

# Tollwut und Tollwutvirus

Schweiz  
Tollwut  
frei !!!  
aber

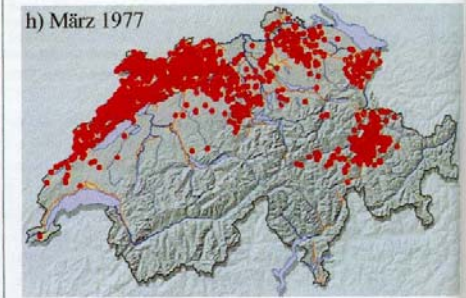
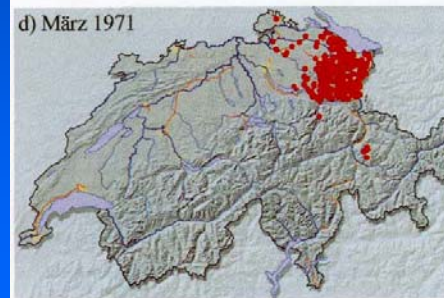
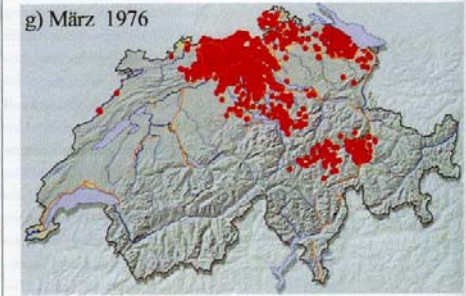
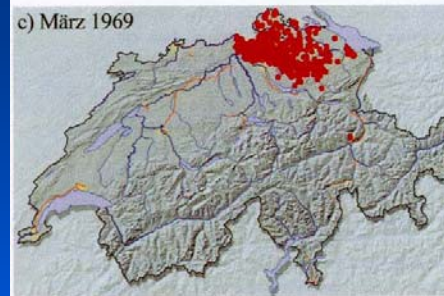
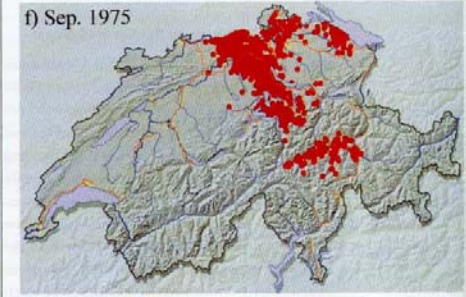
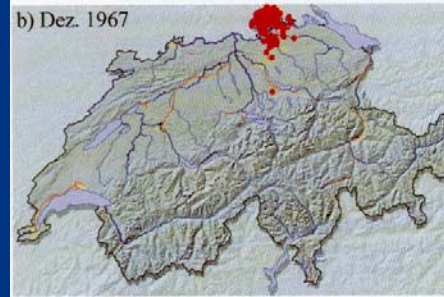
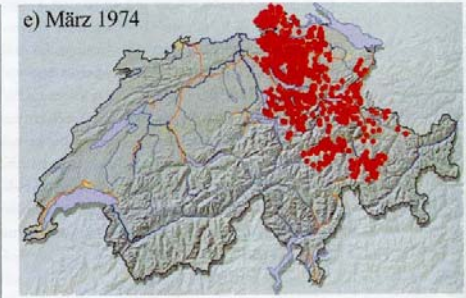
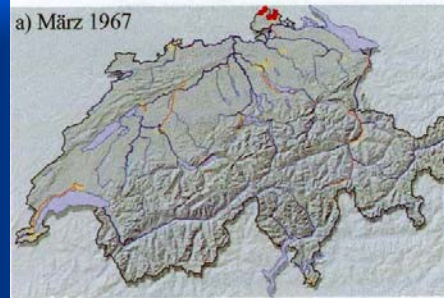


- Neurotrope Virusinfektion bei Säugetieren, Zoonose
- Silvatische Tollwut (**Fuchs**)
- Urbane Tollwut (**Hund**)
- Fledermaus-Tollwut (**ΔAg**)
- Postexpositionelle Impfung
- Fuchsimpfung !!!

