

Rabies : epidemiology, prevention and treatment

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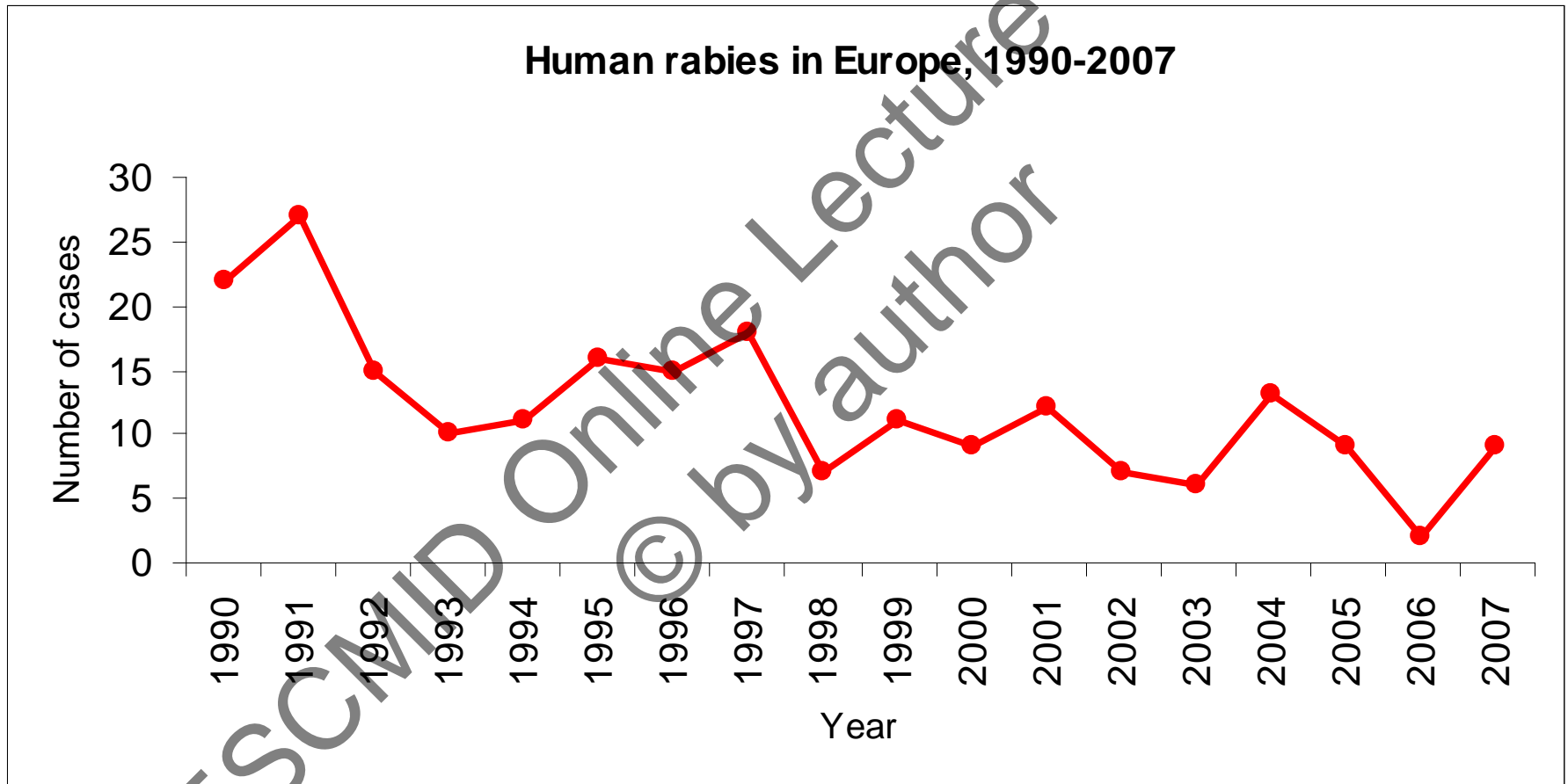
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Human rabies : key facts

- Encephalitis or encephalomyelitis
 - Inoculation from animal bite or scratch (or lick)
 - Hydrophobia and aerophobia
 - No human to human transmission except from graft
 - 100% case fatality ratio (except Jeanna)
- 55 000 cases/ year
 - Most in Asia and Africa, 50% cases < 15 yo
 - Dogs responsible for 99% human contaminations
 - 15 millions PET/year avoiding 327 000 human cases
- Risk of shortage of Ig and vaccines

