

# Zoonoses Associated with Animal Use in Research with Emerging and Re-emerging Pathogens

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## Why Use Literature Surveys for Data?

No national reporting system for LAI (except BSAT).

All zoonoses are not notifiable diseases.

But - Scientific literature

- documents outbreak investigations.

*Example: The Vanderburgh (Indiana) County Health Department, in conjunction with the Indiana State Department of Health, Indiana Board of Animal Health, and CDC, initiated an outbreak investigation to determine the extent of LCMV infection in the staff and rodents in 3 facilities: 97 employees tested, 31 had antibodies, 4 had aseptic meningitis.*

[Emerg Infect Dis](#). 2014 Feb; 20(2): 240–247.

- And interesting cases.

# National Survey of Zoonoses in Lab Animal Workers 1999-2003

BACKGROUND:  
 AALAS members  
 Anonymous survey  
 Self-reporting  
 30% response rate=  
 1,357 responses

Agent	Cases	Exposure	Species
Ringworm	9	Skin contact	Dog,cat, rabbit,ox
Q fever	2	Inhalation	sheep
Giardia	2	unspecified	dog
Pasteurella spp.	2	Bite Needlestick	Rabbit, bat
B. virus	2	Splash unspecified	macaque
Cat Scratch	2	bite	cat
Ectoparasite	2	Skin contact	Mouse, rabbit
Influenza	2	inhalation	Ferret, pig
Rhinovirus	1	inhalation	Chimpanzee

# National Survey of Zoonoses in Lab Animal Workers 1999-2003

Agent	#cases	Exposure	Species
Mycobacterium spp	1	unspecified	Guinea pig
Simian foamy virus	1	Bite or scratch	Baboon
Bacterial infection	1	Splash to mucosa	Sheep

**Lessons Learned:**  
 28 infections reported by 23 individuals; 9 medically confirmed.  
 10 NOT reported to supervisor  
 15 of the 23 involved safety office or occupational health  
 ONLY 8 indicated that there had been follow-up

► *Coxiella burnetti* : 1979-2015.

- Q fever: 1 fatality
- 205 symptomatic infections
- 195 subclinical
- 400 infections + 2 mentioned in GAO account, but contested by the University.
- “worked with or in proximity to sheep during workday”

► Image: Public Domain,  
<https://commons.wikimedia.org/w/index.php?curid=16818>



## Zoonotic LAI Associated with NHP Studies

- Seroconversions to: Ebola-related filovirus (42), Spumavirus (23), Filovirus (6), Simian D virus (2) BAdV1 &2 (11)
- Infection: TMAAdv(2)
- Macacine Herpes B (Monkey B virus) – 11 published 1979-2015.  
2 fatalities



## Faces of LAI - 2 Memorial Foundations

**Elizabeth R. Griffin – 1994-mucosal splash of NHP primate fluid**



**Jeanne Messier – 1994- hantavirus contracted during field work on begging behavior in nestling birds.**



## Diseases transmitted by rodents

### Directly



- Hantavirus Pulmonary Syndrome
- HFRS
- Lassa Fever
- Leptospirosis
- Omsk Hemorrhagic Fever
- Plague
- Rat-bite fever
- Salmonellosis
- South American Arenaviruses
- Tularemia
- LCMV

Lists from [www.cdc.gov/rodents/diseases](http://www.cdc.gov/rodents/diseases)

### Indirectly



- Babesiosis
- Colorado Tick Fever
- Cutaneous Leishmaniasis
- Human Granulocytic Anaplasmosis
- La Cross Encephalitis
- Lyme Disease
- Murine Typhus
- Omsk Hemorrhagic Fever
- Powassen Virus
- Scrub Typhus
- Rickettsialpox
- Relapsing Fever
- Rocky Mountain Spotted Fever
- Sylvatic Typhus
- West Nile Virus

## Viral Zoonoses: acquired from animal – NOT acquired from work with agent.

Example: 185 Hantavirus laboratory- acquired infections and 83 seroconversions in staff working with rats not known to be infected.

