COCA Conference Call – Rocky Mountain Spotted Fever and Human Parapoxvirus
Dr. David Swerdlow (RMSF) and Dr. Edith Lederman (Parapoxvirus)
March 27, 2007

Alycia Downs: Thank you. Good afternoon and thank you for joining us for today's COCA Conference Call on Rocky Mountain Spotted Fever and Human Parapoxvirus. We are pleased to have Dr. David Swerdlow and Dr. Edith Lederman here with us to speak about these topics.

Dr. David Swerdlow is the team leader of the Disease Assessment and Epidemiology Team in Rickettsial Zoonoses Branch of the Division of Viral and Rickettsial Diseases at the National Center for Zoonotics, Vector-Borne and Enteric Diseases at CDC.

The branch studies rickettsial infections in the United States and abroad. He is also Clinical Assistant Professor of Medicine, Division of Infectious Diseases at Emory University School of Medicine and an Adjunct Associate Professor at Emory University's Rollins School of Public Health.

Dr. Edie Lederman is a US Navy Infectious Diseases Physician, currently in her second year of her EIS fellowship with the Poxvirus Program. She has conducted investigations on monkeypox, parapoxviruses, vaccinia, Rift Valley Fever, acute skin disease among roofers, blood-stream infections, foodborne illness, malaria, ehrlichia and rickettsiae.

The objectives for today's call are for clinicians to identify routes of transmission of parapoxviruses and rickettsiae, identify current diagnostic techniques available for confirmation of parapoxvirus and rickettsial infections and to distinguish human parapoxvirus infections from cutaneous anthrax using clinical and historical information. Dr. Swerdlow, you may begin.

David Swerdlow: Thank you very much. I am very glad to be here this afternoon to talk about some diseases that we think are pretty important. The first slide is an introductory slide. Please go to the second slide which lists common tick-borne infectious diseases in the United States.

There are several tick-borne infectious diseases in the United States including Lyme disease, ehrlichioses, Rocky Mountain spotted fever, and babesioses.

Today we will be focusing on Rocky Mountain spotted fever. However, at the end of the talk I will show some data that suggests that Rocky Mountain spotted fever, as well as the other tick-borne diseases, all seem to be increasing in incidence in the United States.

Rocky Mountain spotted fever is the most severe rickettsial illness of humans and it is caused by an organism called *Rickettsia rickettsii*. It was first described as a disease back in 1896. It is endemic to the Americas and cases are reported in both North and South America.

Until recently, there were about 300 to 800 cases in the United States every year, but as we will discuss at the end of this talk, that number has increased lately. Next slide please.

Why are we concerned about this illness? First of all, it is widely distributed and causes significant morbidity and mortality. It can be very difficult to diagnose because the presentation is very non-specific, but perhaps most important, rapid diagnosis and treatment prevents death. And as we will see, it is very important to be able to recognize the illness and start antibiotics quickly in order to prevent death.

The next slide describes the general properties of the organism. Rickettsial organisms are small coccobacillary bacteria. They are slow growing and are intracellular. The next slide shows a Gimenez stained cell. The *Rickettsia rickettsii* organisms are stained red. As you can see, the organism is intracellular. Next slide.

There are two main tick vectors of Rocky Mountain spotted fever in the United States: *Dermacentor variabilis* (American dog tick) and *Dermacentor andersoni* (Rocky Mountain wood tick).

On the slide, the yellow areas on the maps represents the areas where these tick species are found. *Dermacentor variabilis,* the American dog tick is found widely on the East Coast and also in the Pacific region. *Dermacentor andersoni*, the Rocky Mountain wood tick, is located in the Western region of the United States.

The next slide is a map of the United States with Rocky Mountain spotted fever incidence indicated by county from 1997 to 2002. As you can see the incidence of Rocky Mountain spotted fever is highest in the mid-central and southern regions of the United States. North Carolina is a state with many cases but other states are affected as well- for example Oklahoma. In fact, cases have been reported from all 48 states in the continental United States.

The next slide describes the epidemiology and patient demographics of RMSF. Over 90% of cases occur from April through September. Peridomestic acquisition may account for the majority of the cases.