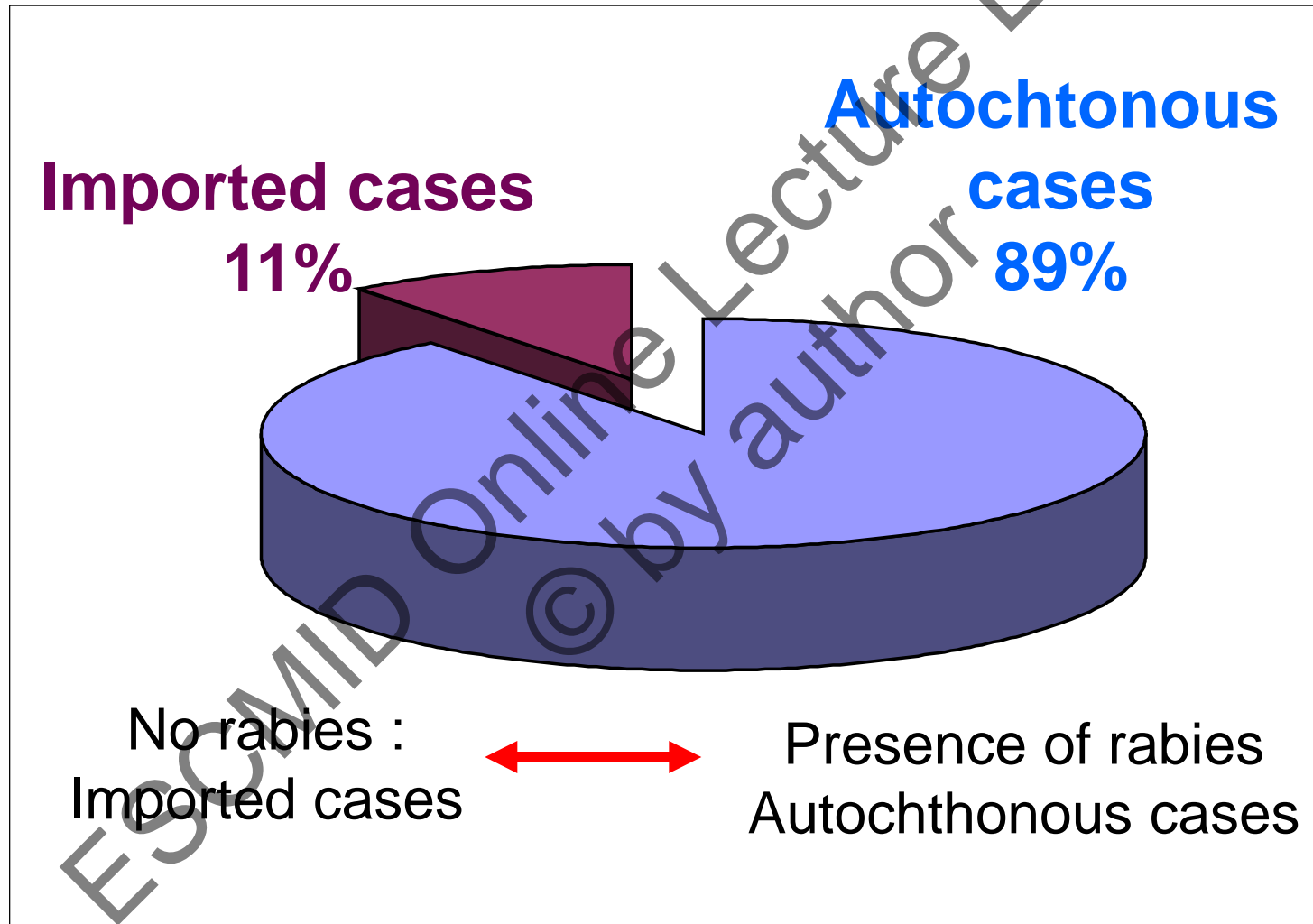
Human rabies Europe



Sources : Rabies Bulletin Europe and Rabnet

Rabies free vs enzootic countries

- Different epidemiological statuses according to the countries



Sources : Rabies Bulletin Europe and Rabnet

Lyssaviruses

Name	Genotype	Geographical distribution	Reservoir	Secondary Host	Human cases	Vaccine Protection
Dog Rabies	1	Worldwide except some islands and Western Europe	Carnivores (worldwide) Bats (Americas)	Humans carnivores herbivores	55 000/year (98% by dog bite)	Yes
LBV	2	Africa	Frugivorous bats	Carnivore, cats, dogs	Never described	No
MOKV	3	Africa	Unknown	Humans, cats, dogs, rodents	1 confirmed 1 suspected	No
DUVV	4	Africa	Insectivorous bats	Humans	3	Very partial
EBLV-1	5	Europe	Insectivorous bats	Humans, Cats, Sheeps	1 confirmed 2 suspected	Partial
EBLV-2	6	Europe	Insectivorous bats	Humans	2	Partial
ABLV	7	Australia	Frugivorous or Insectivorous bats	Humans	2	Partial
ARAV	Non class.	Central Asia (Kirghizistan)	Insectivorous bats	?	Never described	Partial
KHUV	Non class.	Central Asia (Tadjikistan)	Insectivorous bats	?	Never described	Partial
IRKV	Non class.	Siberia	Insectivorous bats	?	Never described	Partial
WCBV	Non class.	Caucasus	Insectivorous bats	?	Never described	Partial

(Source : Pasteur Institute)

