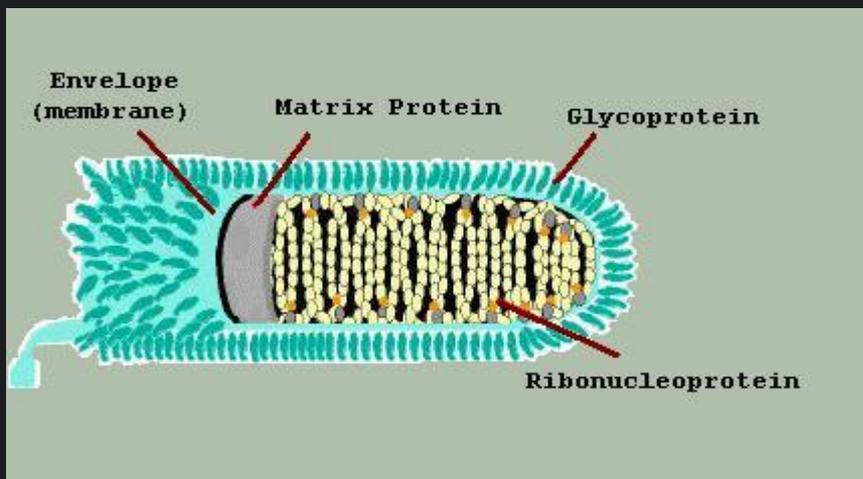




# RABIES IN CHILDREN WHEN TO CONSIDER RABIES AND WHEN TO VACCINATE



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MD PhD

2017

# WILL YOU VACCINATE AGAINST RABIES?

Mum, dad , children: 9 years old and 12 years old.

a. *3 weeks travel to Vietnam, Cambodia: beach and maybe trekking in the mountains*

b. *Six months to Tanzania – mother researcher*

c. *Family visit to the Philippines for 2 weeks -*  
mother from the Philippines



# AGENDA

- Rabies movie 3,5 min
- Epidemiology
- Prophylaxis
- <https://www.youtube.com/watch?v=-moG6JDmJdc>

No conflicts of interest

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Louis Pasteur himself

- 1885 Rabies vaccine



## RABIES FACTS

- Effective vaccines with very few side effects
  - Ca. 30.000- 55.000 people are dying worldwide each year – more than yellow fever
  - 56% of the deaths in Asia and 44% in Africa
  - Children below 15 years of age: 40% of cases
  - With few exceptions it is a deadly disease
-