Many people may think that you acquire tick-borne diseases from backpacking or hiking in the wilderness, but in fact most people probably acquire their illness closer to home.

The age-specific incidence is highest in children. The disease is more frequent in males probably because of varying occupational and recreational exposures. Clusters of infections have been reported from highly endemic areas.

Next slide: clinical manifestations. Early on, patients can present with high fever, severe headache, myalgias, and interestingly, gastrointestinal systems particularly nausea and vomiting. These symptoms can be very vague and can resemble many other diseases. That is one of the main reasons RMSF is difficult to recognize.

Later, patients will develop rash, photophobia, confusion, ataxia, seizures, coughs, trouble breathing, arrhythmias, jaundice, and severe abdominal pain,

Laboratory findings may include thromobocytopenia and hyponatremia.

Long-term sequelae of Rocky Mountain spotted fever infections include CNS deficits and amputations.

The next slide describes the rash of RMSF. Rashes generally are not apparent until two to five days after onset of fever. Therefore on initial evaluation, many patients will not yet have rashes. The rash begins as 1- to 5-mm macules, typically on the ankles, wrists and forearms which then spreads to the trunk. The characteristic petechial rash occurs later. The macules that develop first gradually evolve into petechial legions on or after day 6. Unfortunately, for the diagnostician, the rash may be asymmetric, localized or even absent. Probably about 10% of patients with RMSF have “spotless fever” and never develop a rash.

The next slide shows a photograph of a patient with the typical petechial rash of RMSF. As mentioned, it commonly occurs on the hands and wrists, and ankles, but it can progress to include the whole body.

The next slide shows three photographs of patients with rashes which are not quite as characteristic – for example some are not petechial. Clinicians should be aware that the rash doesn't always look exactly like in the textbooks and it can be very difficult to identify.

The next slide demonstrates some of the more severe sequelae and the pathological basis of the sequelae. The photomicrograph at the bottom demonstrates that the organism affects endothelial cells, particularly of small

blood vessels. The associated vasculitis, causes digit necrosis or cerebral events, etc. Next slide.

As I have mentioned initially, it can be very difficult to diagnosis this illness. Frequently, the patient's illness is thought to be a viral illness, fever of underdetermined etiology, bacterial sepsis or upper or lower respiratory tract infection. Sometimes the illness is initially thought to be an acute appendicitis or cholecystitis due to the nausea, vomiting, and abdominal symptoms that can occur during the initial presentation.

The next slide shows the differential diagnosis of Rocky Mountain spotted fever. We will not go through the entire table today, but some of the other diseases that are important to rule out include meningococcal infections, enteroviral infections and measles.

You certainly want to rule out these other important illnesses or empirically treat for both illnesses if you are not sure. If you don't treat a case of Rocky Mountain spotted fever a death can occur, but if you treat as RMSF when the patient actually has another illness, that can also have a bad outcome- for example if the patient actually had a meningococcal infection. So there are times when you may want to treat more than one possible infection. Next slide.

There are several laboratory diagnostic tests that can be used to confirm Rocky Mountain spotted fever. Serologic evaluation using Indirect Immunofluorescence Assay (IFA) or ELISA, are the most common and probably the best methods.

Immunohistochemical staining or Polymerase Chain Reaction (PCR) can also be used on skin biopsy specimens, biopsies of rash lesions, particularly if they are petechial, has a high sensitivity and specificity for diagnosing the organism.

Culture can be done, but usually is only available at a few high safety level labs in the United States.

The next slide describes serologic diagnosis of Rocky Mountain spotted fever. The problem with serologic diagnosis of Rocky Mountain spotted fever is that 85% of patients lack diagnostic titers in the first week of illness and many people will lack diagnostic titers even seven to nine days after illness.

In other words, in order to diagnose RMSF you need to test both acute and convalescent samples. This is a critical point and should be emphasized.

The IFA assay is a quantitative assay in which you can detect (four-fold) rises in titers; this is confirmatory of Rocky Mountain spotted fever.

ELISA assays are commercially available but are not quantitative. Therefore they are reported as positive or negative, but you can not detect four-fold changes between acute and convalescent samples. Ultimately, this makes it more difficult to confirm the infection.

