Occupational Infections

June 13, 2012

Michael A. Sauri, MD, MPH&TM, FACP, FACPM, FACOEM, FRSTMH, CTropMed Medical Director Occupational Health Consultants 15005 Shady Grove Road, Suite 450 Rockville, MD 20850

msauri@ohcmd.com

www.ohcmd.com

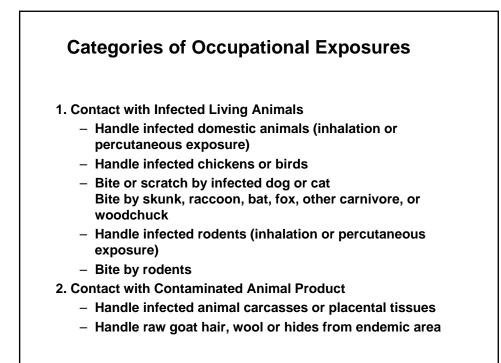
Occupational Setting		
•	Institutions - Military Recruits/Units - Schools - CCC - Prisons - Cruise Ships Hospitals - Tuberculosis - Hepatitis B - HIV - Hepatitis C - Norovirus Medical Research - Aerobiology Farm/Ranch/Forestry - Brucellosis	

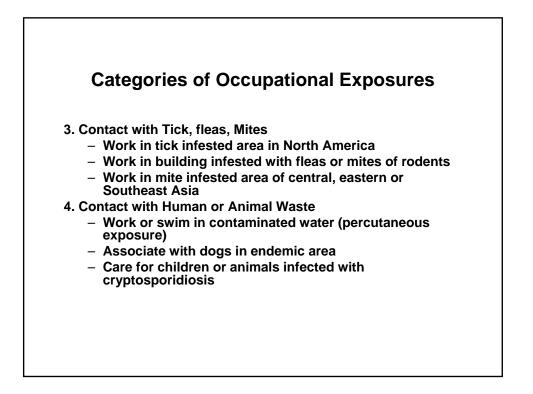
Human Infections

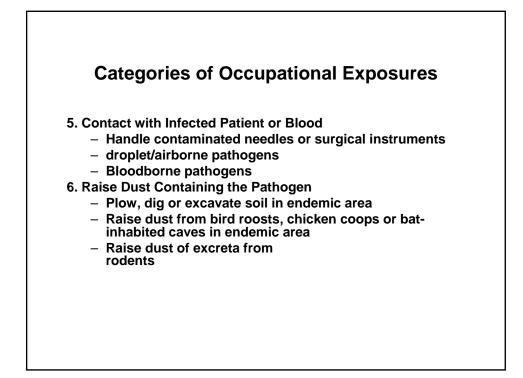
Hospital / Medical Research Institutions First Responders (Lab/Disaster)

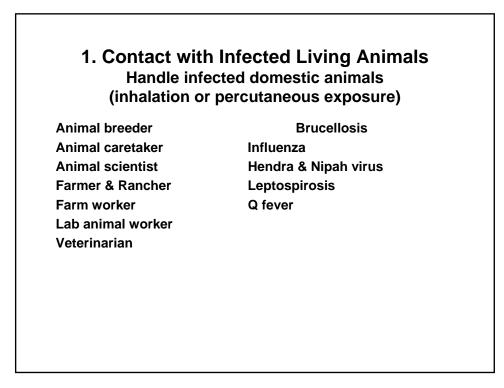
Zoonotic/Arthropod-borne Infections

- Veterinary Medicine
- Farm/Ranch/Forestry/Hunters
- Medical Research
- Military Operations
- Adventure Travelers









1. Contact with Infected Living Animals

Handle infected chickens or birds

Animal breeder Animal caretaker Animal scientist Lab animal worker Poultry farmer Poultry handler Veterinarian