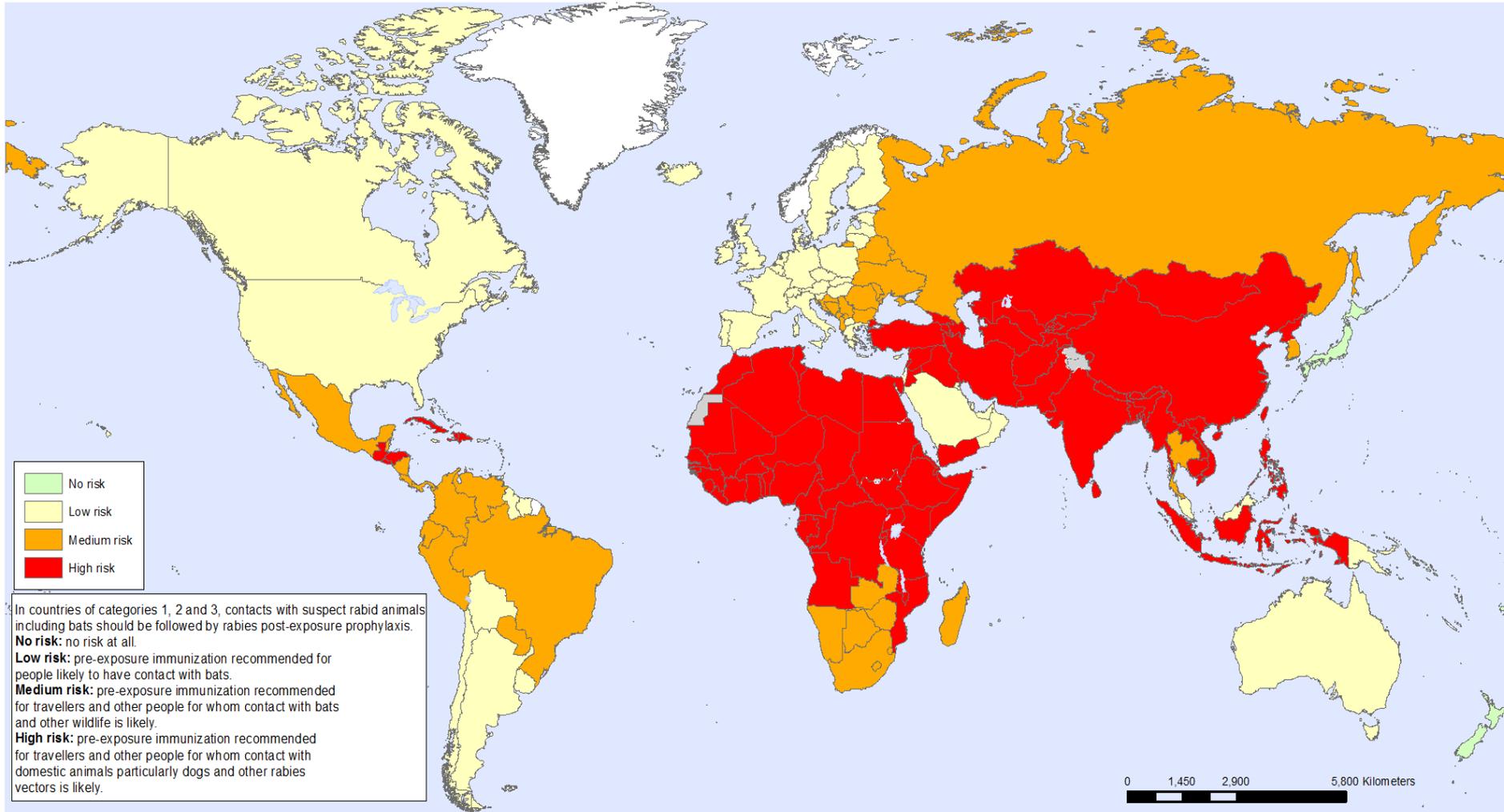


# RESERVOIR

All mammals



# Rabies, countries or areas at risk



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