Usual reservoirs and epidemiological cycles

- Dogs and the urban cycle
- Wild carnivores
- Bats

Urban rabies

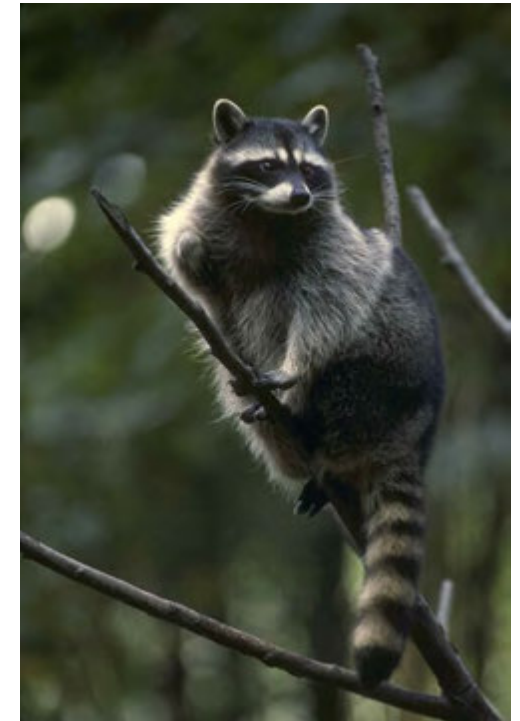
- Dogs, (cats)
- Asia and Africa ++++++
- Progressive disappearance in Central and Western Europe / first half of XX century
- Persistent Enzootic in the South East and Central and Eastern Europe
- No systematic data for eastern borders



Wild carnivores



- Red and arctic foxes
- Skunks, racoon, racoon dog, mongoose, stone marten, etc....

