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# **Rabies in Animals**



### **Rabies in Wyoming**

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Wyoming has the bat and skunk strains of rabies







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#### Distribution of major rabies virus variants among reservoirs in the United States and Puerto Rico, 2007 to 2011





# **Rabies in Wyoming**

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- Animals positive for rabies in Wyoming from 1/1/2000 through 12/31/2013
  - 219 skunks
  - 107 bats
  - 6 cats
  - 5 horses
  - 5 cows
  - 2 dogs
  - 1 squirrel
  - 1 fox



#### 346 animals diagnosed with rabies



### **Rabies in Wyoming**



# 

#### Rabies Positive Wild and Domestic Animals in Wyoming, 2000-2013

Wyomin <sub>i</sub> Departme	COUNTY	Bats	Cats	Cows	Dogs	Foxes	Horses	Skunks	Squirrels
	Albany	8			1				
	Big Horn	3						2	
of Healt	Campbell	2					2	63	
Commit to your hea	Carbon								
	Converse	1	1					4	
	Crook		1					5	
	Fremont	16	1	1				23	
	Goshen	3	1					1	
	Hot Springs	4							
	Johnson	2	1	1	1		1	15	
	Laramie	7						21	1
	Lincoln								
	Natrona	20						15	
	Niobrara							2	
	Park	4							
	Platte	2							
	Sheridan	14	1	3			2	53	
	Sublette								
	Sweetwater	3						12	
	Teton					1		1	
	Uinta	1							
	Washakie	16						1	
	Weston	1						1	



\*the animal symbols do not necessarily represent the number of that species reported as rabies positive.



# **Possible Rabies Exposures**

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#### **Categories of Exposure:**

- 1. Bite
  - any penetration of the skin by the teeth
  - \*\*\*bat bites are small and often missed

#### 2. Non-bite



- scratch, abrasion, open wounds, or mucus membranes contaminated with saliva, CSF, or brain tissue
- Both are considered as a possible exposure to rabies virus and administration of PEP should be discussed



# Animal Bite Surveillance in WY

- Data from WRVPHC Program and Mandatory
   Disease/Condition Reporting
- "Bite" = highly subjective
  - Must have physical contact and include harm
- Total of 3637 incidents reported (2009-2013)
  - 131 other exposures (avg. 26/year)
  - 3506 bite incidents (avg. 701/year)
    - Of those (bite incidents),
      - 2728 (78%) dog related (avg. 546/yr)
      - 626 (18%) cat related (avg.125/yr)
      - 188 (3%) other species related









# Selected incident characteristics and circumstances

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#### **VICTIM CHARACTERISTICS**

(bite only data from 2009-2013; n is the number of incidents where information was known)

Demographic	All Bite Incidents	Dog Related Bite Incidents	Cat Related Bite Incidents
Gender	(n=2951)	(n=2299)	(n=531)
Female	52%	49%	64%
Male	48%	51%	<mark>36</mark> %
Age Category	(n=3112)	(n=2447)	(n= <mark>5</mark> 44)
children (0-18)	37%	42%	16%
adults (>18)	63%	58%	84%

 Most often reported body location of injury = upper extremities (all incidents: 55%; dog related: 48%; cat related: 83%)



# Selected incident characteristics and circumstances

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#### **OFFENDING ANIMAL CHARACTERISTICS**

(bite only data from 2009-2013; n is the number of incidents where information was known)

Characteristic	All Bite Incidents	Dog Related Bite Incidents	Cat Related Bite Incidents
Vaccination Status	(n=2232)	(n=1629)	(n=319)
vaccinated	72%	72%	52%
unvaccinated/not current	28%	28%	48%
Ultimate Disposition	(n=2736)	(n=2145)	(n= <mark>4</mark> 77)
quarantined	74%	78%	61%
not quarantined	26%	22%	39%
[LTF]	[10%]	[ <mark>7</mark> %]	[14%]
[died/euthanized]	[13%]	[1 <mark>0%</mark> ]	[23%]
[released/not a risk]	[4%]	[6%]	[2%]