# TW in der Schweiz

-30 Jahre-

1967-1997



# TW in der Schweiz

-30 Jahre-

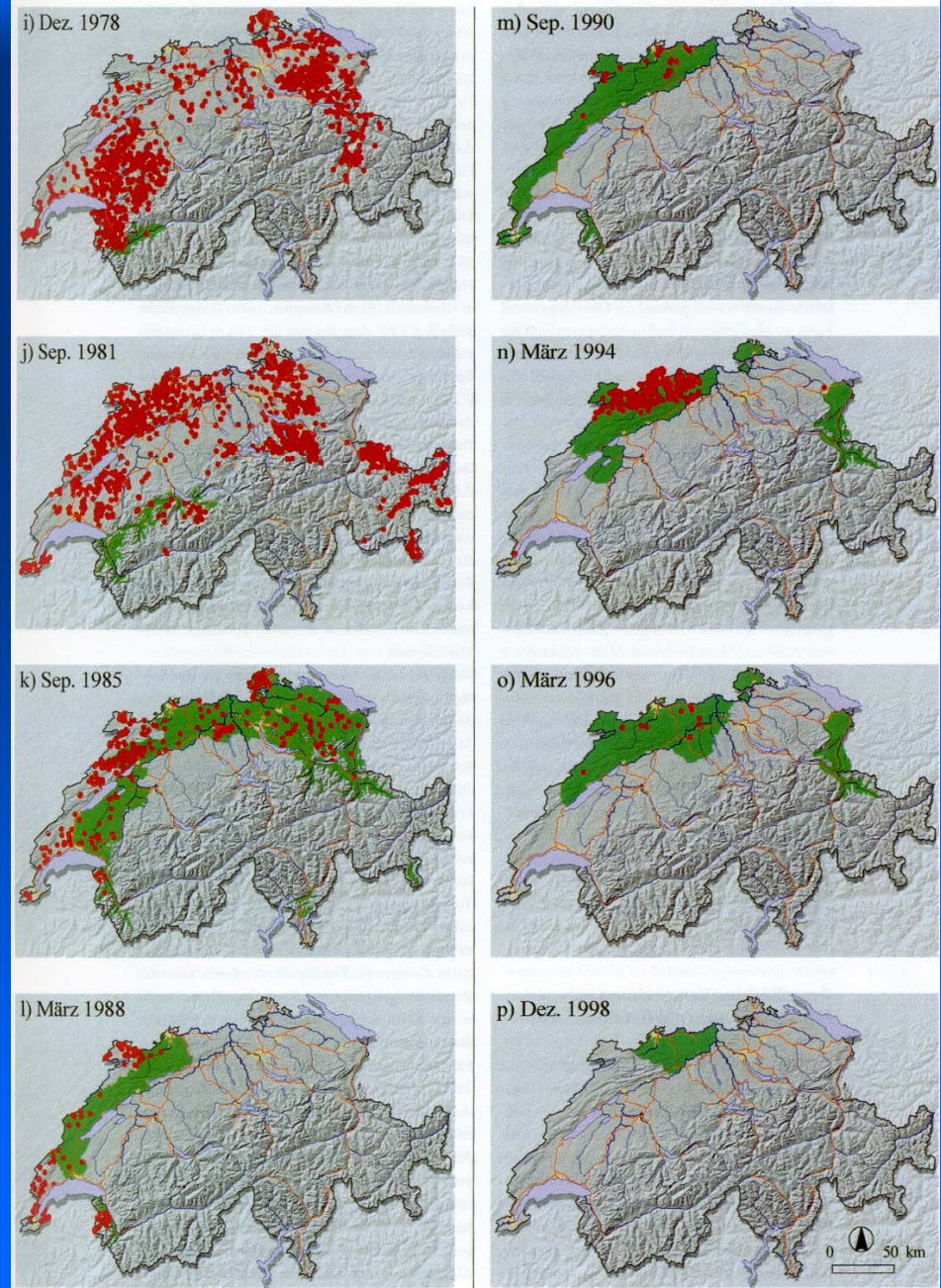
1967-1997

## Letzte Fälle:

- Frühjahr 1996: Fuchs
- Januar 1997: Hund aus Ausland
- Juli 2003: Hund aus Genf/Afrika