Influenza Newcastle disease Psittacosis

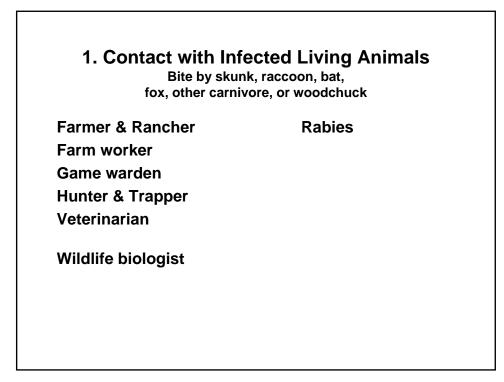
1. Contact with Infected Living Animals

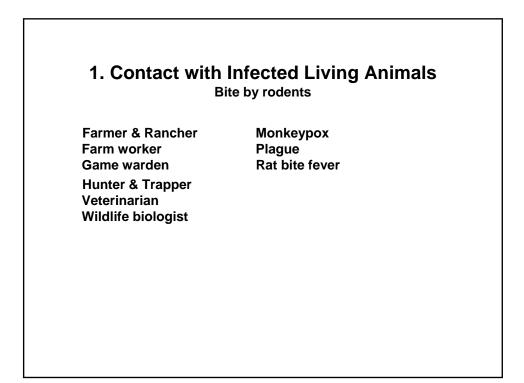
Bite or scratch by infected dog or cat

Animal breeder Animal caretaker Animal scientist Farmer & Rancher Farm worker Lab animal worker Veterinarian

Brucellosis

Cat scratch fever Capnocytophaga infection Pasteurellosis Plague Rabies Tularemia





1. Contact with Infected Living Animals

Handle infected rodents (inhalation or percutaneous exposure to infected rodent)

Farmer & Rancher Farm worker Game warden Hunter & Trapper Veterinarian Wildlife biologist Arenaviral infection Hantavirus infection Lassa fever Leptospirosis Lymphocytic choriomeningitis Monkeypox Omsk hemorrhagic fever Plague

1. Contact with Infected Living Animals Handle infected laboratory rats

Lab animal worker Veterinarian Hantavirus infection LCM Rat bite fever

1. Contact with Infected Living Animals Handle infected macaque monkeys

Lab animal worker Veterinarian **B-virus infection**

2. Contact with Contaminated Animal Product Handle infected animal carcasses or placental tissues Animal breeder Anthrax Animal caretaker Brucellosis Animal scientist **Crimean Congo HF** Glanders Butcher Farmer & Rancher Hendra & Nipah virus Farmworker Influenza Hunter & Trapper Leptospirosis Lab animal worker Newcastle disease Plague Psittacosis Meat packer Slaughterer Veterinarian Q fever Rift valley fever Tularemia

2. Contact with Contaminated Animal Product

Handle raw goat hair, wool or hides from endemic area

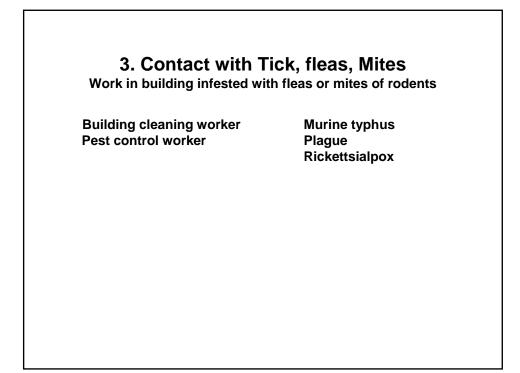
Anthrax

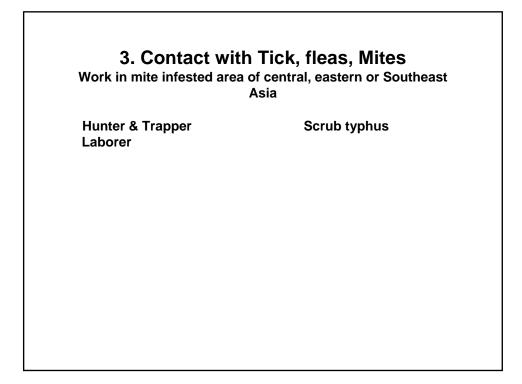
Grader & Sorter Freight handler Packer Drum head Importer

3. Contact with Tick, fleas, Mites

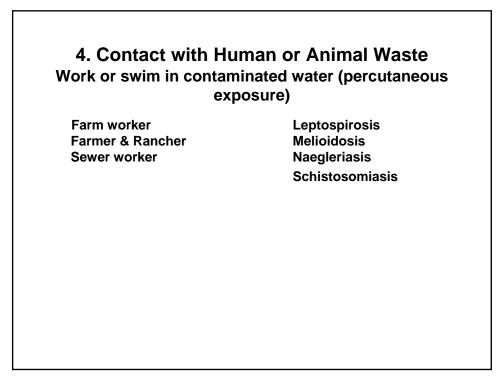
Work in tick infested area in North America