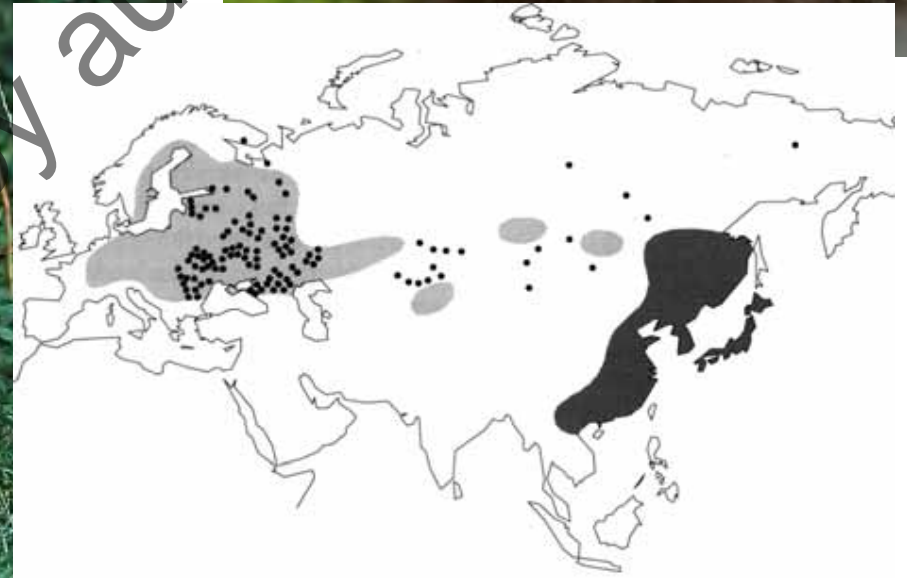


The possible emergence of raccoon dog as a reservoir

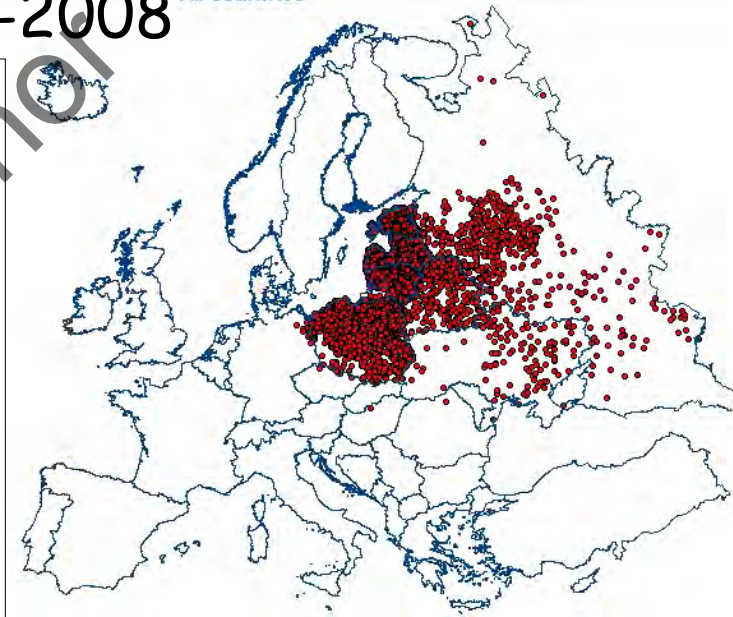
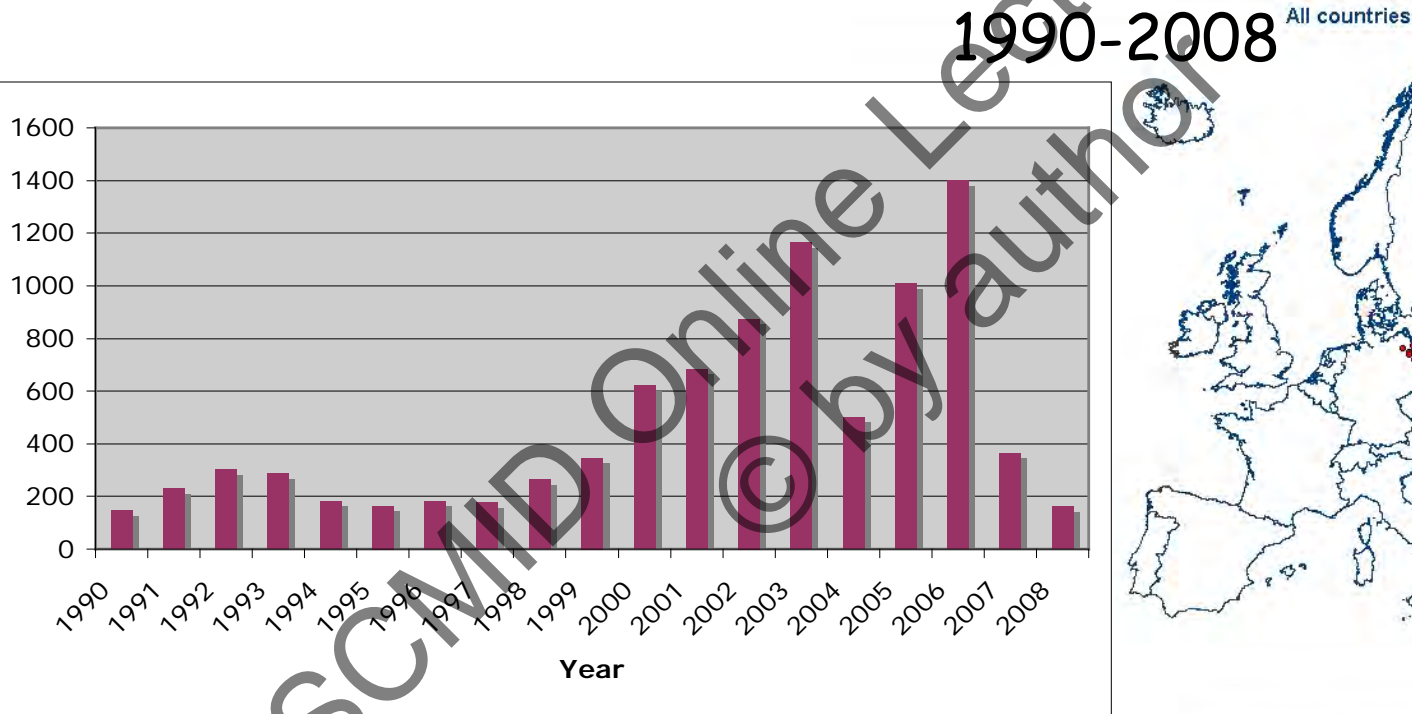
Raccoon dog = Matterhund =
chien viverrin = Tanuki =
Nyctereutes procyonoides



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Surveillance of racoon dog rabies