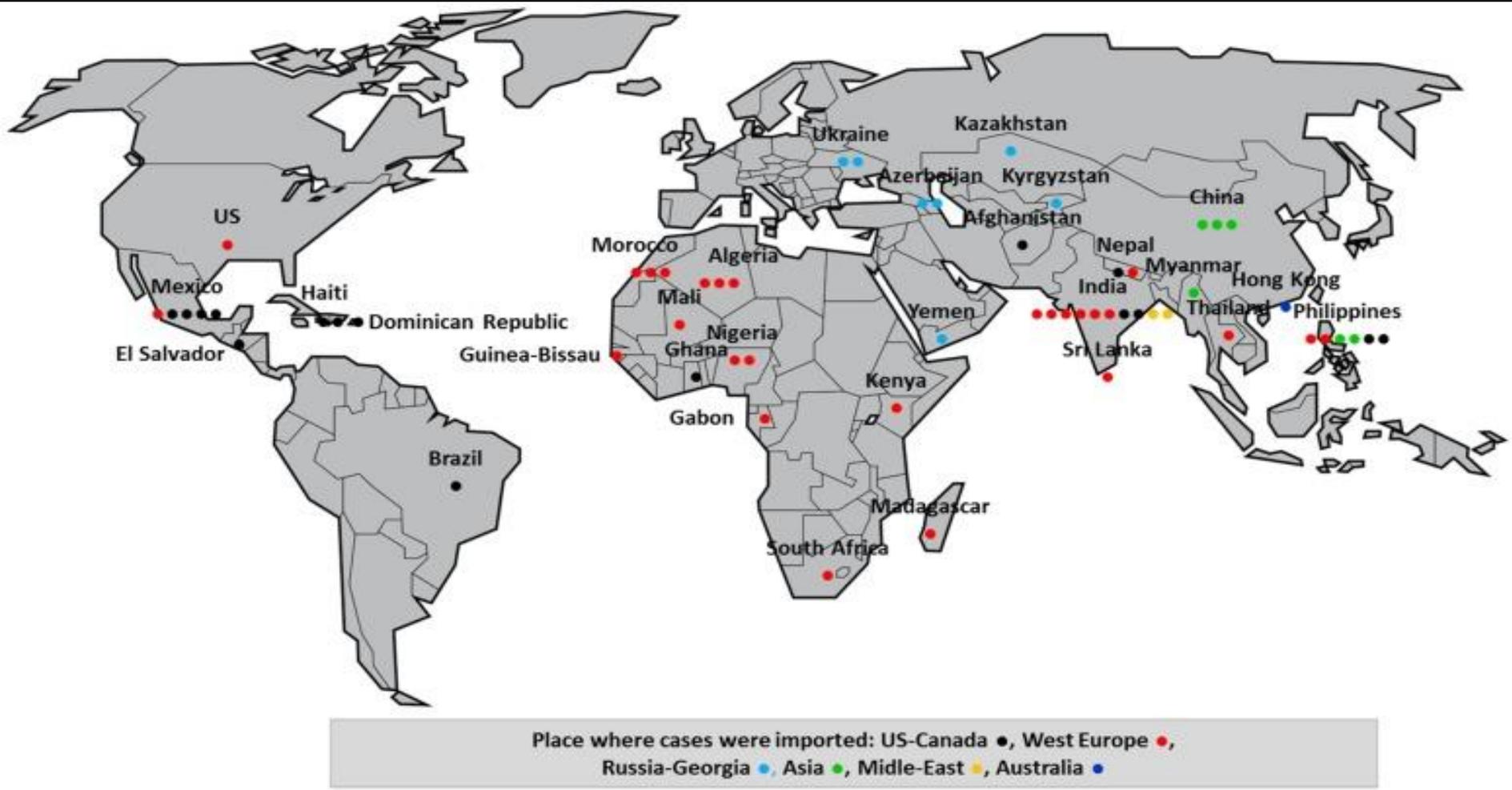
Data Source: WHO Control of Neglected Tropical Diseases (NTD)  
Map Production: Health Statistics and Information Systems (HSI)  
World Health Organization