# Selected incident characteristics and circumstances

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#### **OFFENDING ANIMAL CHARACTERISTICS**

(bite only data from 2009-2013; n is the number of incidents where information was known)

Characteristic	All Bite Incidents	Dog <mark>Rela</mark> ted Bite Incidents	Cat Related Bite Incidents
Ownership	(n=2635)	(n=2063)	(n=540)
Acquaintance's pet	19%	22%	7%
Family member's pet	14%	16%	8%
Friend's pet	8%	9%	4%
Stranger's pet	21%	25%	4%
Stray animal	12%	5%	37%
Victim's pet	27%	23%	40%

- 61% of dog bites offending animal owned by known individual\*
- 42% of cat bites offending animal owned by <u>unknown</u> individual\*
   \*excluding incidents where victim = owner



# Selected incident characteristics and circumstances

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#### **BITE CIRCUMSTANCES**

- Human: depends on species
  - Dog bites = victim breaking up a fight (18%)
  - Cat bites = victim touching animal (42%)
  - All bites = victim approaching/touching animal (18% each)

#### Animal: running at large

- 60% all bites, 60% dog bites, 66% cat bites
- Location: depends on species
  - Dog bites = owner's property (50%)
  - Cat bites = victim's property (48%)
  - All bites = owner's property (45%)







### BRFSS Dog and Cat Bite Question

- How many times in the past year have you been bitten by a dog (2007) cat (2008) severely enough that it punctured the skin?
- Answer options: #, none, don't know/not sure, refused.





# Number of Individuals Bitten by a Dog

- 2.6% x 2007 WY population of 397,465= 10,334
- 95% Confidence intervals around 2.6% of 1.7-3.9
- 10334 [6757,15501]
- Total number of bites: 14,597 (7,585-21,610)





# Number of individuals Bitten by a Cat

- 4.3% x 2008 WY population of 404,211= 17,381
- 95% Confidence intervals around 4.3% of 3.1-6.1
- 17,381 [12,530,24,657]
- Total number of bites: 111,717 (40,351-183,082)





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#### Prevention and Management of Rabies Exposures



# **Management of Animal Bites**

- Thorough washing of the wound with soap and water.
- Use iodine solution if available.
- Notify WDH
- Consider PEP





### Animal Bites – domestic animal



- If a healthy dog, cat or ferret bites a person, animal should be quarantined for ?
  - 10 days to watch for signs of rabies
- If animal unavailable obtain the location, circumstance an behavior of animal and human
- If you have questions about administering PEP call WDH at 1-877-996-9000



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#### Wild animal bites (carnivores/bats)

- Rabies testing or PEP only options (no observation period)
- Regard as rabid unless proven negative by laboratory tests
- If animal is not available for testing, rabies postexposure should begin ASAP
- Small rodents and rabbits
  - Rarely require testing or PEP
  - Consider each case individually





#### **Rabies and Bats**

- Rabid bats have been documented in Wyoming
  - Average of 13 a year
- Recent data suggests human transmission of rabies virus from bats can occur from
  - Minor bites, scratches or mucous membrane exposure
  - Unrecognized bites
  - Seemingly unimportant contact





#### Rabies Vaccines and Immunoglobulin Available in the United States

Туре	Name	Route	Indications	
Human Diploid Cell Vaccine (HDCV)	Imovax® Rabies	Intramuscular	Preexposure or Postexposure	
Purified Chick Embryo Cell Vaccine (PCEC)	RabAvert®	Intramuscular	Preexposure or Postexposure	
Human Rabies Immune Globulin	Imogam® Rabies-HT	Local infusion at wound site, with additional amount intramuscular at site distant from vaccine	Postexposure	
Human Rabies Immune Globulin	HyperRab TM S/D	Local infusion at wound site, with additional amount intramuscular at site distant from vaccine	Postexposure	
Immune Globulin	S/D	additional amount intramuscular at site distant from vaccine	Postexposure	