(C) FLI/2006, administrative boundaries (C) GTK, MACON GmbH

Sources : Rabies Bulletin Europe

Re-emergence of fox rabies in Italy 2008/2010

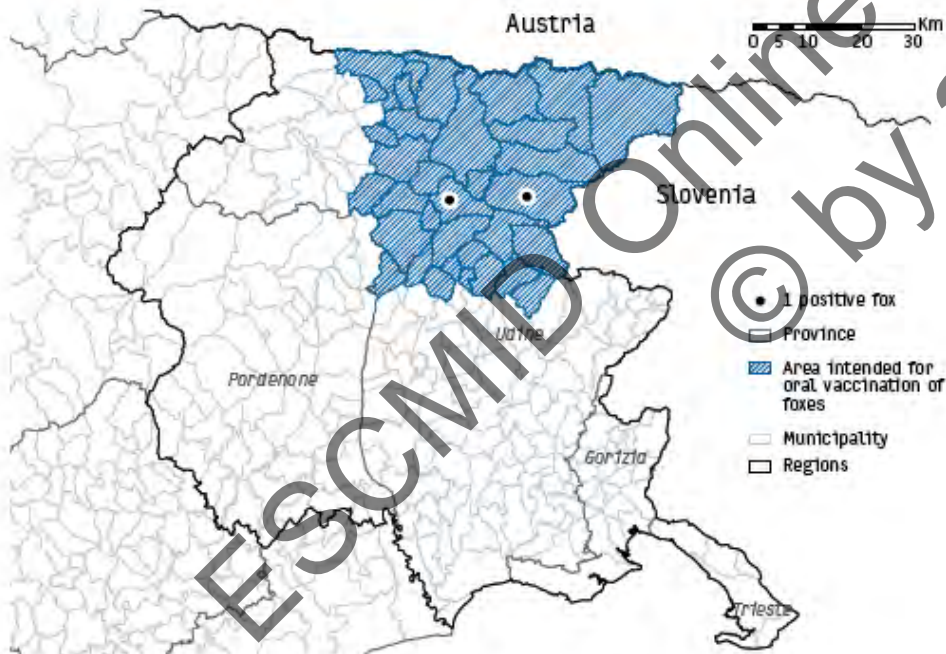
« Last » case: december 1995

October 2008: 2 rabid foxes

Oct 08- Feb 2011 : 287 rabid animals, most foxes, most in 2010

FIGURE 1

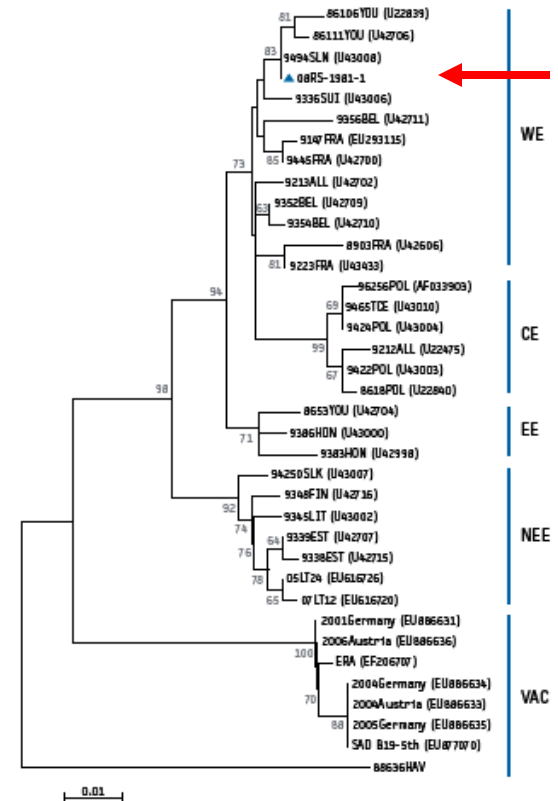
Map of Friuli Venezia Giulia region, Italy, showing the two reported cases as well as the area where oral vaccination of foxes is being implemented



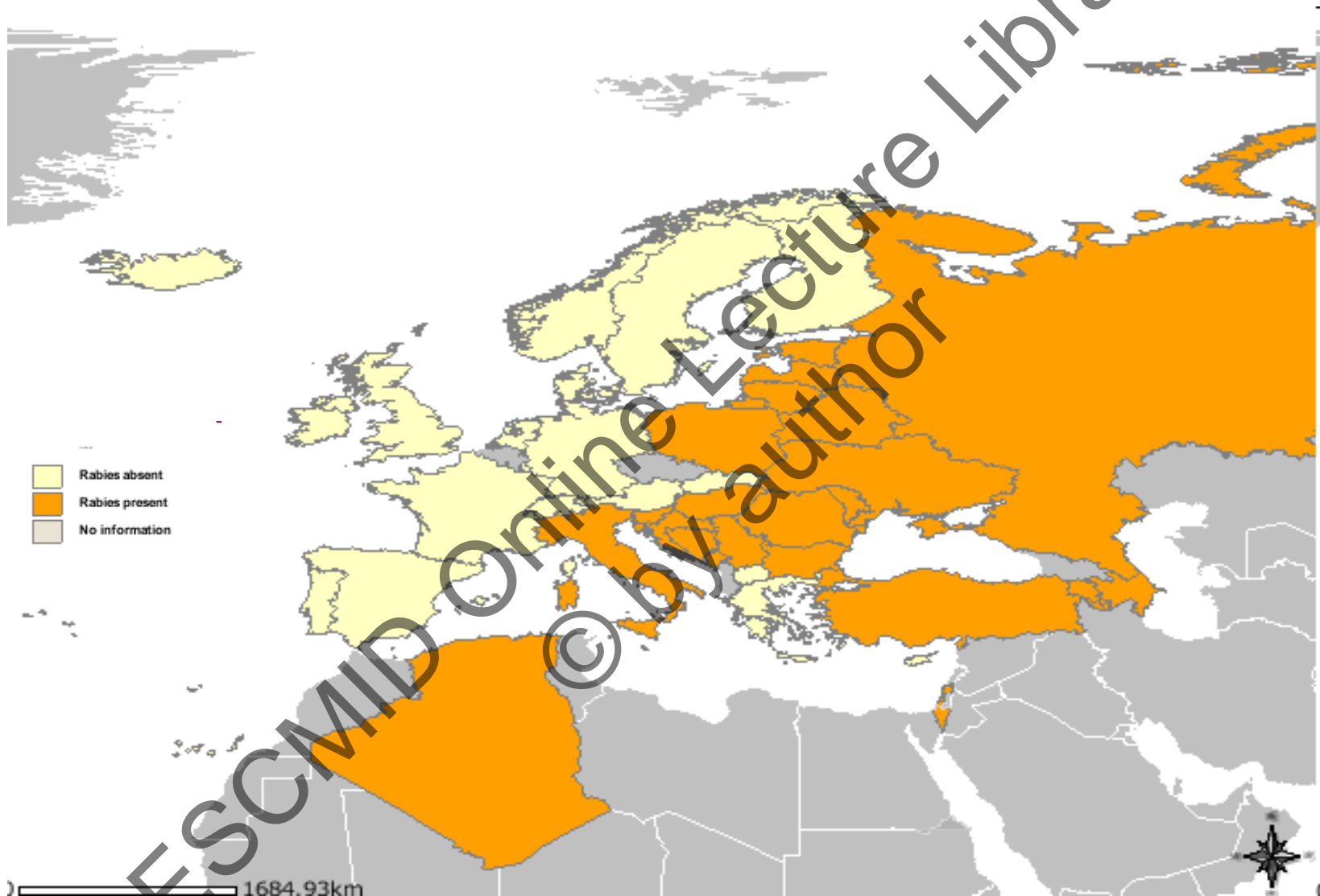
(De Benedictis et al., 2008)