The next slide describes deaths attributable to Rocky Mountain spotted fever. The case fatality ratio was as high as 20% to 30% in the pre-antibiotic era. The case fatality rate is highest in older adults and in males. It should be noted that the disease can kill otherwise healthy adults and children. In addition, the clinical progression may be rapid with a medium time to death of eight days.

The next slide is a graph of Rocky Mountain spotted fever deaths in the United States from 1940 to 1997. And as you can see from 1940 to the 1990s, the death rate went down tremendously. The reason for this was the increased use of appropriate anti-microbial therapy.

The next slide describes Rocky Mountain spotted fever treatment. Tetracyclines are the drugs of choice for Rocky Mountain spotted fever and the clinical response should be within 24 to 72 hours.

Chloramphenicol is an alternative therapy for some patients with Rocky Mountain spotted fever; however, the oral formulation is not available in the United States right now.

Other broad spectrum anti-microbials are characteristically ineffective such as penicillin and Bactrim, drugs you may be using for patients presenting with febrile illness.

This next slide suggests the appropriate dosages for doxycycline in children and non-pregnant adults. Chloramphenicol is suggested for pregnant patients. Therapy should be continued at least 72 hours after defervesence and until there is evidence of clinical improvement. Most importantly, you will need to prescribe antibiotics empirically before you have all the laboratory testing information based on clinical suspicion.

The next slide describes Rocky Mountain spotted fever prevention measures. Of course, it is very important for there to be disease awareness and recognition. Use of protective clothing and repellants is also important; avoidance of tick areas can be helpful.

It is generally not recommended to use anti-microbial prophylaxis following a tick bite. Careful inspection for ticks and prompt removal after returning from the outdoors, in particular during the spring and summer, is important.

There may be a six hour grace period from the time the tick is attached until inoculation of the organism so careful inspection is important.

This next slide describes specific information regarding prevention- Wear light colored clothing, tuck your pants in to your socks, and apply repellant.

Next slide: This slide demonstrates how to remove a tick- use fine tipped tweezers right at the skin and then gently pull straight out without crushing the tick.

The next slide describes surveillance and reporting. Rocky Mountain spotted fever is a nationally reportable disease so cases should be reported to the State Health Department. The reports are then submitted to CDC. Next slide.

I would now like to describe some of the recent epidemiology of RMSF in the United States. This slide shows Rocky Mountain spotted fever cases and incidence from 2000-2005. The numbers of cases in the last five years has increased dramatically increasing from about 500 cases in 2000 to 2000 cases in 2005.

This next slide shows the states reporting the most number of cases including: Missouri, Arkansas, Tennessee, Oklahoma, and North Carolina. As you can see, over the last five or six years these states have all had a significant increase in cases.

One of the questions we have is whether other tick-borne illnesses are also increasing. While we are not going to cover all other tick-borne diseases in detail, I just wanted to show you a couple of other slides.

In this slide we will review the epidemiology of human ehrlichioses. Although there have been some changes in the reporting systems and case definitions, clearly there has been a marked increase in the number of human ehrlichiosis cases.

The next slide shows spread of ehrlichiosis cases in one particular state, Wisconsin. On the left you can see that in 2002 a few counties were affected, but in 2005 there were many more counties affected. The following slide shows the same data from Minnesota.

Finally, the next slide shows increases in Lyme disease, another tick-borne disease.

Why have there been increases in RMSF and other tick-borne diseases? The next slides graphically describes some of the possible reasons. There may be surveillance issues affecting the number of cases reported, increases in recognition and knowledge of the disease, changes in diagnostic testing, changes in human behavior leading to increased contact with ticks, or ecological changes. for example, people moving to suburban areas, climate changes, and changes in the ranges where the ticks are present.

In summary, Rocky Mountain spotted fever is a potentially life threatening disease. It's endemic throughout much of the United States. There is a broad differential diagnosis and early on the disease is difficult to diagnose even for experienced physicians.

Confirmatory assays include acute and convalescent serology, polymerase chain reaction, pathologic evaluation, or culure of biopsy specimens. Clinicians should consider Rocky Mountain spotted fever as the cause of unexplained fever in spring and summer; and doxycycline is the drug of choice regardless of the age.