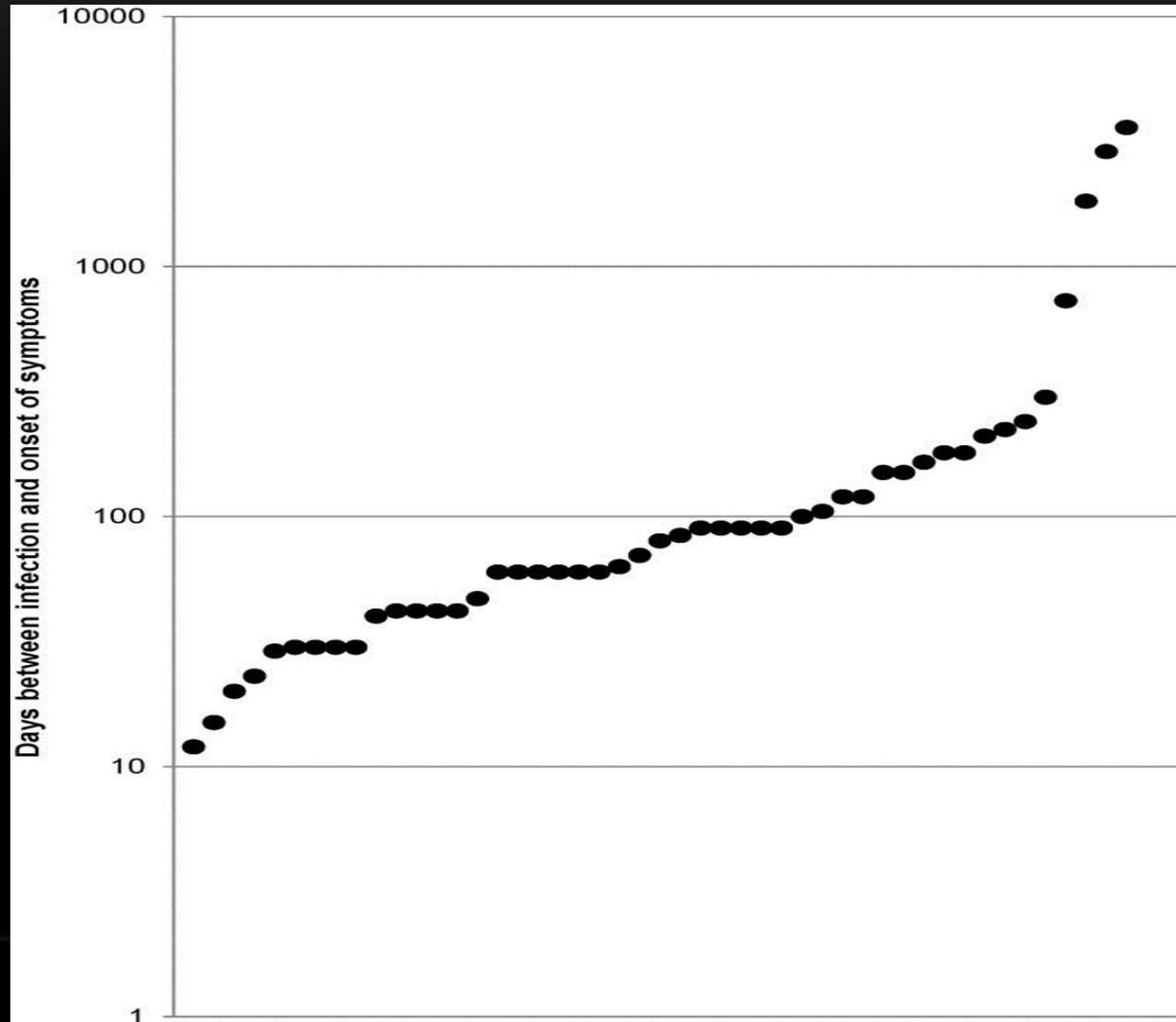
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# IMPORTED HUMAN RABIES CASES WORLDWIDE, 1990–2012

PHILIPPE CARRARA,<sup>1</sup> PHILLIPE PAROLA,<sup>1,2</sup> PHILLIPE BROUQUI,<sup>1,2</sup> AND PHILIPPE GAUTRET<sup>1,2,\*</sup>



# TIME FROM EXPOSURE (BITE) TO DISEASE 10 DAYS UP TO 8 YEARS



Most cases were diagnosed in Europe (56.7%)

Category	Subcategory	N (%)
Age	≤5 years	3 (5.0)
	5–15 years	4 (6.7)
	<b>16–59 years</b>	<b>42 (70.0)</b>
	≥60 years	8 (13.3)
	Not documented	3 (5.0)
Gender	<b>Male</b>	<b>45 (75.0)</b>
	Female	13 (21.7)
	Not documented	2 (3.3)
Reason for travel	<b>Visiting friends and relatives<sup>7</sup></b>	<b>14 (23.3)</b>
	<b>Tourism</b>	<b>8 (13.3)</b>
	Migration (from low to high income country)	7 (11.7)
	Expatriation (from high to low income country)	5 (8.3)
	Business	5 (8.3)
	Medical evacuation	2 (3.3)
	Military	1 (1.7)
	Volunteer work	1 (1.7)
	Not documented	17 (28.3)
	Source of infection	<b>Dog</b>
Bat		3 (5.0%)
Fox		1 (1.7%)
Unknown animal or not documented		5 (8.3%)