FIGURE 2

Phylogenetic tree (neighbour-joining method) of the nucleoprotein gene of a rabies virus isolated from a fox in Italy, October 2008



Terrestrial rabies in Europe



Source : rabnet interactive map

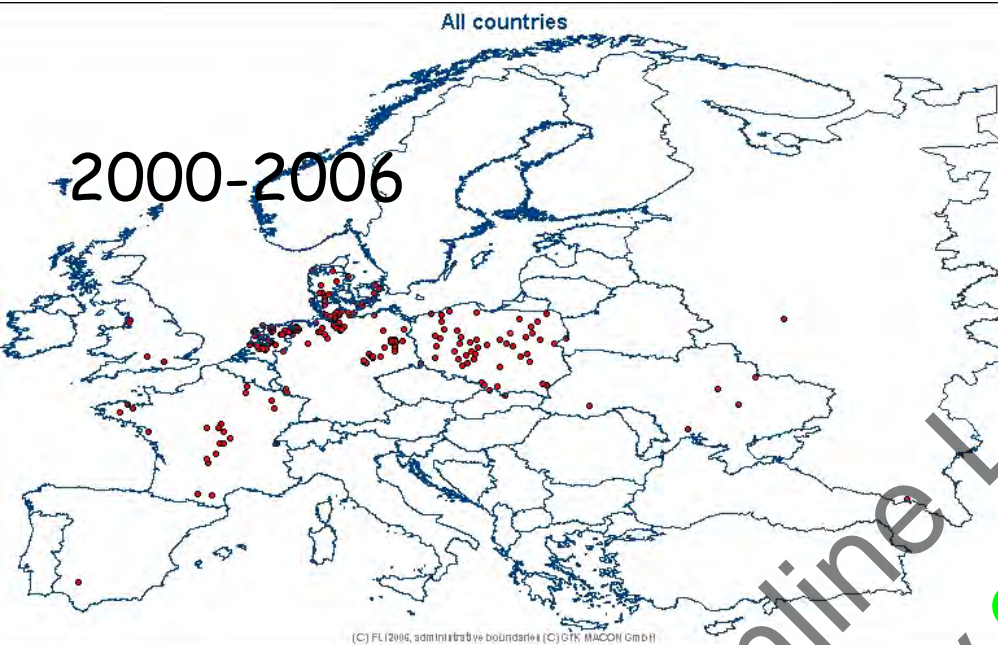
<http://apps.who.int/globalatlas/default.asp>



Bat rabies in Europe

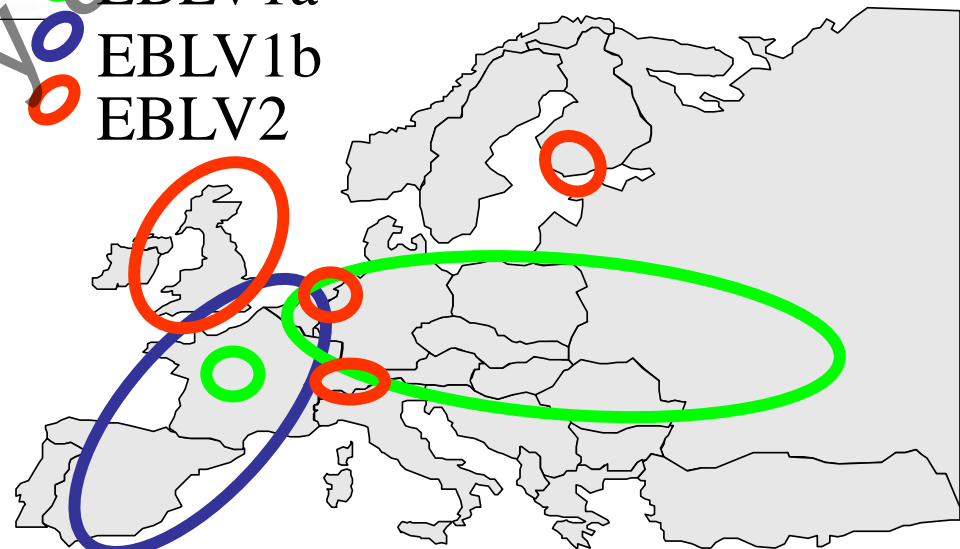
- 1954 : 1st isolation of EBLV in Europe
- Reservoirs : insectivorous bats → *Eptesicus serotinus* and *Myotis myotis*
- Only 5 human cases since 1977 → classical symptoms and issue
- Possible transmission to other mammals
 - Sheep
 - Cat
 - Marten