Grifols/Talecris 919-316-3600

Sanofi Pasteur 800-822-2463

Novartis 800-244-7668



- HRIG 20 IU/kg on day 0, <u>plus</u> 4 rabies vaccinations (1ml via IM) on days 0, 3, 7, 14 days after the first vaccination
- Previously vaccinated: 2 rabies vaccinations on days 0 and 3; <u>no HRIG</u>
- Medical urgency not emergency
- PEP can be given regardless of time lapse since exposure



# **Rabies PEP Logic Tree**

- Is the animal available for observation or testing?
- Is it safe to wait for test results or the 10 day observation period before starting PEP?
- What other facts of the case should be considered?





#### **Factors**

- Species of the animal
- Can the animal be located
- Indoor or outdoor pet
- Type of exposure
  - Bite or non-bite
- Circumstances of the bite
- Ownership of the animal
- Vaccination status of the biting animal





#### **Factors**, continued

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#### Location of the bite

- Facial bite vs. bite to extremity
- Bites to areas with greater innervation, closer to CNS more urgent

#### Severity of the wound

 Regardless of location, the deeper and more serious the wound, the greater the urgency for rabies PEP





# Sheridan County, Rabid Bucket Calf, 2010

- Sunday 7/4 Calf fine
- 7/5 calf ran away at feeding time
- No interest in eating /drinking
- Staggered, wobbly
- Died 7/6
- 2 other calves euthanized
- 4 people get rabies shots





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Sheridan County, Rabid Cow, 2010

- Evening of 3/28
- Cow found down, unable to get up
- Coughing, very vocal
- Acted like something caught in throat
- 3 people get rabies

shots, 1 DVM a booster





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#### Rabies Vaccine:

- 1 ml IM injection days 0,3,7 and 14
- In the deltoid area of the upper arm or lateral thigh for children; <u>not in the gluteals</u>!
- If previously vaccinated, booster day 0 and 3
- Steroids, immunosuppressive agents and antimalarials can interfere with development of active immunity



#### **PEP: HRIG**

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#### Human Rabies Immune Globulin (HRIG)

- Administer on Day 0, infiltrate as much into the wound area as possible, rest in muscle away from vaccination site
- 20 IU/kg
- Can administer up to 7 days after first rabies vaccination
- No HRIG if previously vaccinated



### **PEP: Vaccines, continued**

- Both vaccines safe and immunogenic
- Promotes acute immune response in 7-10 days that lasts <u>></u> 2 years
- Both can be used for pre-exposure and postexposure prophylaxis
- Safe in pregnancy
- Same guidelines for children





# **Pre-Exposure Rabies Vaccinations for Humans**

- Recommended for those with high risk of exposure:
  - Veterinarians and animal handlers
  - Animal control officers
  - Laboratorians working with rabies virus
  - Spelunkers
  - Travelers to endemic areas with poor access to appropriate medical care





### **Pre-Exposure Rabies Vaccinations for Humans**

- (3) 1 ml, IM injections on days 0, 7, and 21 or 28
- Site of injection in the deltoid muscle/lateral thigh in children
- Intended to simplify the postexposure prophylaxis
- Not universally effective without postexposure prophylaxis after recognized rabies exposure





### Titer Testing After Pre-Exposure Vaccination

- Continuous risk category: Check titer every 6 months
- Frequent risk category: Check titer every 2 years
- Boost with 1 dose rabies vaccine if <1:5</li>





# **Rabies Specimen Testing**

- Only the head or brain of an animal larger than 2 pounds (squirrel) should be submitted
  - Brain tissue to include: Brain Stem, Cerebellum, Hippocampus
- Submitted specimens cannot be returned
- Specimen should be kept refrigerated but not frozen



### **Type of Baits Distributed**

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#### **Coated Sachet Baits** Fishmeal Polymer Baits



The outer bait matrix is made from fishmeal (for raccoons and coyotes) or dog food (for gray foxes) combined with a polymer that acts as a binding agent. The vaccine packet, or sachet, resembles a small catsup package but contains about 1.5 ml of vaccine. The sachet is inside the bait matrix and waxed into place.



