the lung edema fluid obtained by fine needle aspiration (FNA). The temporal profile of the inflammatory response and comparison of the serum and urinary cytokine levels vis-à-vis the lung fluid cytokine levels as noninvasive surrogate markers of inflammation were also evaluated.

Methods.—Inflammatory markers (C-Reactive Protein (CRP), Interleukin-1 (IL-1), Tumor Necrosis Factor α (TNF- α), Transforming Growth Factor β (TGF- β), Interferon Γ (IFN- Γ), Interleukin-2 (IL-2), Tumor Necrosis Factor β (TNF- β), Interleukin-5 (IL-5), Interleukin-10 (IL-10), Interleukin-8 (IL-8), Macrophage Chemotactic Protein 1 (MCP-1), Lymphotactin, and Granzyme- β were serially evaluated in the fine needle aspirate (FNA) of lungs, concomitant serum, and urine samples of 13 patients of HAPE. Their physiological and biochemical variables were also studied. All observations were recorded on admission to the hospital, Day 3, and Day 7.

Results.—The significantly high macrophage counts in the FNA, serially high levels of MCP-1, Granzyme B, IL-8, and Gamma Interferon all support the theory of inflammation being a secondary phenomenon rather than the primary causative pathophysiology. CRP increased by Day 7, thereby indicating that inflammation may not be the cause of HAPE but a response to the presence of HAPE.

Conclusions.—The role of inflammation as a cause of HAPE has not been substantiated with this study.

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A Comparison of Climbing Accidents on Mount Rainier over Two 10-Year Periods

Background.—The popularity of rock climbing and mountaineering has seen explosive growth since the 1970s. The incidence of climbing Mount Rainier has increased from 74 821 from 1977 to 1986 to 104 866 between 1997 and 2006. We compared injuries encompassing two 10-year periods, 1977 to 1986, and 1997 to 2006, hypothesizing that injury characteristics may reflect both a growth in involvement in these activities as well as changes in technology.

Purpose.—To evaluate incidence and epidemiology of climbing injuries and fatalities sustained on Mount Rainier. We hypothesized that we would identify an increase in overall injuries. However, given advances in safety technology and education, we hypothesized that types and rates of injuries would decline.

Methods.—We performed a retrospective data analysis of all reported injuries and environmental-related illnesses sustained on Mount Rainier encompassing two 10 year periods from 1977 until 1986 and 1997 to 2006. We identified 159 climbing accidents during the 20 year interrupted timeframe. We separated the evaluated timeframes by 10 years to allow for changes due to technological advances in climbing to manifest themselves. Data were extracted from *Accidents in North*

American Mountaineering journal and an internet search of National Park Service websites and were analyzed using the proportional Z test and chi square method. All of the data collected were public record; all HIPPA information was removed from the extracted data.

Results.—From 1977 to 1986, 70 incidents were identified, and from 1997 to 2006, 89 incidents were sustained by climbers on Mount Rainier. There was a significant decrease in fatalities as compared to total injuries over these time periods (29 vs. 18; $p < 0.05$), accidents caused by avalanches declined (0.012%; $p < 0.05$), and injuries by falls incurred on snow, ice, and rock decreased (0.026%; $p < 0.05$). There was a significant increase in reports of falling snow, ice, and rock (6 vs. 36; $p < 0.05$). In spite of increased climbing rates the injury rate remained stable between the compared time frames. There were no significant differences found in other injury patterns.

Conclusions.—With the ever-increasing popularity of rock climbing, mountaineering, and ice climbing, one would expect to see a corresponding increase in overall injuries and incidents sustained within the National Park system to coincide with this increased number of climbers. The data available to this study actually revealed accident rates have remained stable accompanied by a significant decrease in fatalities sustained by climbers on Mount Rainier. The significant increase in reports of falling snow, ice, and rock likely reflects an increase in accessibility and interest in these environments corresponding with increasing climbing rates and the effects of global climate change. However, this also exposes an area on which wilderness providers may want to focus future prevention and education efforts.

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A Comparison of Mountaineering Accidents on Mount McKinley over Two 10-Year Periods

Background.—Mountaineering has seen explosive growth since the early 1970s. The population climbing Mount McKinley, within Denali National Park, Alaska has almost doubled between 1977 and 2006. We compared injuries encompassing two 10-year periods, 1977 to 1986 and 1997 to 2006, hypothesizing that injury characteristics may reflect both a growth in involvement in these activities as well as changes in technology. We identified the total number of climbers attempting to climb Mount McKinley and compared this to the total number of injuries sustained over the timeframe.

Purpose.—To evaluate incidence and epidemiology of climbing injuries and fatalities sustained on Mount McKinley. We hypothesized that we would identify an increase in overall injuries. However, given advances in safety technology and education, we hypothesized that rates of injuries would decline.

