

# CHAPTER 26

## THE LAKE LOUISE ACUTE MOUNTAIN SICKNESS SCORING SYSTEM

R.C. Roach, P. Bärtsch, P.H. Hackett, O. Oelz  
and the Lake Louise AMS Scoring Consensus Committee\*

### Introduction

In 1991, the Lake Louise Consensus Committee met and agreed on diagnostic criteria and a scoring system for the symptoms and signs of acute mountain sickness<sup>1</sup>. The goal was to provide enough sensitivity, specificity and flexibility to allow use in many different settings and to facilitate comparisons of results among all studies by using this instrument. Since then investigators have used the Lake Louise AMS scoring system in different settings at different altitudes in several countries. The previous standard, the Environmental Symptoms Questionnaire (ESQ), has 67 items, takes time and patience for subjects to complete, and has been resisted by many researchers<sup>2</sup>. In contrast, the Lake Louise AMS scoring system takes only a few minutes to complete and score. Several groups have reported comparable results regarding sensitivity and specificity between the Lake Louise AMS scoring system and the ESQ<sup>3-6</sup>. Therefore, we recommend that this scoring system be adapted as the standard for acute mountain sickness research.

### INSTRUCTIONS: The Lake Louise AMS Scoring System

The Lake Louise scoring system consists of a short self-report questionnaire, which is sufficient in itself, or to which may be added an additional clinical assessment. The AMS Self-report score is the sum of responses to 5 questions; the findings can be verified by interview in the clinical research setting. The Clinical Assessment score is the interviewer's rating of three signs: mental status, ataxia and peripheral edema. This score is added to the AMS Self-report questionnaire score. An optional question is recommended to assess functional consequences of recorded symptoms and signs. The scoring system is designed to allow use in both large surveys and in smaller clinical trials.

### Diagnostic Criteria for Acute Mountain Sickness

A diagnosis of AMS is based on a recent gain in altitude, at least several hours at the new altitude, and the presence of headache and at least one of the following

---

\*The Lake Louise AMS Scoring System Consensus Committee: Almas Aldashev, CIS; Buddha Basnyat, Nepal; A.R. Bradwell, UK; Charles Clark, UK; Geoff Coates, Canada; Allen Cymerman, USA; Allen Ellsworth, USA; R.F. Fletcher, UK; Eugene Gippenreiter, Russia; Colin Grissom, USA; Ben Honigman, USA; Charles Houston, USA; Herb Hultgren, USA; Bengt Kayser, Switzerland; Toshio Kobayashi, Japan; Gig Leadbetter, USA; Marco Maggiorini, Switzerland; N.D. Menon, India; Jim Milledge, UK; C. Carlos Monge, Peru; Michiro Nakashima, Japan; Dick Nicholas, USA; Drummond Rennie, USA; Jean Paul Richalet, France; Paul Rock, USA; Roberto Rodriguez Guaita, Chile; David Shlim, Nepal; John Sutton, Australia; S. Takei, Japan; Gou Ueda, Japan; Ray Yip, USA.

symptoms: gastrointestinal upset (anorexia, nausea, or vomiting), fatigue or weakness, dizziness or lightheadedness and difficulty sleeping. A score of three points or greater on the AMS Self-report questionnaire alone, or in combination with the Clinical Assessment score constitutes AMS.

**A) Self-report questionnaire.** This portion of the scoring system is mandatory and should be reported as a separate score. Each of the following five questions is asked with the corresponding 0 to 3 rating of the response. In some studies, the question "Difficulty sleeping" will not be relevant (e.g. rapid one day ascent) and can be omitted. The sum of the responses on these questions is then calculated as the AMS Self-report score. It is recommended that this score be reported separately, even when used with the Clinical Assessment score. This procedure will allow the comparisons of severity among the majority of studies. All will have the AMS Self-report score, some will have both the AMS Self-report score and the Clinical Assessment score.

1. Headache.	0 No headache 1 Mild headache 2 Moderate headache 3 Severe headache, incapacitating
2. Gastrointestinal symptoms.	0 No gastrointestinal symptoms 1 Poor appetite or nausea 2 Moderate nausea or vomiting 3 Severe nausea & vomiting, incapacitating
3. Fatigue and/or weakness.	0 Not tired or weak 1 Mild fatigue/weakness 2 Moderate fatigue/weakness 3 Severe fatigue/weakness, incapacitating
4. Dizziness/lightheadedness.	0 Not dizzy 1 Mild dizziness 2 Moderate dizziness 3 Severe dizziness, incapacitating
5. 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

**B) Clinical Assessment.** This portion of the scoring system contains information gained by examination. The Clinical Assessment score is the sum of scores on the following three questions.

6. Change in mental status.	0 No change in mental status 1 Lethargy/lassitude 2 Disoriented/confused 3 Stupor/semiconsciousness 4 Coma
7. Ataxia (heel to toe walking)	0 No ataxia 1 Maneuvers to maintain balance 2 Steps off line 3 Falls down 4 Can't stand
8. Peripheral edema.	1 No peripheral edema 1 Peripheral edema at one location 2 Peripheral edema at two or more locations

c) **Functional Score.** The functional consequences of the AMS Self-reported score should be further evaluated by one optional question asked after the AMS Self-report questionnaire. Alternatively, this question may be asked by the examiner if Clinical Assessment is performed.

Overall, if you had any symptoms, how did they affect your activity?

- 0 No reduction in activity
- 1 Mild reduction in activity
- 2 Moderate reduction in activity
- 3 Severe reduction in activity (e.g. bedrest)

#### References

1. The Lake Louise Consensus on the definition and quantification of altitude illness. In: *Hypoxia and Mountain Medicine*. J.R. Sutton, G. Coates, C.S. Houston, editors. Burlington, VT: Queen City Printers Inc., 1992, p. 327-330.
2. SAMPSON, J.B., A. CYMERMAN, R.L. BURSE, J.T. MAHER, P. B. ROCK. Procedures for the measurement of acute mountain sickness. *Aviat. Space Environ. Med.* 54(12):1063-1073, 1983.
3. HONIGMAN, B., J.L. ATKINS, R.C. ROACH, C.S. HOUSTON (Abstract). Acute mountain sickness in the elderly at moderate altitude. In: *Proceedings of the Eighth International Hypoxia Symposium*, Lake Louise, Canada, 1993.
4. BÄRTSCH, P., A. MULLER, D. HOFSTETTER, M. MAGGIORINI, P. VOCK, O. OELZ. AMS and HAPE scoring in the Alps (Abstract). In: *Proceedings of the Eighth International Hypoxia Symposium*, Lake Louise, Canada, 1993.
5. ELLSWORTH, A., T. DUNCAN, S. GOLDBERG, L. JOHNSON, P. HACKETT. Measuring acute mountain sickness using the Lake Louise Consensus Questionnaire (Abstract). In: *Proceedings of the Eighth International Hypoxia Symposium*, J.R. Sutton, G. Coates, C.S. Houston, editors. 1993.
6. LEADBETTER, G., R. ROBERGS, B. RUBY, D. LIUM. The effect of intermittent altitude exposure on acute mountain sickness (Abstract). SW Chapter, *Am. Coll. Sports. Med.* 1992.

**Citation:** Roach RC, Bärtsch P, Hackett PH, Oelz O. (1993). The Lake Louise Acute Mountain Sickness Scoring System. In: *Hypoxia and Molecular Medicine*. JR Sutton, CS Houston, G Coates, eds. Queen City Press, Burlington, VT; pp 272-274.