Ausbreitung der Fuchstollwut



# Tollwut in Europa - 2004

## 2 SUMMARY OF RABIES CASES IN EUROPE

RABIES CASES		4th QUARTER 2004					TOTAL 2004					Remarks
Name	Code	Total	Wildlife	Domestic animals	Bats	Human	Total	Wildlife	Domestic animals	Bats	Human	
ALBANIA	ALB	0	0	0	0	0	3	1	2	0	0	
AUSTRIA	AUT	0	0	0	0	0	1	1	0	0	0	
BELARUS	BLR	60	44	16	0	0	211	135	76	0	0	
BELGIUM	BEL	0	0	0	0	0	0	0	0	0	0	rabies free
BOSNIA A HERCEGOVINA	BIH	10	7	3	0	0	48	34	14	0	0	
BULGARIA	BGR	0	0	0	0	0	11	4	7	0	0	
CROATIA	HRV	123	116	7	0	0	504	471	33	0	0	
CYPRUS	CYP	0	0	0	0	0	0	0	0	0	0	rabies free
CZECH REPUBLIC	CZH	0	0	0	0	0	0	0	0	0	0	rabies free
DENMARK	DNK	0	0	0	0	0	1	0	0	1	0	
ESTONIA	EST	72	59	13	0	0	314	254	60	0	0	
FINLAND	FIN	0	0	0	0	0	0	0	0	0	0	rabies free
FRANCE	FRA	0	0	0	0	0	7	0	3	4	0	
GERMANY	DEU	23	19	0	4	0	49	33	1	14	1	
GREECE	GRC	0	0	0	0	0	0	0	0	0	0	rabies free
HUNGARY	HUN	9	8	1	0	0	125	111	14	0	0	
ICELAND	ISL	0	0	0	0	0	0	0	0	0	0	rabies free
IRELAND	IRE	0	0	0	0	0	0	0	0	0	0	rabies free
ITALY	ITA	0	0	0	0	0	0	0	0	0	0	rabies free
LATVIA	LVA	90	70	20	0	0	443	350	93	0	0	
LITHUANIA	LTU	176	136	40	0	0	553	408	145	0	0	
LUXEMBOURG	LUX	0	0	0	0	0	0	0	0	0	0	rabies free
MACEDONIA	MKD	0	0	0	0	0	0	0	0	0	0	
MOLDOVA	MDA	0	0	0	0	0	7	2	5	0	0	1st/2nd/3rd quarter
NETHERLANDS	NED	1	0	0	1	0	14	0	0	14	0	
NORWAY	NOR	0	0	0	0	0	0	0	0	0	0	rabies free
POLAND	POL	37	26	10	1	0	136	103	23	10	0	
PORTUGAL	PRT	0	0	0	0	0	0	0	0	0	0	rabies free
ROMANIA	ROU	82	56	26	0	0	187	119	68	0	0	
RUSSIAN FEDERATION	RUS	749	279	463	0	7	1549	563	973	1	12	
SERBIA A MONTENEGRO	SCG	51	36	15	0	0	210	167	43	0	0	
SLOVAK REPUBLIC	SVK	12	12	0	0	0	57	52	5	0	0	
SLOVENIA	SVN	0	0	0	0	0	2	2	0	0	0	
SPAIN	ESP	0	0	0	0	0	1	0	1	0	0	
SWEDEN	SWE	0	0	0	0	0	0	0	0	0	0	rabies free
SWITZERLAND + LIEC.	CHE	0	0	0	0	0	0	0	0	0	0	rabies free
TURKEY	TUR	17	3	14	0	0	111	8	103	0	0	
UNITED KINGDOM	UNK	0	0	0	0	0	1	0	0	1	0	
UKRAINE	UKR	411	202	209	0	0	907	425	481	1	0	
<b>total</b>		<b>1923</b>	<b>1073</b>	<b>837</b>	<b>6</b>	<b>7</b>	<b>5452</b>	<b>3243</b>	<b>2150</b>	<b>46</b>	<b>13</b>	