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# Human Rabies Cases and Adverse Reactions to Pre/Post Exposure Prophylaxis

	Rables in the Americas Br	<ul> <li>New York - 2011</li> </ul>				We help prevent rabies	
	World Rabies Day	Cases of	Rabies in Huma	an Beings in the Unit	ed States, by		
		Circumstan	ces of Exposure	and Rabies Virus Va	riant, 1995-2011		
	Entre:	Date of Death	State of Residence	Exposure History*	Rabies Virus Variant <sup>†</sup>		
		March 15, 1995	WA	Unknown#	Bat, Msp		
	-00-00-	September 21, 1995	CA	Unknown#	Bat, Tb		
		October 3, 1995	CT	Unknown#	Bat, Ln/Ps		
	Rabies and Kids!	November 9, 1995	CA	Unknown#	Bat, Ln/Ps		
		February 8, 1993	FL	Dog bite - Mexico	Dog, Mexico		
		August 20, 1996	NH	Dog bite - Nepal	Dog, SE Asia	Saving Lives.	
		October 15, 1996	KY	Unknown	Bat, Ln/Ps	Protecting People.	
		December 19, 1996	MT	Unknown	Bat, Ln/Ps	LEARN MORE ABOUT HOW CDC WORKS FOR YOU.	
		January 5, 1997	MT	Unknown#	Bat, Ln/Ps		
		January 18, 1997	WA	Unknown#	Bat, Ef	1	
		October 17, 1997	TX	Unknown#	Bat, Ln/Ps	1	
I Inknown ex	nocura	October 23, 1997	LN CIN	Unknown#	Bat, Ln/Ps	1	
UTIKITUWIT EX	pusuie	December 31, 1998	VA	Unknown	Bat, Ln/Ps		
		September 20, 2000	CA	Unknown#	Bat, Tb	1	
		October 9, 2000	NY	Dog bite - Ghana	Dog, Africa	1	
		October 10, 2000	GA	Unknown#	Bat, Tb	1	
		October 25, 2000	MN	Bat bite - MN	Bat, Ln/Ps	1	
		November 1, 2000	WI	Unknown#	Bat, Ln/Ps	1	
		February 4, 2001	CA	Unknown# - Philippines	Dog, Philippines		
		March 31, 2002	C.R.	Unknown#	Bat, Tb		
		August 31, 2002	TN	Unknown#	Bat, Ln/Ps		
		September 28, 2002	IA	Unknown#	Bat, Ln/Ps		
		March 10, 2003	VA	Unknown#	Raccoon, Eastern US		
		June 5, 2003	PR	Bite	Dog/Mongoose, Puerto Rico		
		September 14, 2003	CA	Bite	Bat, Ln/Ps	Importo	4
		February 15, 2004	FL	Bite	Dog, Hati		U
		May 3, 2004	AR	Bite (organ donor)	Bat, Tb	-	
		June 7, 200	ок	Liver transplant recipient	Bat, Tb		
		June 9, 2004		Kidney transplant recipient	Bat, Tb		
Orgon Tro	nonlant =	June 12, 2004	TX	Arterial transplant recipient	Bat, Tb		
Organ ha	nspiant	June 21, 2004	TX	Kidney transplant recipient	Bat, Tb		
	•	Survived, 2004	IM	Unknown#	Bat, Unknown		
	7	October 26, 2004	CA	Unknown#	Dog, El Salvado		
		September 27, 2005	MS	Unknown#	Bat, Unknown		
		May 12, 2006	TX	Unknown#	Bat, Tb		
		November 2, 2006	IN	Bite	Bat, Ln/Ps		
		December 14, 2006	CA	Bite	Dog, Philippines		
		October 20, 2007	MN	Bite	Bat, Unknown		
		March 18, 2008	CA	Bite-Mexico	Fox, Tb-related		
		November 30, 2008	MO	Bite	Bat, Ln/Ps	4	
		Survived, 2009	TX	Unknown#	Bat, Unknown	4	
		October 20, 2009	IN	UNKNOWN#	Bat, Ps	4	
		November 11, 2009	MI	UNKNOWN#	Bat, Ln/Ps	4	
Survi	hav	November 20, 2009	VA	Bite	Dog, India	4	
Sulvi		August 21, 2010	LA	Bite	Bat, Mexico, Ds 🔽	4	
		January 10, 2011	WI	Unknown	Bat, Ps	4	
		Survived, 2011	CA	UNKNOWN	UNKNOWN	4	
		July 20, 2011	NJ NY	Bite Bite	Dog, Haiti	4	
	I	August 31, 2011	ΝΥ	bite	Dog, Argnanistan	I	