- Rats in the research colony became infected when wild rats penetrated into colony OR
- Import of infected rats.

*Applied Biosafety 23:3 143-152.*

## LAI Associated with Infected Animals-Examples of Emerging Pathogen Infections.

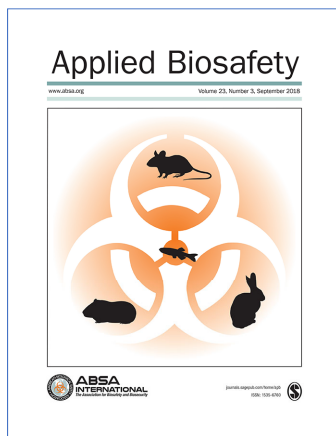
Agent	#	Incident	Reference
M. tuberculosis, MDR	3	Rodent study 2 of 3 staff infected, 3 <sup>rd</sup> became PPD+ No anteroom; respirator removed in workroom	40 <sup>th</sup> biologic safety conference, 1997
Swine influenza	2	Dust masks were accidentally stocked in the ABL53 anteroom instead of respirators.	Wentworth, DE. J Infect Dis 175:7-15.
Venezuelan Equine Encephalitis	3	“worked with infected animals”	<a href="#">J Occup Environ Med.</a> 2004 Aug;46(8):801-11.
West Nile	2	Monitoring wild population: 1 puncture during necropsy, 1 exposure during dead/dying blue jay collection; 1 research needlestick during mouse brain harvest, 1 veterinary student fatally infected from removal of CNS from pony.	MMWR 51:1133-1135. Emerg Infect Dis 11:1648-1649.
Ebola	1	Needlestick with liver homogenate from guinea pig infected with “new” virus – Ebola. Investigator survived.	Emond. <a href="#">Br Med J.</a> 1977. 2(6086): 541–544.

## Examples of Emerging Pathogen Infections.

Ebola	1	Needlestick during guinea pig infection. Fatal infection. Pathologist who did autopsy on scientist: Fatal infection.	<i>Science</i> 2004; 304:1225b.
	1	Gamma globulin was injected IP in mice infected with a mouse-adapted strain of Ebola Zaire. The 5 <sup>th</sup> mouse injected kicked the syringe. The same needle had been used for all 5 mice; the infectious dose for humans for this variant is not known. Exposure reported. Outcome: Quarantine, monitoring. Consult with international community; emergency Investigational New Drug protocols set up in the event symptoms appeared. The scientist was not infected; it was determined that the mice were not viremic on day 2.	<a href="#">Emerg Infect Dis.</a> 2008 Jun; 14(6): 881–887.
	1	Scientist injecting mice with Ebola Zaire concentrated by ultracentrifugation and diluted 1:1 with Freund's adjuvant. Recapping resulted in needle piercing the cap and penetrating 3 pairs of gloves. Consult with international BSL4 community; a live-attenuated recombinant vesicular stomatitis virus (recVSV) vaccine expressing the glycoprotein of ZEBOV was administered 48 hours after the accident. (Emergency import clearance approved). This vaccine was effective in NHP's, this was the first use in a human. 12 hours post vaccination, the scientist had a fever. recVSV viremia was detectable by polymerase chain reaction (PCR) for 2 days. Otherwise, the person remained healthy, and ZEBOV RNA, except for the glycoprotein gene expressed in the vaccine, was never detected.	<i>J Infect Dis</i> 2011 204: suppl_3, Pages S785–S790.



## Animal Biosafety Resources



***Applied Biosafety* 23:3 focuses on Animal Biosafety.**

**The *ILAR Journal* will be publishing articles on animal biosafety as they become available.**

**Also: check the ABSA Laboratory-Acquired Infection (LAI) Database  
On [www.absa.org](http://www.absa.org) under "resources"**

**The LAI database allows you to search for a specific infectious agent and read summarized data from published reports on exposures and infections.**