Wildlife: excluding bats

for amendments and additional information see table 4.2

# Tollwut in Europa

## 1. Quartal 2005

## 2. SUMMARY OF RABIES CASES IN EUROPE

RABIES CASES

1st QUARTER 2005

01.01.05 -31.03.05

Name	Code	Total	Wildlife	Domestic animals	Bats	Human
ALBANIA	ALB	2	2	0	0	0
AUSTRIA	AUT	0	0	0	0	0
BELARUS	BLR	95	73	22	0	0
BELGIUM	BEL	0	0	0	0	0
BOSNIA - HERCEGOVINA	BIH	7	6	1	0	0
BULGARIA	BGR	2	0	2	0	0
CROATIA	HRV	153	147	6	0	0
CYPRUS	CYP	0	0	0	0	0
CZECH REPUBLIC	CZH	0	0	0	0	0
DENMARK	DNK	0	0	0	0	0
ESTONIA	EST	62	54	8	0	0
FINLAND	FIN	0	0	0	0	0
FRANCE	FRA	0	0	0	0	0
GERMANY	DEU	25	24	1	0	0
GREECE	GRC	0	0	0	0	0
HUNGARY	HUN	4	4	0	0	0
ICELAND	ISL	0	0	0	0	0
IRELAND	IRE	0	0	0	0	0
ITALY	ITA	0	0	0	0	0
LATVIA	LVA	109	96	13	0	0
LITHUANIA	LTU	193	166	27	0	0
LUXEMBOURG	LUX	0	0	0	0	0
MACEDONIA	MKD	0	0	0	0	0
MOLDOVA *	MDA					
NETHERLANDS	NED	0	0	0	0	0
NORWAY	NOR	0	0	0	0	0
POLAND	POL	24	22	2	0	0
PORTUGAL	PRT	0	0	0	0	0
ROMANIA	ROU	151	118	33	0	0
RUSSIAN FEDERATION	RUS	839	402	433	4	0
SERBIA AND MONTENEGRO	SCG	33	28	5	0	0
SLOVAK REPUBLIC	SVK	21	20	1	0	0
SLOVENIA	SVN	2	2	0	0	0
SPAIN	ESP	0	0	0	0	0
SWEDEN	SWE	0	0	0	0	0
SWITZERLAND + LIEC.	CHE	0	0	0	0	0
TURKEY	TUR	56	6	50	0	0
UNITED KINGDOM	UNK	0	0	0	0	0
UKRAINE	UKR	490	256	234	0	0
<b>TOTAL</b>		<b>2268</b>	<b>1426</b>	<b>838</b>	<b>4</b>	<b>0</b>

Moldova \* no data

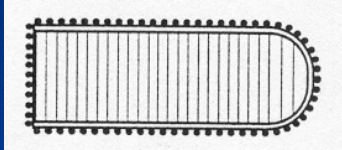
Wildlife: excluding bats



# Mononegavirales: ss(-)RNA

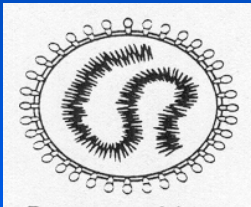
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## Rhabdoviridae



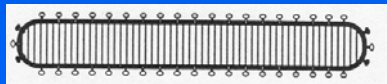
- Lyssavirus
- Vesiculovirus
- Ephemerovirus
- Cytorhabdovirus
- Nucleorhabdovirus