\* Data for exposure history are reported only when the biting animal was available and tested positive for rabies; or when plausible information was reported directly by the patient (if lucid or credible); or when a reliable account of an incident consistent with rabies exposure (e.g., dog bite) was reported by an independent witness (usually a family member).



# Human Rabies Exposure not Recognized

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#### Mostly bat strain rabies

 In Texas in 2006 a 16 yr old boy reported waking up from a nap with a bat flying around his face. There were no bite marks or scratches. Neither the boy, his parents or any family friends knew bats could carry rabies and thus he never received PEP. Seven weeks after exposure the boy dies from rabies.



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#### Woman Who Died From Rabies Wasn't Advised That Bats Could Pose Risk

Posted: 08/15/2013 3:05 pm EDT | Updated: 08/16/2013 1:09 pm EDT

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By Bahar Gholipour, Staff Writer Published: 08/15/2013 02:45 PM EDT on LiveScience



# Human Rabies Exposure not Recognized

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#### • Bat Strain, California, 2012

 34 y/o male, right arm pain, died in Zurich, friend later noted had observed patient touch bat March 2012 while in California.

#### Bat Strain, South Carolina, 2011

 46 y/o female, hand tingling, short of breath, died < 24 hours, Family later noted patient had history of bats in home.

#### • Bat Strain, Michigan, 2009

 55 y/o male, numb left hand, neck pain past 10 days, dies after 5 day hospitalization. Relative later remembers bat on arm story.

#### • Bat Strain, Indiana, 2009

 43 y/o male, Oct 5<sup>th</sup> -fever cough, left arm numb, admitted 2 days later, dies Oct 20<sup>th</sup>. Friend later remember bats in tarp.

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#### Fourth Rabies Death Reported From a Single Organ Donor

By DENISE GRADY Published: July 9, 2004

A week after reporting that three patients died of rabies spread by transplants from an infected organ donor, officials at Baylor University Medical Center in Dallas said yesterday that rabies had killed a fourth recipient of tissue from the donor.

All the patients died in June, but the fourth case was not recognized at first because doctors did not know that the patient had received tissue from the infected donor, hospital officials said. Tests from the Centers for Disease Control and Prevention in Atlanta confirmed vesterday that







## Rabies in Organ Donor Transplant Recipients

- Arkansas Donor, 2004
  - Bat strain, donor had mental status change
  - Kidney recipient, III after 25 days, died 4 days later
  - Liver recipient, ill after 21 days, died 6 days later
  - Kidney recipient, ill 27 days later, died 10 days later
  - Iliac artery/liver recipient, transplant in May, died month later
- North Carolina Donor, 2013
  - Raccoon strain, donor vomited, arm tingling
  - Kidney recipient, died 1 ½ years after transplant
  - 3 other recipients received rabies PEP (never developed rabies)



