

# Preliminary High Latitude Center Study Report, Mount McKinley (Denali)

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DENALI HAS ATTRACTED hundreds of climbers annually for more than a decade.<sup>1</sup> Most climbers attempt routes on the west and south sides of the mountain, embarking from the aircraft landing site on the southeast fork of the Kahiltna Glacier. This massing of people on the mountain had led to a number of well-known problems.<sup>2</sup> Despite the increasing number of climbers, fatalities (mortality rate) remain fairly constant at about one percent (1%).<sup>3,4</sup> The instance of illness or nonfatal injury (morbidity) remains high as well. This mortality and morbidity among climbers is an incentive for research into the prevention of injury and treatment of injuries that occur on Denali's slopes. Denali's popularity makes it uniquely situated for such a research effort. Indeed, there is probably no other place on earth where so many people willingly place themselves in such a high, cold environment.

The potential for scientific and medical research along the West Buttress route has been discussed by others.<sup>5</sup> During the climbing seasons, the University of Alaska, Anchorage placed research camps at the southeast fork of the

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<sup>1</sup> National Park Service Statistics.

<sup>2</sup> "Denali Dilemma," Gerhard, Robert, *American Alpine Journal*, 1977, pages 96-101.

<sup>3</sup> "Death on Denali," Wilson, R., M.D., Mills, W., M.D., Rogers, D., M.D., Propst, M., M.D., *Western Jn. Medicine*, 128:471-476, June 1978.

<sup>4</sup> National Park Service Statistics.

<sup>5</sup> Climbs and Expeditions: Davidson, A., *American Alpine Journal*, 1969, page 371.

Kahiltna Glacier in 1982 only and at 14,300 feet on the West Buttress in 1982 and 1983. The purpose of these camps was to conduct experiments and run protocols investigating cold-and-altitude-related medical problems. Subjects came from the large number of climbers, volunteers and rescue victims. The studies were, with a few exceptions, non-invasive (not involving needles or entering body cavities). In conjunction with this formal research, a questionnaire was circulated among climbers gathering demographic and equipment data as well as assessing health problems during their Denali climb. The first questionnaire actually preceded the research camps and gathered information from 1981, and was continued during the 1982 and 1983 climbing seasons. Results from 899 respondents have been gathered utilizing a computer to compile and analyze data.

The profile of the average Denali climber emerges. He, 89% male, is 28 years old, stands five feet eight inches tall (170 cm.) and weighs 158 pounds (71.8 kg.). He has been climbing for eight years. 65% are from North America, 25% are from Europe, and 10% are from the Far East. 75% of the climbers have attended college, and 20% have graduate degrees.

Despite their proven warmth, vapor barrier (bunny) boots have been largely replaced by double boots with either overboots or supergators. By 1983, 79% of the climbers were wearing plastic double boots. Dome tents were used by more than 80% of the climbers in 1983. Polypropylene underwear has supplanted wool and cotton in 70% of climbers. Down jackets and down sleeping bags still predominate. Most climbers travelled in relatively small groups, the average group size being five members. 25% of all climbers were guided. Only 46% of the respondents reached the summit. To reach the summit an average of fourteen days was required.

Denali lies well above the 60th parallel. This northern latitude exaggerates altitude and cold effects in comparison to mountains nearer the equator.<sup>6</sup> Denali storms are legendary and its cold continues to cause freezing injury at a rate of 16%. Barometric pressures are lower for a given elevation as well, compared to equatorial peaks.<sup>7</sup>

The 14,300-foot camp barometer ran consistently just above half an atmosphere measurement. With this relatively low oxygen concentration 30% of the climbers experienced acute mountain sickness (AMS) of varying degrees. Headache was present in 52%, usually first appearing at 14,500 feet or above. Insomnia and loss of appetite were very common above 15,000 feet. Hypothermia requiring some kind of external rewarming was experienced by 3% of the climbers. Of the 16% suffering frostbite, 42% demonstrated some degree of gangrene and tissue loss. 49% of all climbers used some medication. Aspirin was the most frequently used, followed by Acetazolamide (Diamox), Dalmane (a sleeping pill), and Tylenol.

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<sup>6</sup> "The World's Great Mountains: Not the Height You Think," Moore, T., *American Alpine Journal*, 1968, pages 109-116.

<sup>7</sup> Ibid. 6.

While the purpose of this project was pre-planned medical and mountain research, we felt an obligation to provide medical care when needed. The camp was equipped and staffed on a fairly sophisticated level. Good radio communication coordinated evacuation of a number of severely ill or injured persons. In June of 1982, two Japanese climbers fell descending the West Rib. They sustained multiple trauma including head injuries causing coma. They were spotted after their fall by personnel at the research camp and, after rescue, were carried to the 14,300-foot camp by stretcher. Bad weather prevented their evacuation for nearly three days. During this time the research camp became a mini-intensive-care unit providing IV fluids and medications as well as respiratory support and initial rewarming. Both men survived.<sup>8</sup>

No deaths occurred on Denali in 1982. Two died in 1983. Of these two deaths, one occurred on a winter climb and a second resulted from a crevasse fall low on the Kahiltna Glacier.

The presence of medical facility on Denali has had a major impact. At the same time a number of philosophical questions are raised. Is a climber for instance less careful and less responsible knowing rescue and medical services are available? The remoteness and wildness of Denali are certainly altered by the increasing numbers of people present on its west side May through July. The research camp no doubt added to this effect. Yet to assert simply that the mountain is a wilderness and should not be intruded upon ignores the obvious reality of the West Buttress. Indeed as garbage and waste problems accumulate, more of civilization's basic sanitary needs (outhouses and garbage cans) will probably be required. Denali is a large, major, far-spread mountain. For those climbing routes on the north and east sides, the research camp has had little impact. Weighing the pros and cons there seems to be a gathering opinion among both local and national groups that it would be helpful to continue such a facility on the West Buttress, that provides not only means of important medical and mountain research but also acts as a small emergency dispensary.

#### ACKNOWLEDGEMENTS

The research camps owe their placement and operation to many individuals. We wish to thank all who helped, especially: 1) Brian Okonek and Diane Calamari Okonek, Camp Bosses in 1982 and 1983, Talkeetna, Alaska. 2) The National Park Service and Robert Gerhard, Chief Climbing Ranger, Denali National Park. 3) The 242nd Aviation Company, Fort Wainwright, Alaska, for helicopter support, and the members of the Mountain Warfare Training Center, Fort Greeley, Alaska, and the two commanders, Lt. Col. T. Leavitt, and Lt. Col. John Hite, U.S. Army. 4) Karl Maret, M.D., Bio-Engineering, San Diego, California.

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<sup>8</sup> University of Alaska, High Latitude Study, and the Mount McKinley Project, (1981-1983), Mills, W., M.D., Rau, D., M.D. *Alaska Medicine*, pages 21-28, April, May, June 1983, Vol. 25, No. 2.