You may have all heard that doxycycline is not always recommended for children, but it is felt that the short course of therapy and that the risks and benefits of therapy support the use of doxycycline regardless of the age.

This is all I wanted to cover today about Rocky Mountain spotted fever. There are some additional slides at the end which we won't be able to cover describing an investigation of Rocky Mountain spotted fever in Arizona where a new tick vector -- Rhipicephalus sanguineus (brown dog tick) was identified as the cause of Rocky Mountain spotted fever. We will have to see in the next few years whether the brown dog tick turns out to be a vector fro RMSF in other parts of the United States.

Finally, I'd like to acknowledge, Christopher Paddock, John Openshaw and Jennifer McQuiston for supplying many of the slides that I used in this talk today. Thank you.

Alycia Downs: Thank you Dr. Swerdlow that was a very informative presentation. We will now hear from Dr. Lederman. Dr. Lederman, you may begin.

Edith Lederman: Thank you very much. Good afternoon everyone, it's my pleasure to speak to you today about an investigation of human parapox infections which occurred in Missouri State and gives us an opportunity to discuss the clinical, epidemiologic and molecular aspects.

Going on to slide 2, the objectives: to identify routes of transmission of parapox viruses from animals to humans; to identify current diagnostic techniques available for confirmation of parapoxvirus infections at CDC; and finally to distinguish between human parapoxvirus infections and cutaneous anthrax using clinical and historical information.

The overview of this presentation today will include background on parapoxviridae, specifically focusing on orf and pseudocowpox viruses which were involved in this outbreak.

Then some background on the investigation itself: the field and laboratory components, the investigation results, the conclusions, and finally the limitations.

Parapoxviridae is a very diverse genus of pox viruses which include orf virus, pseudocowpox virus, bovine papular stomatitis virus, as well as sealpox virus.

These viruses cause cutaneous and systemic disease in the specific animal hosts that they affect specifically, orf virus among sheep and goats, and pseudocowpox virus among dairy cattle.

parapox infections are common diseases of ruminants and occur in animals by either direct contact with infected animals or environmental contact, specifically for orf virus, if they've been vaccinated with the orf vaccine (which is a live unattenuated vaccine).

As I've mentioned, these are very common diseases. For example, 40% of flocks in the United States have been infected with orf virus in the past three years. And these infections occur most commonly in the spring which coincides with live stock birth and exposure of susceptible newborns.

These infections are zoonotic diseases, orf virus and pseudocowpox, the incidence of which in humans is unknown currently. This is probably because the diseases are not reportablen they occur in rural areas, they occur in populations due to occupation or a vocational exposures (these populations are familiar with the diseases and, therefore, may not seek medical attention) and, for the most part, these infections are self limited.

You will notice from the photographs above of orf and pseudocowpox virus that they appear clinically indistinguishable and, therefore, have been lumped into a group know as barnyard parapoxviruses.

These infections, however, do last a long time (anywhere between four to eight weeks), they may be very painful, and may become superinfected.

Electron microscopy and serology cannot distinguish between these parapox viruses. You would have to use a molecular tool such as PCR.

I did want to mention that in hosts with significant immune compromise these infections can become quite severe and progressive, requiring medical and/or surgical therapy just as in this case of orf infection in a patient with non-Hodgkin's lymphoma (see photograph).

For these reason, we conducted this investigation. Between the months of February and May in 2006, there were four human cases of parapox virus infections reported to CDC in the State of Missouri. Two of the cases were initially diagnosed as cutaneous anthrax expending very limited public health resources.

There was one child who was barred from school because of communicability concerns and in one month fair season was to begin in Missouri. So there was concern as to whether the general public was at risk for these infections.

The objectives of our investigation in Missouri were to decide whether or not there was a true increase in disease, or was this simply an increase in reporting. Also, was there a common source for these infections, for example, a common sale barn or the use of the orf vaccine? We do not know the baseline for this disease. However, over the past two years Missouri has only reported one case of parapox virus infection to the CDC.

We also wanted to determine if there was still a lingering risk to humans (i.e., infected animals). Are there health messages that we could provide to minimize the future risk?

And finally, there were two cases misdiagnosed as cutaneous anthrax. Were there potential messages that we could provide for primary care providers to prevent this in the future?