### Symptomology of Clinical Rabies in Humans

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- 1. Prodromal period (days to months): general malaise, chills, fever, headache, photophobia, anorexia, nausea, vomiting, diarrhea, sore throat, cough, musculoskeletal pain, abnormal sensation around bite site (itching, burning, numbness, paresthesia)
- Acute neurologic phase (2-10 days): nervous system dysfunction, anxiety, agitation, dysphagia, hypersalivation, paralyses (typically flaccid), episodes of delirium, priapism, and
   \*\*\*Hydrophobia is the pathognomic sign of rabies!!!

3. Coma





# Recovery of Rabies Patients in the United States

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- Wisconsin, 2004
  - 15 y/o female, left hand numb, tingling, bitten by bat 1 month before, blurred vision. Tests for rabies antibodies positive.

#### • Texas, 2009

 17 y/o female, history of recurring headaches and disorientation, never developed severe symptoms. Exposure to bats in Texas cave. Tests for rabies antibodies positive.

#### California, 2011

 8 y/o female, 1 week history of sore throat and vomiting, then abdominal pain and difficulty swallowing. Respiratory distress. Tests for rabies antibodies positive. Therapeutic coma/Milwaukee protocol. Discharged after 7 weeks, full recovery.



#### Recovery of a Patient from Clinical Rabies --- Wisconsin, 2004

Rabies is a viral infection of the central nervous system, usually contracted from the bite of an infected animal, and is nearly always fatal without proper postexposure prophylaxis (PEP) ( $\underline{l}$ ). In October 2004, a previously healthy female aged 15 years in Fond du Lac County, Wisconsin, received a diagnosis of rabies after being bitten by a bat approximately 1 month before symptom onset. This report summarizes the investigation conducted by the Wisconsin Division of Public Health (WDPH), the public health response in Fond du Lac County, and the patient's clinical course through December 17. This is the first documented recovery from clinical rabies by a patient who had not received either pre- or postexposure prophylaxis for rabies.

While attending a church service in September, the girl picked up a bat after she saw it fall to the floor. She released the bat outside the building; it was not captured for rabies testing, and no one else touched the bat. While handling the bat, she was bitten on her left index finger. The wound was approximately 5 mm in length with some blood present at the margins; it was cleaned with hydrogen peroxide. Medical attention was not sought, and rabies PEP was not administered.

Approximately 1 month after the bat bite, the girl complained of fatigue and tingling and numbress of the left hand. These symptoms persisted, and days later she felt unsteady and developed diplopia (i.e., double vision). On the third day of illness, with continued diplopia and onset of nausea and vomiting, she was examined by her pediatrician and referred to a neurologist. At that time, the patient continued to have blurred vision and also had partial bilateral sixth-nerve palsy. Magnetic resonance imaging (MRI) with and without contrast and magnetic resonance angiography (MRA) studies of her brain were normal, and the patient was sent home.



Milwaukee Protocol, version 4.0 (updated 9/13/2012)

#### Protocol

- 1. Do not administer rabies vaccine or immunoglobulin to a patient with rabies.
  - RIG delays development of rabies antibodies in CSF, essential for survival.
  - Preliminary evidence favors detrimental survival after rabies vaccine in bat rabies.
  - We have administered beta-interferon to a few rabies patients with poor prognostic epidemiology, with evidence for a peripheral effect on viral load. This can be considered in particular for dog rabies, where CSF responses are often poor. It appears to "buy" an additional week for serological response to mature.
- 2. Maintain patient in isolation.
  - There has never been a laboratory-documented case of human-human transmission of rabies other than by transplantation.
  - Patients can be removed from isolation when saliva is negative by RT-PCR on 3 occasions in the presence of serum neutralizing antibodies > 0.5 IU/ml by RFFIT, FAVN or other test for neutralizing antibodies.
- 3. Transfer patients with laboratory-confirmed rabies to a tertiary care facility capable of critical care including intracranial pressure monitoring.
  - Institutions in developing countries can handle rabies if they treat head trauma and tetanus with critical care facilities.