Bat rabies in Europe



Eptesicus serotinus

- EBLV1a
- EBLV1b
- EBLV2



Prevention of human rabies

- Control of rabies in animals is the key-point
 - Limitation of stray dogs
 - Control of dogs importation in rabies-free countries
 - Vaccination of foxes (and raccoon dogs)
 - (Vaccination of pets)
- Vaccination or post exposure treatment (PET) in humans

Oral vaccination of foxes in Europe

- Started in Switzerland in 1978
- Live vaccines

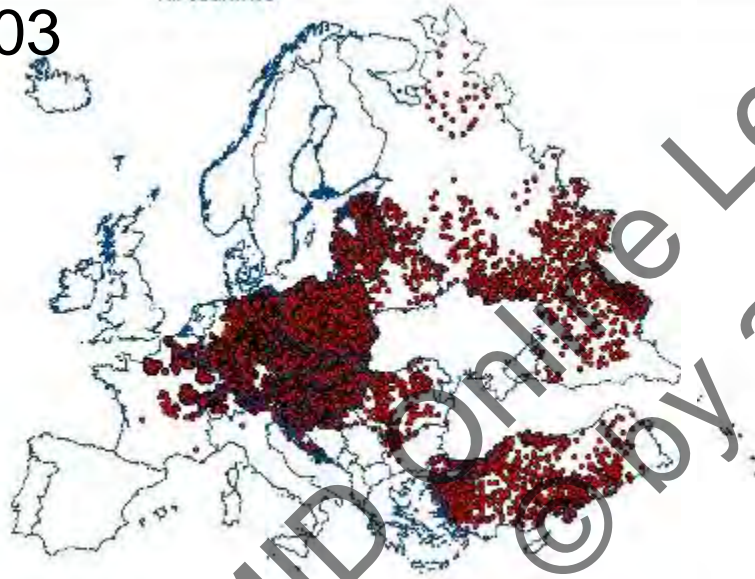


Wildlife rabies (terrestrial)

- Impact of foxes oral immunizations

1990-2003

All countries



2008

All countries



Sources : *Rabies Bulletin Europe*

Preventive vaccination in humans: WHO recommendations

- Indications
 - Professional at-risk exposures
 - Long lasting stay with limited access to medical care in enzootic country
- Preferably cell culture vaccines, not nerve tissue vaccines
- Vaccine scheme
 - 3 injections: D0, D7, and D21 or D28
 - Booster
 - if continual or repeated risk
 - If Antibodies <0.5 UI/L

To treat or not to treat after exposition to rabies virus:

WHO recommendations

- category I – touching or feeding animals, licks on intact skin
→ no PET
- category II – nibbling of uncovered skin, minor scratches or abrasions without bleeding
→ vaccine (*Ig if immunosuppressed patient*)
- category III – single or multiple transdermal bites or scratches, contamination of mucous membrane with saliva from licks, licks on broken skin, exposures to bats
→ vaccine + Ig

To treat or not to treat ?

- The biting animal can be reliably diagnosed or watched
 - Stop PET if negative or if animal still healthy at D10 after bite
 - Consider delaying PET in rabies-free countries
- If not : assess the local epidemiological situation ?
 - Evidence of enzootic rabies → PET
 - No information → PET
 - Bat → PET
 - Terrestrial rabies-free country → ???

The local situation assessment: reliable sources of information

- Sources of information
 - RABNET (WHO)
 - Health Protection Agency
 - Public health websites : RIVM, RKI, CDC



Built on the Global Health Atlas Platform

- About
- Data query
- Interactive maps
- Map library
- Login
- Current user: Rabies

Welcome to RABNET
Human and Animal Rabies
an interactive and information mapping system

The World Health Organization has been collecting rabies data electronically on a yearly basis through "Rabnet", an interactive information system able to generate interactive maps and graphs using human and animal rabies data.

DATA ENTRY

"Rabnet version2" is now allowing for online data entry/update at country level and on Administrative level 1 (e.g. Province, State or District depending on country political/administrative organization). Once validated by WHO, data are transferred into Rabnet version2. Data entry is restricted only to designated national rabies focal points, who are provided by WHO with a username and password required to access the online questionnaire. To download a user manual specifically for national focal points, please [click here](#).

CONSULTING DATA

Apart from rabies data, Rabnet offers basic information resources containing ready-made maps, rabies related documents and details of collaborating centres. Rabies data can be displayed in interactive maps and linked to a broad range of country-specific indicators (population, education and health services) to provide a more comprehensive picture of the situation at different levels.

PLEASE NOTE THAT NO PASSWORD AND/OR USERNAME ARE REQUIRED TO CONSULT RABNET DATA ON HUMAN AND ANIMAL RABIES.

To download a user manual on how to consult rabies data on Rabnet, please [click here](#).

For further information, problems with the system, or to get a username and password (only for WHO rabies focal points), please contact us: rabnet@who.int



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- General Information
- >> Guidelines
- Rabies Incidents

Guidelines

Guidelines relating to pre- and post-exposure prophylaxis

Please note that from 1st January 2011, the new rabies post-exposure form incorporates the risk assessment tool, country risk table, and the Rabies Immunoglobulin Calendar-Calculator. The Calendar-Calculator can be used separately if required.

