umented. Based on the results of this study, deer are not as large a reservoir for *E coli* O157:H7 as cattle, but they likely play an important role in its spread, especially where deer live near cattle.

(*Appl Environ Microbiol.* 2001;67:1218–1224) J. R. Fischer, T. Zhao, M. P. Doyle, et al.

AVIATION, SPACE, AND ENVIRONMENTAL MEDICINE

Effect of daily versus intermittent exposure on heat acclimation

Anyone who has ever participated in an outdoor activity on a hot humid day understands the benefits of heat acclimation. Many studies that define the physiological changes that take place during this process have been reported. There is less literature, however, describing the best method with which to become heat acclimated. The authors of this study test the hypothesis that daily exposure to heat is more efficacious for heat acclimation than intermittent exposure.

Fourteen healthy athletes (mean age 23.5 years) were randomized into 2 groups of 7 subjects. Each group contained 5 females and 2 males, and there were no significant differences between the groups. Before the sessions started, the maximum exercise capacity of each subject was determined by measuring peak oxygen consumption, VO_2, while exercising on a rowing ergometer. Each subject then exercised on the rowing ergometer at a power output equal to 70% of their maximum ability. One group exercised for 30 minutes per day for 10 consecutive days. The other group exercised for 30 minutes per day every Monday, Wednesday, and Friday for a total of 10 sessions. All sessions took place in an environmental chamber set at 38°C and 70% relative humidity. Rectal temperature, skin temperature, heart rate, ratings of perceived exertion, and sweat rate were all recorded.

Results show consecutive exposure to be superior to intermittent exposure in nearly every category. Rectal temperature decreased significantly in both groups by day 5, but fell to 96% of its predicted plateau value in the consecutive exposure group and to only 26% of the predicted plateau in the intermittent exposure group. Heart rate decreased to 63% of the predicted plateau in the consecutive exposure group compared to only 16% in the intermittent exposure group. Skin temperature was also significantly lower in the continuous exposure group. Ratings of perceived exertion and sweat rate were not significantly different between the groups.

The main limitation of this study is the small sample size. Otherwise, the methods are clear and consistent, and the statistical analysis seems sound. In addition, the authors of this article present a very thorough review of relevant literature, which adds to the validity of the design and the results. Despite the study's small size, the results of this study agree with the results of previous similar studies. Larger studies should be done to confirm these results.

(*Aviat Space Environ Med.* 2000;71:385–390) N. Gill, B. Phed, and G. Sleivert.

CLINICAL INFECTIOUS DISEASES

Risk factors for severe pulmonary and disseminated coccidioidomycosis: Kern County, California, 1995–1996

In most cases, patients with coccidioidomycosis (CM) suffer nothing more than mild, influenza-like symptoms, but in severe cases, this disease can be fatal. As with many diseases, knowing who is at risk to develop severe complications can help direct management decisions. It is well known that the San Joaquin Valley in California is hyperendemic for CM, and much of our data about CM comes from research done in this area. This article provides a recent update of CM in Kern County, which is located within the San Joaquin Valley.

The authors conducted both a 2-year population-based surveillance program for CM and a retrospective case-control study of patients with CM. The surveillance program identified all the individuals between January 1, 1995, and December 31, 1996, in Kern County who were older than 18 years and had culture, histopathologic, molecular, or serological evidence of *Coccidioides immitis,* the fungus that causes CM. From this data set, patients with positive diagnoses between January 1, 1995, and September 30, 1996, were classified as having mild CM, severe pulmonary CM, or disseminated CM. Mild CM was defined as a mild flulike illness. These patients served as case controls. For someone to be classified as having severe pulmonary CM, there had to be radiographic evidence of pneumonia that resulted in hospitalization. Patients classified as having disseminated CM were those with extrapulmonary or miliary CM. Enrolled patients were then contacted by telephone and asked to complete a standard questionnaire. Data on demographic characteristics, outdoor activities, dust exposure, past medical history, tobacco and alcohol use, occupation, socioeconomic status, and antifungal treatment for CM were obtained. Also recorded was the number of days missed from work or school as a result of having CM.

The surveillance program identified 905 persons newly diagnosed with CM. Of these, 682 met inclusion criteria for the case-control study, and 380 were enrolled. Both univariate and multivariate analyses were performed. Univariate analysis revealed several risk factors for severe pulmonary CM and disseminated CM. Patients who acquired severe pulmonary CM were more likely to be older, more likely to be agricultural workers, and more likely to have a longer disease course. Risk factors for disseminated CM were being male, being black, being pregnant, or having a longer disease course.

