of blood, that should be carefully evaluated.

Gerald Dubowitz, US
Gastric problems are exceptionally common at altitude. Individuals who have reported only occasional and mild discomfort at sea level frequently have worsening problems at altitude. Similarly, people with regular problems at sea level have significant dyspepsia higher up. Gastro- intestinal haemorrhage is not uncommon at altitude and has plagued many expeditions over the years.

It is easy to confuse the initial symptoms of anorexia with AMS, but normally melaena tends not to go unnoticed. While it is most valuable to get the subject ‘s blood pressure, this needs to be taken in both supine and erect positions and look for a postural drop. If this isn’t possible then lying and sitting (e.g. in a tent) can reveal abnormalities which are not otherwise detected in a single supine BP.

Early evacuation or just descent is essential with a handful of simple H2 blockers (ranitidine etc) or proton pump inhibitors as available (e.g. omperazole) there is little point in giving both. Recovery is usually complete on descent and there is no particular reason why the subject, if well, cannot reascend once stable (and on adequate therapy). Next time send him with at least a months’ course of medication.

David Hillebrandt, UK
I think this illustrates excellent remote area management and evacuation of a patient with an acute medical problem that is potentially life threatening using the minimal facilities and drugs available. Praise to all concerned.

What about the next time the patient wants to join you on a trip. I would not go with him he agreed to be investigated so that a definitive diagnosis could be made, or at least attempt to be made. I would not want it to happen again and potentially ruin my next trip as well.

Jim Milledge, UK
This is obviously a case of bleeding from the gut in an awkward location and the team is to be congratulated on their management of the case. Perhaps the answer to the question, "Why did he bleed?" is in the sentence, "Occasional use of Aspirin". I remember a similar situation occurring in my friend when we were medical students and staying at Aviemore in Scotland in the days before the Centre was built. He had taken an Aspirin for headache on going to bed and the next morning had a brisk melena with the usual symptoms and signs. Fortunately he stopped bleeding and we could treat him conservatively but his Hb was down to 7.0 when we got it done a few days later.

Brownie Schoene, US
interestingly GI bleeds do not seem to be very common at high altitude in spite of stress and type A personalities. Obviously a potentially fatal condition in remote areas. I think he was treated correctly although after his first bout of melena, I would have sent him down with antacids, omeprazole, etc. in medicine, we are always dealing with margins of safety, and with high altitude and remote areas, we are already raising the ante and not allowing for much margin. he easily could have bled to death. Once back at his age he needs a thorough work-up or ulcers, malignancy, H. Pylori, etc, but that is his choice.

Jim Litch, Nepal
This case reads as a typical presentation of GI bleed from peptic ulcer disease (PUD). The associated history of aspirin use may suggest the cause. Interestingly, I have cared for several cases of GI bleed or PUD while working as a mountaineering ranger on Mt McKinley (Denali) in Alaska, but relatively few cases during our years in the Himalaya. This may suggest a cold related feature, rather than hypoxia, as an additional precipitator of this condition. None-the-less, it must be remembered that "common conditions are common at high altitude as well as near sea level".

Tom Hornbein, US
High altitude is part of our larger universe and therefore can be not only a provocateur to, but a confounding variable for the whole gamut of disease seen at, but not exclusively at, sea level. My only other take is to be cautious bonding to this individual for future journeys, given his denial that he has a problem warranting further evaluation.

Shigeru Masuyama, Japan
Diagnosis: Acute Gastro-Duodenal mucosal lesion due to hypoxic(?) stress. Gastro-intestinal problems and GI bleeding are not rare at high altitude. I experienced the same case on a Mt. Everest expedition. The subject had several episodes of melaena at ABC (6500m) and his Hb measured there dropped to 6.5g/dl. While H2 antagonist was effective for the melena, I led him down to BC and sent him back to Japan immediately. However, gastric endoscopic examination just after arrival at Japan revealed no abnormal gastro-duodenal findings. Sugie* reported in his endoscopic examination among climbing members at Xixapangma BC (5020m) that gastro-duodenal mucosal lesion were observed in 13 out of 22 subjects. Among them, 3 acute gastric mucosal lesion(2 linear gastric ulcer and one bleeding gastritis), 2 duodenal ulcer and one gastric ulcer were included. No abnormal findings by GFS with massive melaena would suggest that acute gastric mucosal lesion (AGML) are responsible in this case.

*Japanese Journal of Mountain Medicine 11:55-58, 1991

CASE REPORT

High Altitude Cerebral Oedema - A Rescue

Cerebral oedema is easy. You go down. Well, like many things in medicine it is easy in retrospect.