We go on to the next slide which is investigation methods. During this investigation, we used a number of standardized survey tools: separate tools for the cases and for random livestock handlers in the community, as well as local veterinarians.

You'll see to the right of the slide there's a photograph of some of the aides that we use specifically for our livestock handlers to help jog their memory when discussing disease in humans and animals. Next slide.

The surveys of community farmers that we conducted dealt with a number of questions including: demographics, the occupational exposure, the degree of animal exposure that they had on a regular basis, whether or not they've had

parapox virus infections in their animals, and their personal history of parapox virus infections.

Finally, we also explored whether or not they used non-porous gloves while dealing with infected animals and whether or not they used the orf vaccine if they had sheep.

These surveys were conducted at neighboring farms as well as county and state fairs among livestock exhibitors.

We also conducted a very brief survey of veterinarians. We asked veterinarians what their experience was with animals and humans infected with parapoxvirus infections, as well as their knowledge of the use of the orf vaccine in their community.

In addition, we were able to visit a number of case and neighboring farms in order to do sampling of animals and the environment.

These specimens were assessed by molecular analysis using parapoxvirus real time (PCR) assays both for genus and species.

Now, I'll review the results -- next slide.

This slide shows a map of Missouri and demonstrates a geographic distribution of the cases, as well as neighboring farms at which we were able to conduct interviews, and collect specimens from animals and the environment.

During the field investigation, we found that the primary four cases were evenly split between males and females and their ages ranged between 10 and 41 years of age. Their primary risk factors included being infected on a family farm (all of the cases); and three of four the cases were participating in bottle feeding of young infected animals. Gloves were not worn in any case when handling the ill animals.

We also would like to explore whether or not there had been any animal movement on and off of these farms. Three of four of the farms had no new animals in the past year and the only access to other animals that they [their farm animals] may have had was during shows at fairs.

During our investigation, none of the animals at the case farms had overt parapox virus infection. Finally, none of the farms used the orf vaccine.

Although we didn't detect any further human cases at the primary case farms, we did find two cases of convalescing orf virus infection in humans at one of

the neighboring farms. These cases were confirmed by serology. Both of these individuals were bottle feeding sick kids and we did not find any evidence that would link these cases to the primary cases.

We did find plenty of orf virus, however, when we visited neighboring farms. Three of five neighboring farms had overtly infected animals. During an investigation at the state fair, as you would expect (due to quarantine regulations), none of the animals had any overt infections.

There were approximately 17% of livestock handlers who reported a history of parapox virus infections. We compared individuals with and without a history of parapox virus infections and found only two risk factors associated with infection: that is male sex (an odds ratio of five) and whether or not they observed infected animals in their own herd or flock (an odds ratio of almost eight).

We did a crude burden of disease estimate amongst those individuals with parapox virus infection. We found that the rate was six infections per 1000 person years (or really farm years) among this population of Missouri farmers. So in other words, if an average farmer should work 30 years then 18% of all of those exposed farmers would have at least one parapox virus infection in their lifetime.

We saw some interesting results among the veterinarians in these counties. Nearly 50% of veterinarians had at some point been consulted in their career for human orf virus infection and 11% for pseudocowpox, and about a third of them were aware of orf vaccine use amongst local farmers.

A laboratory evaluation revealed that at case farms, we only had one positive animal at the time of the investigation which was a calf specimen. And we were able to match that specimen to the primary human specimen for pseudocowpox.

The interesting results, however, were at the neighboring farms and the state fair; 100% of the animals that we tested that had clinical disease were confirmed positive by PCR and even more interestingly 22% of asymptomatic animals including animals at the state fair were positive by PCR for parapox (orf in these cases) virus.

We also found one fomite, specifically an artificial nipple, which you'll see in the photograph at the right lower corner, was positive by PCR.

In the next slide, our conclusions: In summary, parapoxvirus infections are common in Missouri livestock specifically in target species as well as their handlers.

We felt that it was important to educate the target human population, (i.e., farmers and livestock handlers) and have subsequently created a frequently asked question sheet which is available on the CDC Web site: http://www.cdc.gov/ncidod/dvrd/orf_virus/

Also parapox virus infections in humans may be confused with alarming clinical entities such as cutaneous anthrax and we felt that focused education for primary healthcare providers and public health professionals was warranted.