# CONCLUSION

PLOS NEGL TROP DIS. 2013 MAY; 7(5): E2209.

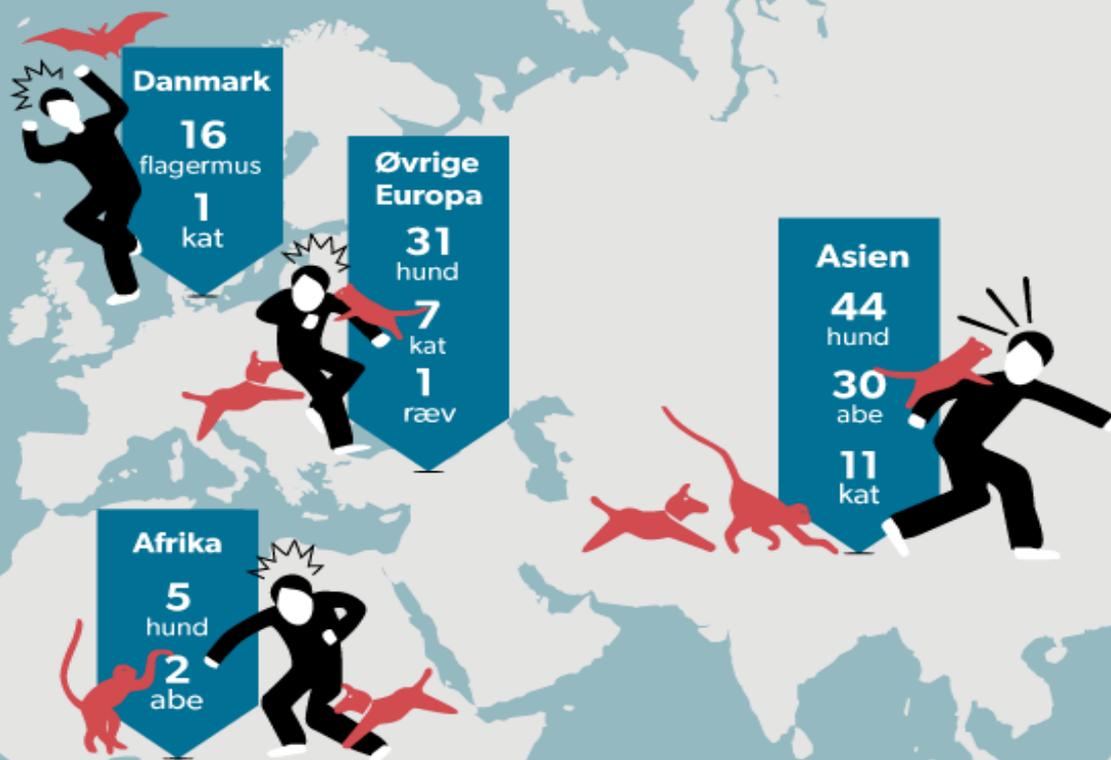
- **Many cases were associated with short duration travel** which challenges the common view that preventive vaccination against rabies should be preferentially given to long-term travelers to high risk areas
  - **Many of the rabies cases were in migrants traveling to their origin country** who may lack the budget for pre-travel vaccination
-

# Her blev danskere livsfarligt bidt



156 danskere blev i 2014 bidt af dyr, som kan være syge med dødelig hundegalskab. I Danmark var **bid fra flagermus** årsag til, at 16 personer blev sat i behandling, heriblandt to børn. Én person blev sat i behandling efter **bid fra en kat importeret fra Rusland**.