Last October, four of us were on our way back from the *Medical Expeditions* base camp on Kanchenjunga. Gill, Rick, Alan and I had planned a small detour up a 6,200 metre peak called Tengkongma, with the help of Dawa, our sirdar. We had all walked up to base camp slowly and were well acclimatised

A couple of days earlier we had inspected the route and mistakenly headed up the wrong gully. We thought we now knew the route so we were irritated when the porters again turned up from the valley too soon. Much yelling and gesticulating achieved nothing but confusion. Alan got increasingly upset and kept asking why they had gone up the wrong route. After about the twentieth time of asking I snapped and said that if I knew the answer I would certainly have told him by now. Dawa shot on and caught them up and then signalled a compromise alongside a scree slope. I was soon too busy trying to breathe to worry about the route.

Every few steps left me breathless. As I struggled to keep up with Gill and Rick I noticed Alan striding on ahead. Fantastic views across the valley to Kanchenjunga and other peaks kept our morale up. Eventually we reached a traverse and then cut into the valley leading up to Tengkongma where we spotted our porters heading back down the valley. They had been to the high camp and set up tents at the foot of the glacier - an easy day's stroll for them. After stopping for a while we set off down a steep scree descent. This brought a change of fortune for me and I sped on ahead with Dawa leaving Alan far behind. I was not unduly concerned. Many people have difficulty on steep descents and Alan had said he had been seriously scared on a scree slope a few days earlier so I was not surprised that he was slow. The route led down to a river and then ascended through a big boulder field and alongside a waterfall to the tents. By 2.45 pm I had reached the camp and was delighted to see Dorje, our cook-boy brewing tea on a stove sheltered under a large rock. It was nearly half an hour before Rick arrived carrying Alan's pack.

Another 15 minutes later Gill arrived supporting Alan who was exhausted, cold and complaining of headache. We got him straight to his tent, gave him some hot soup and some painkillers for his headache and hoped he would soon feel better.

The glacier ended at an icewall a few yards from the tents and looked very inviting so the others wasted no time in kitting up to practise some climbing and plan the route for the next day. As the only doctor in the group, I stayed back to keep an eye on Alan. We were at about 5500 metres. He had spent a week at 5000 metres and been for two separate day walks to 5400 without trouble but now he clearly had at least moderate AMS and severe exhaustion and cold. I contemplated descent but the prospect was daunting to say the least. The route we came up was not an option because of the ascent involved. Going straight down the gully would be a difficult scramble down a big boulder field with a long way to go before we lost any significant altitude. Most of the journey would be in the dark. I radioed base camp and was at least able to discuss the case with experts in high altitude medicine. It may seem easy now to say that we should have headed straight down. But the prospect was horrendous and he didn't initially have signs of serious illness. But his headache got worse and he started vomiting. Examining someone in a small one-man tent in the cold is not easy but he was clearly deteriorating and said he felt very ill. He was beginning to get a bit confused. I forced him up to see if he could walk and was shocked by his ataxia. There was no doubt he had cerebral oedema. Nightmare or no nightmare we had to go down and it was now 5 pm.

We abandoned camp with alacrity leaving Dorje to sort things out there. I gave Alan 500 mg of acetazolamide and 8 mg dexamethasone most of which he promptly vomited. He needed two people to support him taking nearly all his weight. The nimble Dawa took one side nearly all the way and we took turns on the other. There was thick mist and no moon so we were soon walking by torchlight. We would manage barely twenty yards before he would need a rest. Even sitting down he still needed support and tended to drift off to sleep. On several occasions his breathing became very slow and shallow and he appeared to be slipping into coma. We shouted at him to keep breathing and not to fall asleep. I gave him some more dexamethasone which he kept down. We followed the gully down, scrambling over large boulders walking three abreast and it took a lot of concentration to avoid stumbling. Never have I blessed my trekking pole so much.

Also invaluable was our radio. As soon as we set off we were able to ask for a rescue team to meet us and we stayed in radio contact all the time. Once they started up the Tengkongma gully we spoke to them every few minutes but we were all on new terrain and there was no way for either party to identify our position or even know if we were on the same route. Because we were losing altitude so slowly Alan's increasing exhaustion outweighed any benefit from the increasing oxygen pressure. We frequently had to force him on when he asked for a rest. When we did stop it was worse for us as we had to keep shaking him and shouting at him to keep him awake. Gill was brilliant at keeping up a "conversation" with him. Whenever we stopped we listened out for the others. We whistled, we yodelled, we shone torches into the mist but all to no avail. As the rests grew longer and more frequent I got more scared. On several occasions I thought we were losing him.