This is an example of the educational materials that we've created as a result of this investigation. As I mentioned, this frequently asked question sheet is geared toward the industry has been co-authored by CDC and APHIS and is available on both Web sites (CDC and USDA) and the Web site link is provided below.

As far as determining or differentiating parapoxvirus infection from cutaneous anthrax, I think it boils down to two key points. Number one is the history of the health of the animals involved. If asymptomatic or minimal disease is present then you're not dealing with anthrax.

Anthrax rapidly kills animals usually within 24 or 48 hours. In addition, it's useful to look at the geographic distribution of previous cases of anthrax. *Bacillus anthracis* is not routinely found in all US soil, so the concept that anyone in the US could go in their backyard and grow anthrax from the soil is probably not true. It occurs where previously infected animals have died.

The major epizootics in the previous decades have occurred in North Dakota, South Dakota, Minnesota and Texas with occasional cases in New Mexico, Nevada, California and Montana. So if you're dealing outside of those states, then this is not cutaneous anthrax from contracted from infected livestock.

Also, the parapoxvirus infections on these three case farms and the four cases do not appear to have a common source. We've decided that this is likely an increase in reporting probably because of the confusion with anthrax and activation of the public health system, as well as the timely release of an MMWR (case series of orf infections) in February of that year.

We've also determined that veterinarians may be consulted for human disease specifically parapoxvirus infections and this maybe contributing to under recognition of the disease by physicians.

Furthermore, transmission to humans appears to occur most often with bottle and tube feeding and that is the primary risk factor in our population.

We've also determined that fomites may be an important route of transmission from animal to animal (For example, the common nipple that we found to be positive by PCR in our investigation). Asymptomatic animals appear to shed virus. The orf vaccine, although used in this community, does not appear to be related to these human cases.

There are a number of limitations which are worth mentioning in this study. We would imagine there is significant recall bias given the fact that we asked farmers to recall medical history from their past and there is some question as to the accuracy of their own diagnosis.

The farmers were selected by a convenience sample so the results are not necessarily generalizeable across the United States. Furthermore, currently there is a lack of a reliable culture system for parapoxviruses, such that the results from the PCR only determine that there is a presence of DNA. We don't actually know whether or not this is viable virus and thus its infectivity to humans.

I'd like to acknowledge the many partners who participated and who were wonderful supporters in this investigation. I think Dr. Swerdlow and I would be happy to take any questions at this time.

Alycia Downs: Thank you Dr. Lederman that was very informative. We can now open up the lines for the question and answer session. Please address your questions to the respective speaker.

Coordinator: Thank you if you would like to ask a question, please press star 1, unmute your line and record your first and last name when prompted. To withdraw your question, you may press star 2. Once again to ask an audio question, please press star 1. You do have a question from. Your line is open.

Question: I have a question for Dr. Swerdlow. This is concerning Rocky Mountain spotted fever. We had a case reported to us or come to our attention where she initially presented with a rash she was seronegative at that time and then was treated as if she had Rocky Mountain spotted fever recovered and then three to four weeks later had a follow up titer pulled and remained negative.

So the case never made into our surveillance system, but there was a question is there such a thing as seronegative Rocky Mountain spotted fever. And I found a couple of references, but not really supported in the literature and I was wondering if you had any comment on that.

David Swerdlow: Well, theoretically, antibiotic therapy could blunt the immune response, but we actually think that that is fairly rare if it ever happens. It would be

especially unusual for a person with full blown Rocky Mountain spotted fever with a rash not to develop an immunological response. It would have been interesting in retrospect if we could have gotten a skin biopsy specimen from that patient and performed PCR or culture or IHC on the sample.

Question cont'd: Yeah we looked at -- yeah we did all the follow up serology and we didn't do anything beyond serology though because you know the rash and the testing was done well before it came to our attention.

Coordinator: Thank you. Our next question is from Miami County Health Department, your line is open.

Question: Yes, thank you. This question is for Dr. Lederman. You said, I'm sorry about the ignorance, but why do we call these viruses' parapoxviruses and not just simply poxviruses because that's what they are.