I alt 139 danskere blev bidt i udlandet af dyr, som kan have rabies: 88 i Asien (heraf 52 i Thailand), 39 i Europa, **syv i Afrika**, én i Mellemøsten, to i USA og to i Grønland.



# Scandinavians exposed and died of Rabies

The first case of rabies in Sweden in 26 years. Inform travellers abroad about risks and treatment following suspected infection]. Hojer J et al. Lakartidningen 2001 Mar 14;98(11):1216-20.

- In June 2000, . The patient, a 19-year-old woman, had been bitten by a dog in Thailand three months earlier. She was admitted with a 2-day history of pain and paresthesia at the exposure site (right arm), along with anxiety. She died 18 days after onset of symptoms. ***Tourists must be informed of the vital importance of post-exposure prophylaxis after suspected infection.***

**A case of supposed exposure** Poulsen A et al Ugeskr Læger 2004;166:2676-2677

- A Danish woman in Guinea-Bissau was possibly exposed to rabies, when examining her dog for a foreign body in its throat. The vaccinated dog was not furious, but with progressing disease, it developed encephalitis, hydrophobia, and excess production of saliva, and finally died. ***Long-term expatriates in rabies endemic countries should be advised to consider rabies vaccination.***

# EXPERIENCE

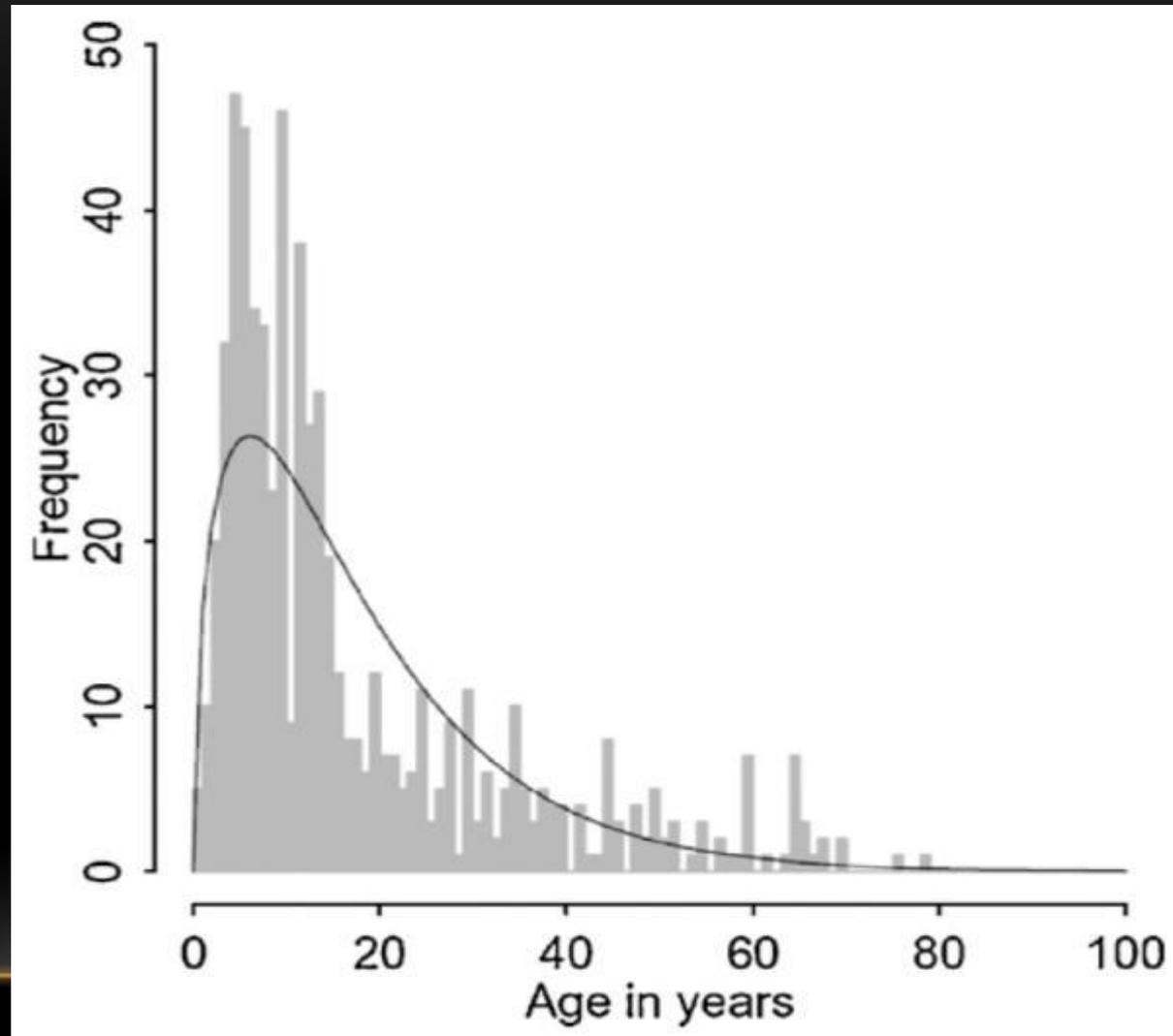
- No intention to have a dog
  - Children were vaccinated
  - Dog vaccinated once
- Recognition- not my dog !
- Evacuation difficult
- Rabies IG accessibility difficult
- Hospital standards
- Finansiël costs
- Psychological distress