Finally a glow in the distance heralded our rescuers. One of their Sherpas had spotted us and came running to us. Frustratingly he had got disorientated and for a while couldn't find the rest of the team but suddenly we were surrounded by people. It was now 9.30 pm. After an injection of dexamethasone and a few minutes on oxygen, Alan was soon looking a lot better. Progress down the hill was barely faster though, partly because it was getting much steeper and turned into scree. But at least he could have oxygen at each of the stops. I was able to stop supporting Alan now which was as well as I was getting seriously exhausted myself. I was glad to be able to hand over clinical responsibility to Paul Richards, the expedition doctor and concentrate on getting myself down. At one point I lost my footing and did a spectacular somersault, but apart from a badly bruised knee, all was well. Even Dawa took a nasty fall cutting his hand badly.

Finally, at 11.40 pm we reached the valley. The rescue team had kindly put up some tents there to save the long slog back to base camp and Paul stayed to keep an eye on Alan overnight. By morning Alan was considerably better with symptoms of a hangover but he managed to slowly walk back to base camp with Paul. After a few days there with a continuing headache, he descended further to make a full recovery.

This was not an experience I would like to repeat. It emphasised the unpredictability of mountain sickness. Alan was the best acclimatised of us and had been almost as high as our camp a couple of days previously with no ill effects. Going “downhill” can be all the more difficult if it is not steep. Boulder fields can be treacherous in the dark and we were not reaching any denser air. Oral acetazolamide and dexamethasone are useless in a vomiting patient!

I next met a very fit Alan on the last day of the trek. Mercifully for him he could remember little of that eventful evening except that he had promised to buy me a beer!

Mark Howarth, UK

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FORTHCOMING MEETINGS

Wilderness Emergency Medical Technician (EMT)/Command Physician, Aberdovey, Wales. November 8th-13th 1999

The first course in the UK will be held at Aberdovey, Wales, 8-13 Nov 99. If anyone is interested,please contact the organiser, Dr Jel Coward at jel@wildmedic.org or Jon Pote, at potes@enterprise.net

THE THIRD UKRAINIAN CONGRESS OF PATHOPHYSIOLOGISTS
Honoring Academician Nikolay Gorev (1900 - 1992)
Odessa, 24-27 May, 2000

The Congress is organized by:
Ministry of Public Health of the Ukraine, Ukrainian National Academy of Sciences, Ukrainian Pathophysiological Society, Odessa Medical University

ADDRESS of the Organizing Committee: Bogomoletz Institute of Physiology of the Ukrainian Academy of Sciences, Bogomoletz St.,4 Kiev 252024, UKRAINE
Phone : (380-44) 293-6151, 256-2492, 256-2489, 256-2479
Fax : (380-44) 293-1678, 293-3431
E-mail: sereb@mail.kar.net

The Congress is dedicated to the 100th anniversary of the birth of Ukrainian pioneering pathophysiologist, ***Nikolay Gorev***. It will be concerned primarily with the following topics:

1. Pathophysiology of the circulatory and respiratory systems.
2. Age-related pathophysiology
3. Pathophysiology of the immune system
4. Clinical pathophysiology
5. Pathophysiology of extreme conditions
6. Pathophysiology of the nervous and endocrine systems
7. Teaching of pathophysiology in universities.

The Congress presents the opportunity to visit Ukraine, to exchange ideas with scientists from many countries, and to learn of the past and current activities of Ukrainian scientists. The visits of scientific laboratories is planned.
OFFICIAL LANGUAGES: Russian, Ukrainian, English (simultaneous translation)

4th World Congress on Mountain Medicine and High Altitude Physiology, Arica, Chile 1st-6th October 2000

Details from:

Claus Behn, Physiology and Biophysics, ICBM, Faculty of Medicine, University of Chile, Independencia 1027, Santiago, Chile Phone: 56-2-678-6215; Fax 56-2-777-6916; email cbehn@machi.med.uchile.cl

ANNOUNCEMENTS

Bibliography of High Altitude Medicine and Physiology

Bibliography of High Altitude Medicine and Physiology The 1999 edition of the Bibliography of High Altitude Medicine and Physiology is now available. The Bibliography is based on citations hand selected from the libraries of Drs. Hackett, Roach, Houston and Richalet. The new version has been updated to contain over 6000 references germane to the broad field of high altitude medicine and physiology. And in 1999, the bibliography contains many citations with abstracts. One CD contains the bibliography in several formats, plus demonstration versions of some of the most popular bibliography management software programs. The included programs include demos of EndNote, Reference Manager and Procite. The Bibliography is provided in native format for each of those databases, and in text format. All databases and demo programs are for the PC, except for EndNote where a MacIntosh version is also provided. The cost is $75 US, plus shipping and handling ($5 North America, $10 International). The Bibliography may be ordered by writing to Dr. Rob Roach, BHAMP, Box 343, Montezuma, NM 87731, USA. Email: rroach@hypoxia.net. US orders by check or money order. International orders, please inquire.