## Paramyxoviridae



- Paramyxovirus
- Morbillivirus
- Rubalavirus
- Pneumovirus

## Filoviridae



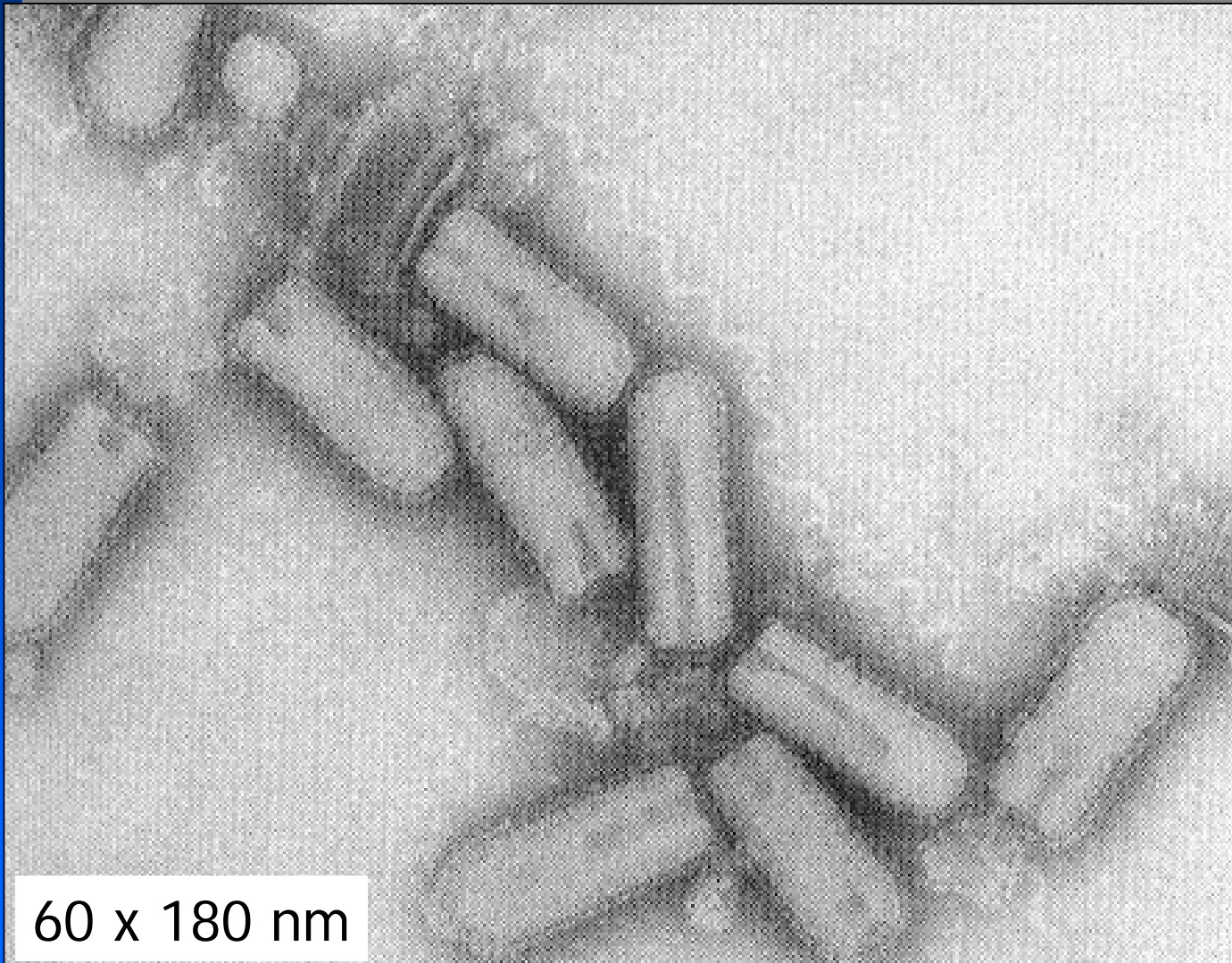