Head stuck  
between the  
bars during  
consultation



# IN TANZANIA POSTEXPOSURE - AGE:



*Vaccine*. 2009 Nov 27; 27(51): 7167-7172.

**Evaluating the cost-effectiveness of rabies post-exposure prophylaxis:**

**A case study in Tanzania** [Eunha Shim](#),<sup>a,\*</sup> [Katie Hampson](#),<sup>b,1</sup> [Sarah Cleaveland](#),<sup>c,d,e,2</sup> and [Alison P. Galvani](#)<sup>a</sup>.

# HIGH RISK COUNTRIES- FOR EXAMPLE VIETNAM

- **WHO recommendations:**
  - **pre-exposure immunisation for travellers and other people for whom contact to domestic animals especially dogs is likely**
- **CDC:** Rabies can be found in dogs, bats, and other mammals in Vietnam, so **recommends** this vaccine for the following groups:
  - **Travelers involved in outdoor and other activities** (such as camping, hiking, biking, adventure travel, and caving) that put them at risk for animal bites.
  - **People who will be working with or around animals** (such as veterinarians, wildlife professionals, and researchers).
  - People who are taking **long trips** or moving to Vietnam
  - **Children**, because they tend to play with animals, might not report bites, and are more likely to have animal bites on their head and neck.
- **SSI:** mentioned as “**special risk**” if travelling **1-4 weeks or longer:**
  - **possibility** to vaccinate
    - “(Man kan vaccineres før afrejse (3 doser), men i alle tilfælde skal man søge akut lægehjælp, hvis man bides af et lokalt pattedyr, uanset dyrets adfærd. )”

# PROPHYLAXIS PRE-EXPOSURE

- Avoid "strange" animals
- Imovax /Verorab (Inactivated rabies vaccination)
  - **3 dosages day 0, 7 and 28**. First booster after one year. Then a booster every 5. year (or measure titer to be more than 0,5 IE/ml).
  - Antibodies develops 7 to 14 dage after vaccination. Nearly 100 % of all immunised will develop protective antibody levels after 2 dosages of Rabies-Imovax.
  - Relatively few adverse events

# TREATMENT IF BITTEN

- Clean the wound with water and soap
- Or use 70% alcohol/1% povidone-iodine
- Tetanus prophylaxis