Edith Lederman: Yes sir, thank you for the question. Yes of course they are poxviruses, but the specific genus which they fall under is the parapoxvirus genus. Does that clarify?

Question cont'd: Okay thank you.

Edith Lederman: Okay thank you.

Coordinator: American Academy of Dermatology, your line is open.

Question: Yes this question is for Dr. Lederman. In the past few years, we've heard about small outbreaks of orf shortly after the Muslim Festival of Eid ul-Adha when the faithful will handle the sheep or goats. We just had Eid ul-Adha about two months ago, have we had any outbreaks recorded after that holiday?

Edith Lederman: Yes Dr Norton. Thank you for the question. To my knowledge, in the United States, we have not had any cases associated with the sacrifice of animals. I think though that in the US the frequency of home slaughter is probably pretty rare so that this route of exposure to the general public would be unusual.

Question cont'd: Thank you.

Coordinator: Once again to ask a question, press star 1. One moment please. Your next question is from Basic Care Clinic, your line is open.

Question: Thank you. Wonderful discussion today. I wanted to find out if exposure to and acquiring Rocky Mountain spotted fever, or orf, provides long-term immunity to future exposures and if so, how long?

Edith Lederman: Thank you very much for that question, I'll go ahead and answer the parapoxvirus question and then David I'm sure will be happy to answer the Rocky Mountain spotted fever question.

It's a great question and actually we don't know the answer to that. We do know that both humans and animals can be reinfected with parapoxviruses so that it's unclear how long the immunity lasts.

Question cont'd: Thank you.

Coordinator: Next question is from Illinois Department of Public Health, your line is open.

Question: Thank you. I was wondering if Dr. Swerdlow could address infection with Rocky Mountain spotted fever in the absence of a tick bite such as removing ticks from a pet.

David Swerdlow: Well, yes that brings up two important issues. One is that many people don't recall having a tick bite and so that somewhere around 50% or 60% of people may not recall having a tick bite at all. So if someone has what looks like Rocky Mountain spotted fever, but they've been in areas where they could have been exposed to ticks you should suspect RMSF even in the absence of a known tick bite.

Addressing your specific question -- yes you can acquire RMSF infection without a tick bite. If you crush a tick or get any of the feces from the tick into a place where it can infect you (e.g., mucus membranes such as your eyes, etc.),you could indeed acquire Rocky Mountain spotted fever. That's one of the reasons why we recommend that people pull ticks from themselves or from their children carefully so they don't crush the tick or get any of the fecal material from the tick on their fingers where it could then get into their eyes.

Coordinator: Once again to ask a question press star 1. One moment please.

Alycia Downs: Well thank you again Dr. Swerdlow and Dr. Lederman. If there's no other questions would either of you like to make any closing comments?

David Swerdlow: Well I would just like to mention that everything that I've covered and more is described in a Morbidity and Mortality Weekly Rreport (MMWR) that we put out on March 31, 2006 (MMWR Recommendations and Report, March 31, 2006, Volume 55, No. RR4) called "Diagnosis and Management of Tick-Borne Rickettsial Diseases: Rocky Mountain spotted fever, Ehrlichioses and Anaplasmosis," and that is available on the CDC web site (http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5504a1.htm).

It is a really nice practical guide for physicians and other healthcare and public health professionals to learn about Rocky Mountain spotted fever and other rickettsial tick-borne illnesses

And finally in conclusion, I just wanted to say again that we think RMSF is important to recognize and treat early to prevent deaths. But, you also need to consider other illnesses too, such as meningococcal meningitis while waiting for serologic results to return. It's important to recognize our disease and to treat for them, but don't forget about other diseases as well.

Alycia Downs: Well thank you again, Dr. Swerdlow and Dr. Lederman for providing out listeners with this information. I also want to thank our listeners for joining us for this call. In case you didn't get the chance to ask your question, please send an email to coca@cdc.gov. The recording of this call and transcript will also be posted to the COCA web site at www.bt.cdc.gov/coca. Please stay tuned for our next COCA Conference Call. Thank you and good bye.

Coordinator: Thank you. This concludes today's conference, please disconnect at this time.

END