- 21 February 2011 (updated) Rabies post-exposure form and calendar (Excel Spreadsheet, 148 KB)
- Rabies country risk table (updated 21 February 2011)
- HPA Colindale Clinical Rabies Service (PDF, 92 KB) April 2010, amended 15 Sept 2010
- Rabies vaccine Ig administration advice leaflet (PDF, 1.4 MB) Revised 27 May 2009
- Rabies vaccination and interpretation of rabies serology - Advice for bat workers and their GPs (PDF, 25 KB)
- Immunisation against Infectious Disease (the Green book) – rabies (PDF, 81 KB)
- Revised WHO position paper on rabies vaccines (August 2010) (pdf file: external link)
- The Public Health Management of a Suspected Case of Human Rabies (PDF, 523 KB) updated July 2009
- Memorandum on Rabies - Prevention and Control (pdf file: external link)

Useful articles on management of human rabies

Editorial: Recovery from Rabies. Jackson AC. *New England J Med* 2005;352:2549-50 (external link)



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Rabies Incidents

Rabies risks in terrestrial animals, by country

Note: bats may carry rabies-like viruses in countries which are declared rabies-free in terrestrial animals. Therefore exposure to bats or their secretions should be considered as a potential rabies risk wherever in the world this has occurred.

Click on a letter to go to that listing

ABCDEFGHIJKLMN OPQRSTUVWXYZ

Country names, and levels of risk

Table with 2 columns: Country names, and levels of risk. Rows include Afghanistan (High risk), Albania (High risk), Algeria (High risk), American Samoa (Low risk), Andaman and Nicobar Islands (High risk), Andorra (No risk), Angola (High risk), Anguilla (No risk), Antarctica (No risk), Antigua and Barbuda (No risk), Argentina (High risk), Armenia (High risk), Aruba (No risk), Ascension Island (No risk), Australia (No risk), Austria (No risk), Azerbaijan (High risk), Azores (No risk).

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Post exposure treatment

- Vaccines
 - 5-dose regimen: D0/D3/D7/D14/D28
 - 4-dose regimen: 2 doses at D0 then 1 dose at D7 and D21
- Patients previously vaccinated
 - D0/D3
 - Intramuscular
 - No immunoglobulins
- Immunoglobulins
 - Human 20 IU/kg
 - Equine 40 IU/kg
 - Into or around the wound(s)
 - Not in patients with former preventive vaccination

Alternative PET

- Alternative 4-dose regimen
 - Healthy immunocompetent patients
 - Wound care + Ig + vaccine chosen by the WHO
 - D0/D3/D7/D14
- Intradermal
 - if short supply of vaccines,
 - **if intradermal use authorized in the country,**
 - using a vaccine with proven benefit of the intradermal use
 - 2 x 0.1 ml (shoulder and leg) at D0/D3/D7/D28
- No change from intradermal to muscular route and *vice versa*

การฉีดป้องกันหลังสัมผัสโรค (Post-exposure immunization)

การฉีดวัคซีนเข้าในผิวหนัง
(TRC-ID Regimen: 222011)

ลักษณะการฉีด	ขนาดยา	วันฉีด	แพทย์ผู้ฉีด
วันที่ 0 (D0)	0.1 มล. 2 เข็ม		
วันที่ 7 (D7)	0.1 มล. 2 เข็ม		
วันที่ 30 (D30)	0.1 มล. 2 เข็ม		
วันที่ 90 (D90)	0.1 มล. 1 เข็ม		
วันที่ 30 (D30)	0.1 มล. 1 เข็ม		

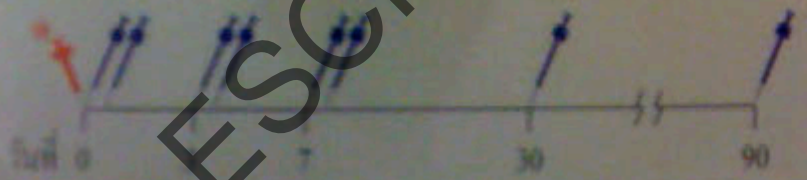
การฉีดวัคซีนเข้ากล้ามเนื้อ
(IM Regimen: 11111)

ลักษณะการฉีด	ขนาดที่ใช้	วันฉีด	แพทย์ผู้ฉีด
วันที่ 0 (D0)	0.5 มล.	Sept 29, 09	✓
วันที่ 7 (D7)	0.5 มล.	Oct 2, 09	✓
วันที่ 14 (D14)	0.5 มล.	Oct 5, 09	✓
วันที่ 30 (D30)	0.5 มล.	Oct 13, 09	
วันที่ 30 (D30)	0.5 มล.	Oct 29, 09	

โปรดกลับมารับวัคซีนเพื่อตรวจหาผลข้างเคียงของวัคซีน

การให้ภูมิคุ้มกันโคออบูลิน

ให้ ERIG 40 IU/kg จำนวน... (หรือ HRIG 20 IU/kg จำนวน..... IU)
ในวันแรก 7 วันถัดมาฉีดใน Category 3 (ตามคำแนะนำขององค์การอนามัยโลก)



Is it possible to treat human
rabies ?

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