#### Antirabies antibody titers without vaccination

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e ndividual nstitution

<u>IA Home</u> als Home ontact Us <u>Help</u> I read with interest the recent *JAVMA* News article<sup>1</sup> on villagers in Peru who had antibodies against rabies virus, despite never having been vaccinated. As a fourth-year veterinary student, my classmates and I were offered an opportunity to enroll in a trial of an experimental rabies vaccine. The experimental protocol involved measuring prevaccination antirabies antibody titers, and I was found to be one of three students in the country with a prevaccination antibody titer. I had no history of being bitten by or in contact with a rabid animal; however, when I was 8 or 9 years old, my father had caught a bat that we kept in a cage until it died. I never touched the bat, but did observe it for prolonged periods.

Several years later, I attended a meeting during which a researcher from the CDC talked about his investigations into the deaths of several spelunkers from rabies. He surmised that bat guano in the caves may have contained the virus and attempted to test his theory by setting out a series of cages containing animals known to develop rabies, such as cats, dogs, skunks, and raccoons. After a waiting period, he discovered that a number of the animals had developed rabies and concluded that the air in a highly contaminated environment might contain the rabies virus.

Allen Wolff, DVM

Brunswick, Ohio.

1. Cima G. Villagers had rabies antibodies without vaccination. J Am Vet Med Assoc 2012; 241: 681.

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#### Support for law against deceitful practices



#### CDC Recommends:

- Testing of serum, saliva, CSF and nuchal skin biopsy
  - Viral isolation from CSF or saliva
  - Viral antigen by IFA in nuchal skin biopsy
  - Viral RNA from saliva, tissues (nuchal), other fluids
  - Antibody in CSF or in serum from unvaccinated



⇒



### Adverse Events After Rabies Vaccine (n=170)

Commit to your health.

- Sore Arm......15-25%
- Headache......5-8%
- Nausea/malaise......2-5%
- Local Edema..... < 1%

Plotkin SA. Rabies Vaccine Prepared in Human Cell Cultures: Progress and Persepectives. Rev Infect Dis 1980;2:433-47



### Adverse Events After Rabies Vaccine (n=90)

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- Redness/Pain...... 21%
- Headache......7%
- Fever......3.6%
- Nausea......5%

Anderson LJ, Sikes RK, Langkop CE, et al. Post-exposure trial of a human diploid cell strain rabies vaccine. *J Infect Dis* 1980;14: 133-8.



### Adverse Events For Flu Vaccine (n=5049)

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- Sore Arm...... 33.4%
- Local Redness......18.1%
- Headache......7%
- Fever (sensation)......15.2%

Lee CS, Lee KH, Jung MH, Lee HB. Rate of influenza vaccination and its adverse reactions seen in health care personnel in a single tertiary hospital in Korea. Jpn J Infect Dis. 2008 Nov;61(6):457-60.



# Neurological Reactions After Rabies Vaccine

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- Only 5 published reported cases (includes case of Guillain-Barre transient neuroparalytic illness)
- Out of several million does of rabies vaccine given
- In general population Guillain-Barre type illness occurs in 1/100,000 people/per year

Bernard et al., 1982; Boe & Nyland, 1980; Knittel et al., 1989; Tornatore & Richert, 1990; Moulignier et al., 1991



## **Adverse Reactions (cont.)**

- Adverse reactions to HRIG include local pain and low-grade fever
- PEP should not be interrupted or discontinued because of local or mild systemic adverse reactions
- Manage with anti-inflammatory and antipyretic medications





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#### http://www.health.wyo.gov/phsd/epiid/rabies.html