Farmer & Rancher Farmworker Forester Groundskeeper Highway maintenance Hunter & Trapper Landscaper Logging worker Rail track maintenance Babesiosis Colorado tick fever Ehrlichiosis Lyme disease Powassan virus encephalitis Relapsing fever RMSF STARI Tick paralysis Tularemia





A. Contact with Human or Animal Waste Gare for children or primates infected with hepatitis A Child care worker Hepatitis A Lab animal worker Veterinarian



4. Contact with Human or Animal Waste Associate with dogs in endemic area

Farmer & Rancher Farm worker Echinococcosis

4. Contact with Human or Animal Waste Care for children or animals infected with cryptosporidiosis

Animal handler (cattle) Child care worker

Cryptosporidiosis

5. Contact with Infected Patient or Blood

Handle contaminated needles or surgical instruments

Dental worker Embalmer Healthcare worker AIDS Crimean-Congo HF Ebola -Marburg Hepatitis B Hepatitis C Lassa fever

5. Contact with Infected Patient or Blood **Droplet/airborne pathogens** Healthcare worker Adenovirus caring for sick patients Arenavirus infection Crimean-Congo HF Diphtheria Ebola -Marburg Influenza Lassa fever Measles Meningococcus Monkeypox Mumps Mycoplasma infection Parvorvirus Pertussis Rubella SARS Tuberculosis Varicella

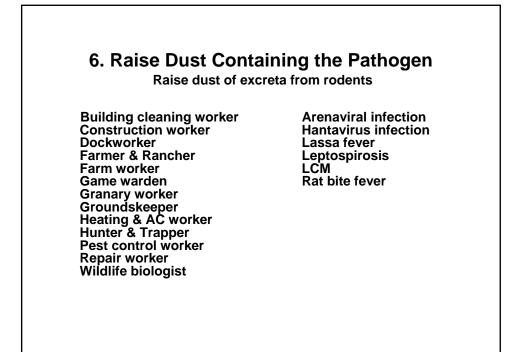
5. Contact with Infected Patient or Blood Bloodborne pathogens

Healthcare worker caring for sick patients infection AIDS

Arenavirus

Crimean-Congo HF Ebola -Marburg Hepatitis B Hepatitis C Lassa fever West Nile virus infection

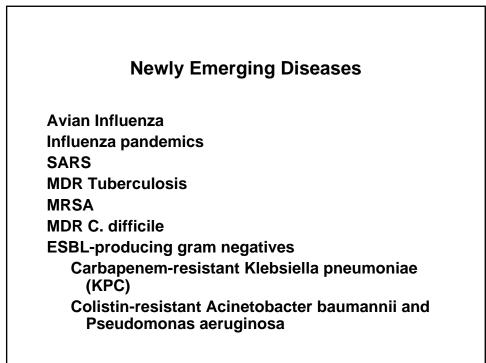
6. Raise Dust Containing the Pathogen Raise dust from bird roosts, chicken coops or bat-inhabited caves in endemic area Histoplasmosis Construction worker Demolition worker Farmer & Rancher Farmworker Gardener Heating & AC worker Roofer

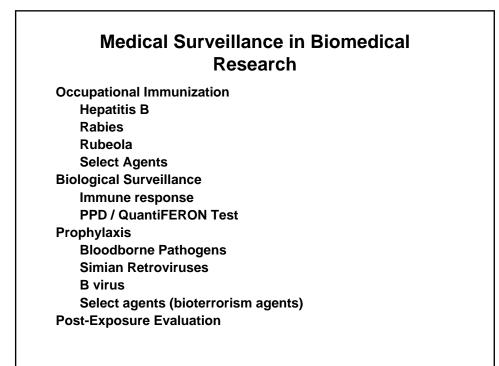




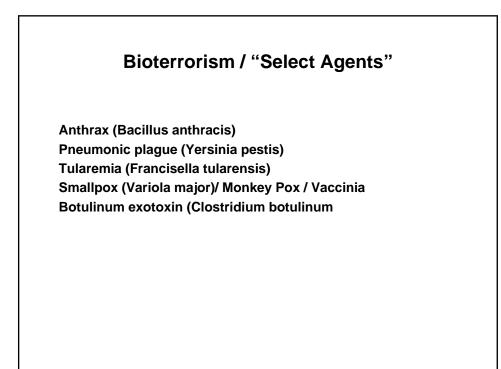
Plow, dig or excavate soil in endemic area