# TREATMENT POST EXPOSURE (PEP)

- **Non vaccinated individuals:**
  - 5 dosages of rabies vaccine day 0, 3, 7, 14 and 28.
  - At the same time as the first dosage should be given rabies immunoglobulin 20 IE/kg . Vaccine and immunoglobulin should be given in 2 different syringes and 2 different places at the body. If the risk for infected bite is big it is possible to give 2 dosages day 0.
- **Persons that are fully immunised within the last 5 years:** 2 dosages day 0 og 3.
- **Persons, immunised for more than 5 years or immunised incompletely:**
  - 5 dosages day 0, 3, 7, 14 and 28.

**Rabies Immunoglobulin is not available everywhere- evacuation might be necessary**

Denmark:SSI: phone: 41 317404 – open 24 hours

# PROS ET CONS

- **Pros:**
  - **Deadly disease**
  - *Same number of death than for example Yellow fever and more than Japanese Encephalitis*
  - PEP is not available everywhere –quality of vaccines abroad? RIG should be given optimally within 3 days
  - For not diseased - psykological stress in incubation period
  - Logistic difficulties to get PEP – especially RIG
  - You might not be able to avoid to be bitten - even if you avoid animals – and you might neglect the risk
- **Cons:**
  - Yet another vaccine – 3 injections .....
  - Even if a vaccine is "safe" there is always a risk of adverse effects
  - **Price cirka 500 Danish crowns per vaccination =1500 DK (Verorab, Imovax)**
  - You can get PEP - effective, especially if given early
  - Revaccination every 5th year ?
  - Periodically shortage of vaccine – vaccinate where the risk is highest?

# WHO WILL I VACCINATE AGAINST RABIES?

Mum, dad , children: 9 years old and 12 years old.

a. 3 weeks travel Vietnam, Cambodia: beach and trekking in the mountains

At least inform the family about the risk and to get PEP if bitten by mammal - vaccinate "investment ?"

b. Six months to Tanzania – mother researcher

Vaccinate all !

c. Family visit to the Philippines (village)

for 2 weeks - mother from there

Vaccinate the children –

probably all ?

**Following all bites from a mammal- consider the risk of rabies**



# TREATMENT



Jeanna Giese survived without PEP

## Symptomatic

- **Milwaukee protocol:**

- ketamine, midazolam, and phenobarbital to suppress brain activity and the antiviral drugs – (ribavirin), amantadine
- 14(15) survivors all with some sequelae

## Survival after Treatment of Rabies with Induction of Coma

*Rodney E. Willoughby, Jr., M.D., Kelly S. Tieves, D.O., George M. Hoffman, M.D., Nancy S. Ghanayem, M.D., Catherine M. Amlie-Lefond, M.D., Michael J. Schwabe, M.D., Michael J. Chusid, M.D., and Charles E. Rupprecht, V.M.D., Ph.D.*  
New England Journal of Medicine 2005

# Furious Rabies after an Atypical Exposure

Heiman F. L. Wertheim\*, Thai Q. Nguyen, Kieu Anh T. Nguyen, Menno D. de Jong, Walter R. J. Taylor, Tan V. Le, Ha H. Nguyen, Hanh T. H. Nguyen, Jeremy Farrar, Peter Horby, Hien D. Nguyen

PLOs Medicine 2009

Don't eat dogs !!!



doi:10.1371/journal.pmed.1000044.g001

**Figure 1:** Dog Meat for Consumption for Sale at a Market in Hanoi, Viet Nam

In Vietnam dog butchering and eating is regarded as a risk factor for rabies

# Differential diagnosis



# HTTPS://WWW.YOUTUBE.COM/WATCH?V=OTIYTB LJZQC

- <https://www.youtube.com/watch?v=OtiytlJzQc>
- <https://www.youtube.com/watch?v=-moG6JDmJdc>