Multivariate analyses showed slightly different results. Risk factors for severe pulmonary CM, as defined by an odds ratio

(OR) greater than 1.0 and a 95% confidence interval (CI) that did not overlap 1.0, included diabetes (OR = 3.3, 95% CI 1.3–8.1) and smoking cigarettes within the previous 6 months (OR = 2.4, 95% CI 1.1–5.4). The administration of oral antifungal therapy decreased the OR of acquiring severe pulmonary CM to 0.3 (95% CI 0.1–0.5). Risk factors for developing disseminated CM were black race (OR = 4.6, 95% CI 1.4–15) and having an annual income of less than $15 000 (OR = 2.4, 95% CI 1.1–5.7).

The results of this study agree in large part with data published by the Centers for Disease Control and Prevention (CDC). The major limitation of this study is that only 56% of the cases that met inclusion criteria were enrolled. Nevertheless, the data are valuable. According to the CDC Web site, risk factors for disseminated CM include immunosuppression, being black or Filipino, and pregnancy. There are no specific risk factors cited for severe pulmonary CM. In this study, there were too few people of Asian descent and too few people with immunosuppression to be statistically significant. Of course, much of the CDC data comes from previous studies from Kern County, so it is not surprising that the results are consistent. Ideally, physicians can use all of these data to better identify who is at risk for complications from CM. Through both primary and secondary prevention, morbidity and mortality could be decreased. Finally, if randomized controlled trials could confirm the suggested effect of early antifungal therapy, we would have another weapon against this disease.

(*Clin Infect Dis.* 2001;32:708–714) N. E. Rosenstein, K. W. Emery, S. B. Werner, et al.

INTERNATIONAL JOURNAL OF SPORTS MEDICINE

Respiratory effects of a single dive to 50 meters in sport divers with asymptomatic respiratory atopy

The threat of bronchoconstriction prevents severe asthmatics from scuba diving, but it is unknown whether individuals with asymptomatic respiratory atopy are safe to dive. Thus far, there is no definitive evidence demonstrating that individuals with asymptomatic respiratory atopy are at risk while scuba diving. As scuba diving becomes more popular, this issue will likely affect more people. The authors of this study evaluate the effects of a single wet dive on the pulmonary function of 9 sport divers with asymptomatic respiratory atopy.

The subjects were confirmed as having asymptomatic respiratory atopy if they had a positive skin prick reaction to at least one common airborne antigen but did not experience wheezing or use bronchodilators on a regular basis. Nine healthy sport divers of similar age, height, and weight were chosen as control subjects. All subjects wore wet suits and full scuba gear. Each spent 15 minutes at a depth of 50 m in the wet compartment of a hyperbaric chamber in Germany. Timed decompression stops were made during ascent, so that the total of each dive was 32 minutes. The water temperature was held at 24°C. Pulmonary function tests were performed before the dive, 3 hours after the dive, and 24 hours after the dive. Parameters measured were specific airway conductance, forced vital capacity, forced expiratory volume in 1 second, minimum expiratory flow at 50% of vital capacity, hemoglobin concentration, and transfer factor of the lung for carbon monoxide. Methacholine challenges were performed 4 weeks after the dive.

Results showed no significant differences in pulmonary function before the dive. After the dive, only airway conductance was significantly different between the groups. Three hours after the dive, conductance increased to 14% above baseline in the group with respiratory atopy. Twenty-four hours after the dive, conductance fell to 15% below baseline in this group. Methacholine challenges at follow-up were normal. In their discussion, the authors state that the changes in airway conductance might represent a bronchoconstrictive response. In the control group, airway conductance did not change with time. The authors speculate that these results could indicate that individuals with respiratory atopy are more susceptible to the hazards of diving than the normal population. On the other hand, since no other measure of pulmonary function changed, including expiratory flow, the authors note that their results might not be clinically significant.

The key feature of this study is that the subjects actually performed a wet dive wearing full gear. According to the authors, this is the first study of its kind. At the same time, however, the size of the study group was very small. Larger numbers might be needed to detect subtle differences between groups. Furthermore, it is not known if the lungs of individuals with asymptomatic respiratory atopy would respond in the same manner if dives were performed at various times of the year, when different airborne antigens might be higher in concentration. A larger, longer term study will be needed to determine whether the results of this study have any clinical significance.

(*Int J Sports Med.* 2001;22:85–89) K. Tetzlaff, C. M. Staschen, N. Struck, and T. S. Mutzbauer.

MEDICINE & SCIENCE IN SPORTS AND EXERCISE

Stretching at the ankle joint: viscoelastic responses to holds and continuous passive motion

To the sports enthusiast, a sprained ankle means waiting 4 to 6 weeks before returning to full activity. To the emergency physician, it means a potential radiograph, RICE (rest, ice, compression, elevation), and discharge. Neither patients nor physicians are usually very alarmed by ankle sprains, yet there can be significant long-term morbidity from severe sprains. Moreover, millions of health care dollars are spent each year in treating this common injury. Better methods of prevention