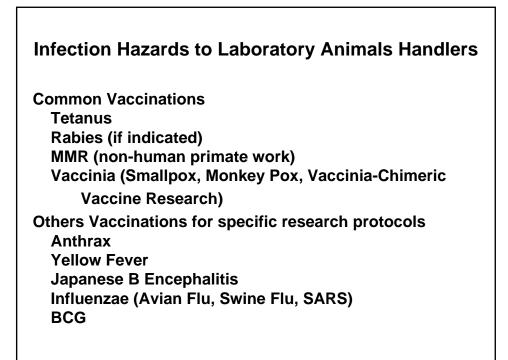
Archeologist Demolition worker Farmer & Rancher Farmworker Coccidioidomycosis Paracoccidioidomycosis

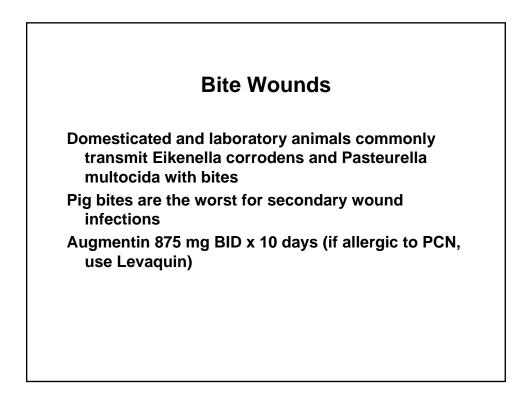


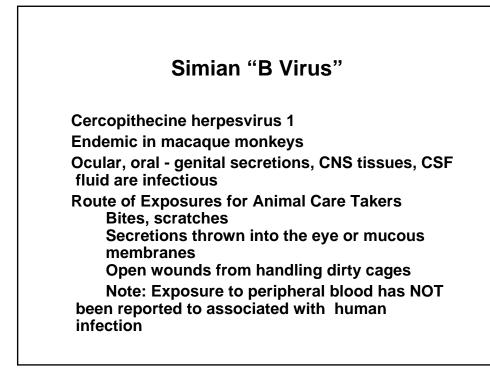


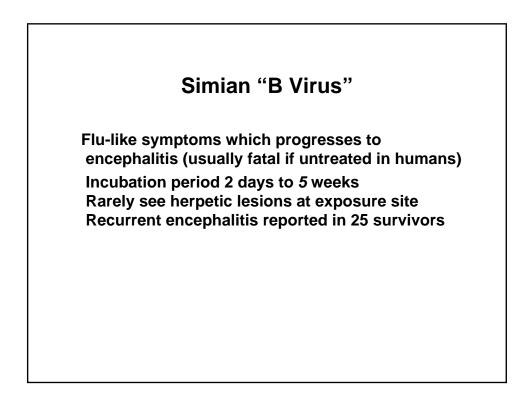
Travel-Associated Diseases Routine Vaccination Required Travel Vaccinations Yellow Fever Meningococcal (Haaj) Recommended Travel Vaccinations Hepatitis A Typhoid Fever Hepatitis B Japanese Encephalitis Rabies Meningococcal Malaria Traveler's Diarrhea