Wilderness & Environmental Medicine

In February of this year, Wilderness & Environmental Medicine, the official journal of the Wilderness Medical Society, was indexed in Index Medicus. Index Medicus is the US National Library of Medicine's database of biomedical journals. It is available online as MEDLINE. This indexing recognizes the necessity of accessibility to this unique journal in the area of medical research.

Wilderness & Environmental Medicine presents a scholarly forum devoted to the publication of original scientific and technical Please let us know if you experience any problems.

articles related in whole or in part to wilderness medicine, including reviews and abstracts of current literature. Wilderness & Environmental Medicine combines traditional clinical research with practical wilderness medicine insights gained from active work in the field. The Journal is supported by an Editorial Board composed of members from across the US and around the world, including Japan, Germany, Scotland, New Zealand, Switzerland, France, United Kingdom and Canada. The Wilderness Medical Society, located in Colorado Springs, CO, publishes this peer-reviewed quarterly journal.

For further information contact:
David Stadler
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Mountain Medicine Website

NEW! Mountain Medicine Website: www.mountainmedicine.org

This site was installed 1999 by ICAR-MEDCOM. It is a meeting point for mountaineering physicians and rescuers and offers a wide range of mountain medicine information. The homepage is linked to the most important mountain medicine organisations of ICAR, UIAA and ISMM and many others. So you can choose from a lot of different sources in this field. It will be our aim to collect all scientific and practical data about mountaineering medicine and its medical emergency aspects.

Furthermore you will find also on this site the homepage of ICAR-MEDCOM, the Commission for Mountain Emergency Medicine. Try it!

Hermann Brugger, Bruneck
brugger.med@pass.dnet.it

If you know any of the missing members of the ISMM listed below, please contact Bruno Durrer (see address on the cover) to direct the ISMM Newsletter to them.

MISSING MEMBERS	
NAME	**COUNTRY**
CANEPA Andrea	Italy
HOLLANDER Ellen	USA
STRICKER Kay	Switzerland
CARTER Keith	Canada
DUGAS Laurent	France
TER MINASSIAN Aram	France

INTERNATIONAL SOCIETY FOR MOUNTAIN MEDICINE
APPLICATION FOR MEMBERSHIP and MEMBERSHIP RENEWAL FORM

There are several ways by which you can pay your membership fees: **1.** By credit card: please use the form below or **2.** Send a ***Euro***check (in Swiss Francs) in favour of the ISMM directly to the Membership Secretary **3.** Give your bank the order to transfer the appropriate equivalent amount to our account: nr.CO-257.980.0, United Bank of Switzerland (UBS), CH-1211 Geneva 4, Switzerland. **4.** *Swiss* members can pay by postal check to PC 12-172-9 and mention the ISMM account number CO-257.980.0 at UBS. Renewal of membership is due on the 1st January each year. If fees are not received on time, membership will cease, after a single reminder.

USE FOR NEW APPLICATION & FOR MEMBERSHIP RENEWAL ON 1st JANUARY EACH YEAR

PLEASE USE BLOCK CAPITALS.

Name and Position/Affiliation: _____
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Membership category: [ ]regular member (40 US$ or 50 Swiss Fr)
(tick as appropriate) [ ]residents (30 US$ or 40 Swiss Fr)
[ ]group member (170 US$ or 200 Swiss Fr)
[ ]student member (25 US$ or 30 Swiss Fr)*
[ ]complimentary membership (apply to the President of ISMM in writing)**

Payment by: Eurocheque [ ] Credit card [ ] Bank order [ ] Postal cheque (in CHF for Swiss members) [ ]
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* student member: anyone enrolled in an academic curriculum leading towards a degree.
** complimentary membership is available for those who experience difficulty in paying their subscription

Credit Card Form (to be completed by those who pay with a credit card):

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Please charge my credit card for the amount of _____ Swiss Francs for the membership fees for the ISMM.

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New membership:[ ] (y/n)

Signature: _____ Place and date:_____

Send to: Dr.Bruno DURRER, Membership Secretary of the ISMM, Arztpraxis CH 3822 Lauterbrunnen, SWITZERLAND, Fax:++41 33 856 26 27, email: B.Durrer@popnet.ch