Methods.—We performed a retrospective data analysis evaluating all reported injuries and environmental-related illnesses sustained on Mount McKinley encompassing two 10 year periods from 1977 to 1986 and 1997 to 2006. We identified 201 climbing accidents during the 20-year interrupted timeframe.

Data were extracted from *Accidents in North American Mountaineering* journal and an internet search of National Park Service websites and were analyzed using the proportional Z test and chi square method. All of the data collected were public record; all HIPPA information was removed from the extracted data.

Results.—From 1977 to 1986, 103 incidents were identified, and from 1997 to 2006, 98 incidents were sustained by climbers on Mount McKinley. In spite of increased climbing rates, the overall injury rate declined between the compared periods, (103 vs. 98; $p < 0.05$). There was a significant decrease in the rate of falls on snow/ice/rock (0.23%; $p < 0.05$), altitude medical sickness/high altitude pulmonary edema/cerebral edema (0.26%; $p < 0.05$) and environmental injuries (0.35%; $p < 0.05$), and fatal accidents on Mount McKinley between the compared time frames (20 vs. 9; $p < 0.05$). The incidence of falling snow, rock, and ice increased between the compared timeframes (0.041; $p < 0.05$). In spite of increased climbing rates the injury declined 0.9% between periods. There were no significant differences found in other injury patterns.

Conclusions.—With the ever-increasing popularity of mountaineering and ice climbing on Mount McKinley, one would expect to see a corresponding increase in overall injuries and incidents sustained on Mount McKinley to coincide with this increased number of climbers. The data available to this study actually revealed a decrease in overall accidents accompanied by a significant decrease in fatalities sustained by climbers. The decrease in the overall rate of injuries and fatalities likely reflects an increased awareness of the hazards facing climbers, enhancements in climbing technology, and improved technical ability of climbers attempting the summit of Mount McKinley. Increasing rates of falling snow, rock, and ice may be influenced by exposure of increasing number of climbers on Mount McKinley and the global effects of climate change. However, this also exposes an area on which wilderness providers may want to focus future prevention and education efforts.

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Mountain Lion Attacks in the United States: 1950 through May 2009

Introduction.—Information regarding mountain lion attacks on humans has become more prevalent in the mainstream media. It remains unclear if there has been an increase in the number of attacks, or an increase in the prevalence of reports. Furthermore, the epidemiology of human-mountain lion encounters is not documented in the medical literature.

Objective.—The purpose of this study is to examine the epidemiology of documented mountain lion attacks on humans from 1950 to May 2009.

Methods.—This is a retrospective case series using data of confirmed mountain lion attacks on humans during the study time period. Data were gathered from publicly available resources including government agencies, newspaper reports, and

other published accounts. Data related to the prevalence of cases, human and animal demographics, nature of human-animal interaction, outcome of interaction, and outdoor activities during interaction were collected. Descriptive statistics are reported, and differences in categorical proportions are analyzed using a Chi-square distribution.

Results.—Reports of 141 attacks and 15 fatalities were found during the study time period. The number of reported attacks has gradually increased with a peak in 1990. Attacks on children were not more likely to be fatal when compared to adults. Attacks were more likely to be fatal if the attack occurred during the winter ($p = 0.007$) or if the attacking lion was > 36 months in age ($p = 0.006$). The attacking mountain lions were not more likely to be male. The nature of the preattack reaction was associated with a fatal outcome ($p = 0.029$), whereas the post-attack reaction was not ($p = 0.815$).

Conclusion.—The number of reported mountain lion attacks and fatalities has increased since 1950 with a plateau in 1990. Attacks by older lions are more likely to be fatal, especially during the winter months. These data will help provide a basis for understanding risks and outcomes during mountain lion encounters.

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Ziploc Bags for Preventing Bears from Smelling Food

Background.—Wilderness activities occasionally result in bear-encounters. To deter bears from detecting food scents, the American Bear Association recommends double-bagging food carried into the wilderness.

Objective.—Our objective was to determine if food sealed in double-bagged Ziploc bags would decrease the ability of bears to detect food scents as compared to food in unsealed Ziploc bags.

Methods.—This was a prospective randomized single-blinded study performed on bears at Northwest Trek Wildlife Park, WA. Two black bears (*Ursus americanus*) and 2 brown bears (*Ursus arctos*) were presented with open buckets in front of their enclosures: one concealing food wrapped in 2 layers of Ziploc bags and another with empty Ziploc bags. The time the bears spent at each bucket was recorded for 30 seconds. In the first phase, Ziplocs were open; in the second, Ziplocs were sealed.

Results.—The average time the bears spent at the open Ziplocs with food and open Ziplocs without during the first phase of the experiment was 9.573 and 6.613 seconds, respectively ($N = 75$). The average time spent at the closed Ziplocs with food and closed Ziplocs without in the second phase of the experiment was 6.25 and 6.8875 seconds, respectively ($N = 80$). The standard deviation for all average times was 1.5 seconds. An independent samples 2-tailed t-Test demonstrated a statistically significant difference ($P = 0.032$) when compar-