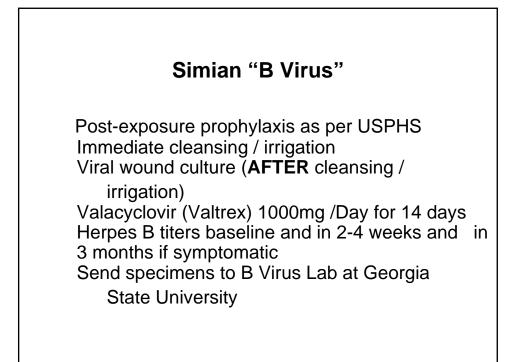


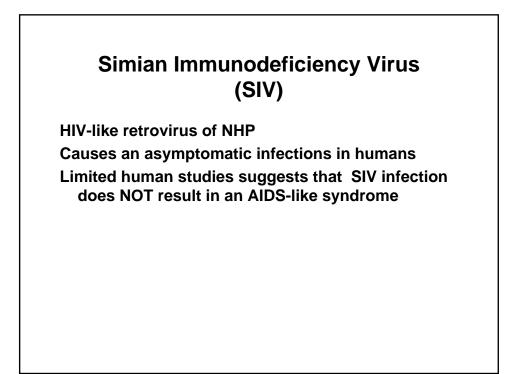


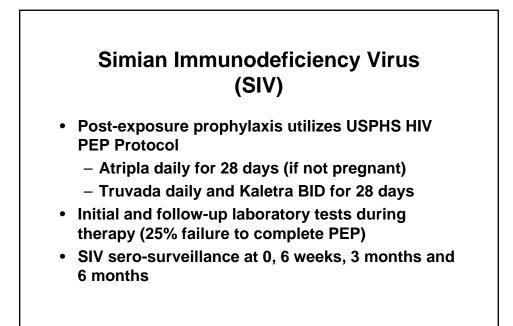












Laboratory-Acquired Infections 1930's - 1940's

The first studies of the occupational hazards to bacterial, fungal and rickettsial agents in laboratories were published in the 1930's and 1940's.

Laboratory-Acquired Infections 1950 - 1975

Laboratory works were shown to have higher rates of Brucellosis, Q fever, typhoid fever, viral hepatitis and tuberculosis compared to the general population.

20% of cases were attributed to documented accidents (mouth pipetting and needle sticks) and exposure to infectious aerosols was considered to be the plausible but unconfirmed source of infection in the remaining

Laboratory-Acquired Infections 1970's - 1980's

- There was a marked decline in bacterial and rickettsial infections and with a lesser decline in Viruses and fungi.
- At the same time there was growing attention focused on laboratory exposure to Hepatitis B virus and WV.
- In the 1990's, attention focused on laboratory exposure to recombinant DNA, chimeric virus development using vaccinia virus, and carcinogenic material/tissues)

Laboratory-Acquired Infections 2000 - Present

Attention has focused on laboratory exposure to disease agents without current effective treatments "SELECT AGENTS" (e.g. ricin, hemorrhagic viruses) MDR Bacteria (TBc, C. difficile, ESBL, MRSA) MDR Viruses (HIV, Avian Flu, SARS) Prions (?) Nanoparticles (?)

Top Ten Laboratory-Acquired Infections 1979-2004

Total of 1, 141 laboratory-associated infections in literature review

Mycobacterium tuberculosis	199 cases	
Arboviruses	192	
Coxiella burnetti	177	
Hantavirus	155	
Brucella	143	
Hepatitis B	82	
Shigella spp.	66	
Salmonella spp.	64	
Hepatitis C	32	
Neiserria meningitidis	31	

Laboratory-Acquired Vaccinia Infections

- The Center for Disease Control (CDC) reported 5 cases of occupational exposure to orthopox virus that resulted in hospitalization in the April 18th, 2008 edition of the MMWR (Vol. 57, No. 15). Their investigation of the cases identified four preventable causes for these significant occupationally-related orthopox infections:
- 1. The employee's refusal to receive vaccination;
- 2. The laboratory failure to vaccinate their employees;
- 3. Failure to revaccinate individuals with inadequate response to an initial vaccinia vaccination; and
- 4. Failure to re-vaccinate (booster) exposed employees at 10 years.

References Laboratory-acquired Infections

Meyer, KF, Eddie BL Laboratory infections due to brucella, J Infect Dis, 68: 24-32, 1941

Sulkin, SE, Pike RM, Survey of laboratory acquired infections. Am J Public Health, 41: 769-781,1951.

Pike, RM: Laboratory-associated infections, Summary and analysis of 3,921 cases, Health Lab Sci, 13: 105-114, 1976

Pike RM, Past and present hazards of working with infectious agents, Arch Path lab Med, 102: 333-336, 1978

Biological Safety, Principles and Practices. ASM Press. 2006.

Occupational Infections, Library of Medicine, 2012; http://www.hazmap.com/infect.htm

References (Continued)

CDC/NIH/PHS's Biosafety in Microbiological and Biomedical Laboratories (5th Edition)

NRC 2010 The Guide for the Care and Use of Laboratory Animals (8th Edition)

Sauri, M, Medical Surveillance in Biomedical Research, , Applied Biosafety, Vol 12, No 4, Dec 2007, pp 214 –16

Guidelines for the Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents developed by the DHHS Panel on Antiretroviral Guidelines for Adults and Adolescents; A Working Group of the Office of AIDS Research Advisory Council (OARAC); vailable at http://aidsinfo.nih.gov/contentfiles/AdultandAdolescentGL.pdf

Cohen et al, Recommendations for Prevention of and Therapy for exposure B Virus, Clinical Infectious Diseases, 2002. 35; 1191-1203

Langley (Editor), Animal Handlers Occupational Medicine State of the Art Reviews 1999, Vol. 14, No.2