- Filovirus

## Bornaviridae



- Bornavirus

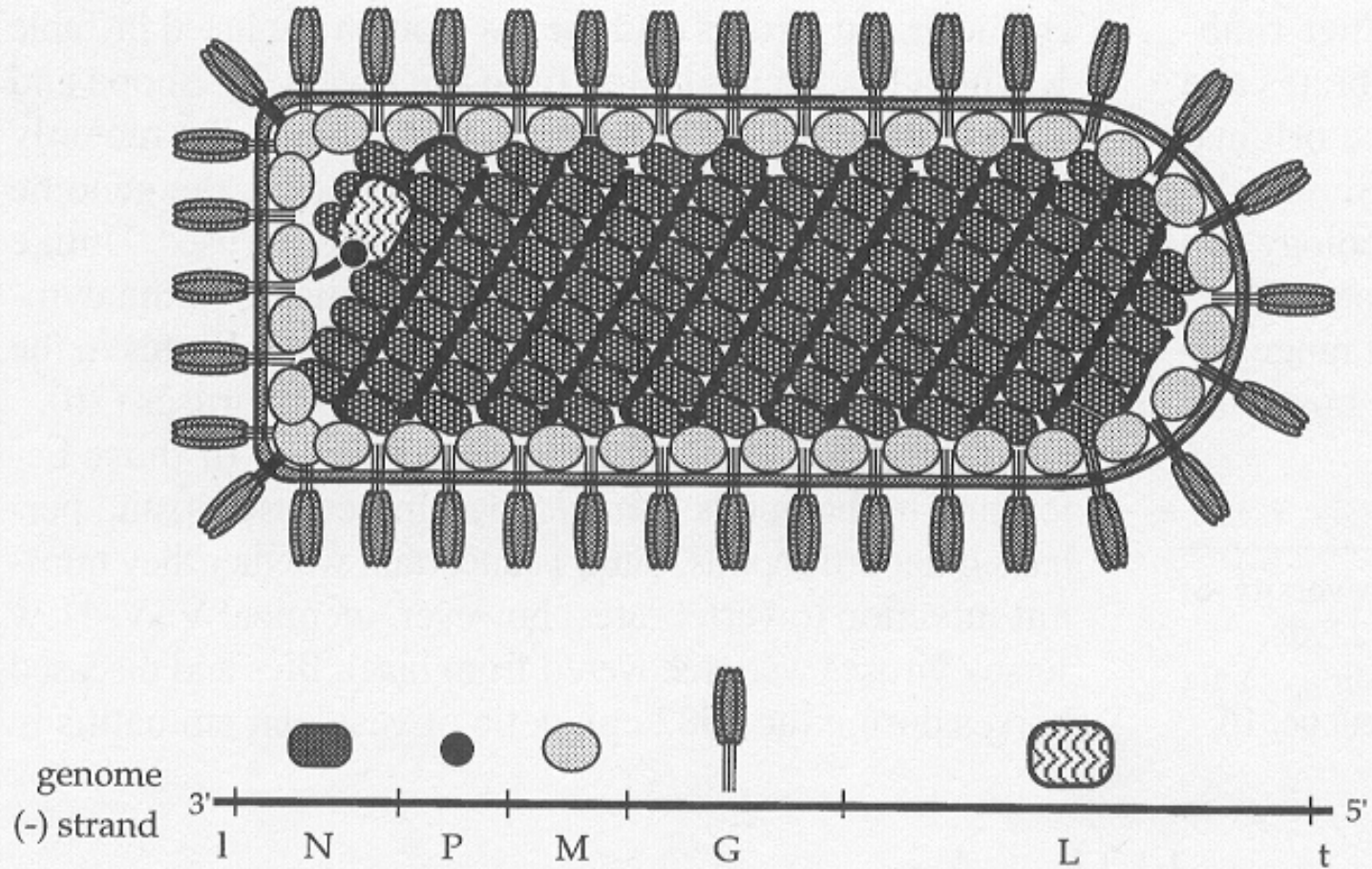
# Tollwutvirus EM



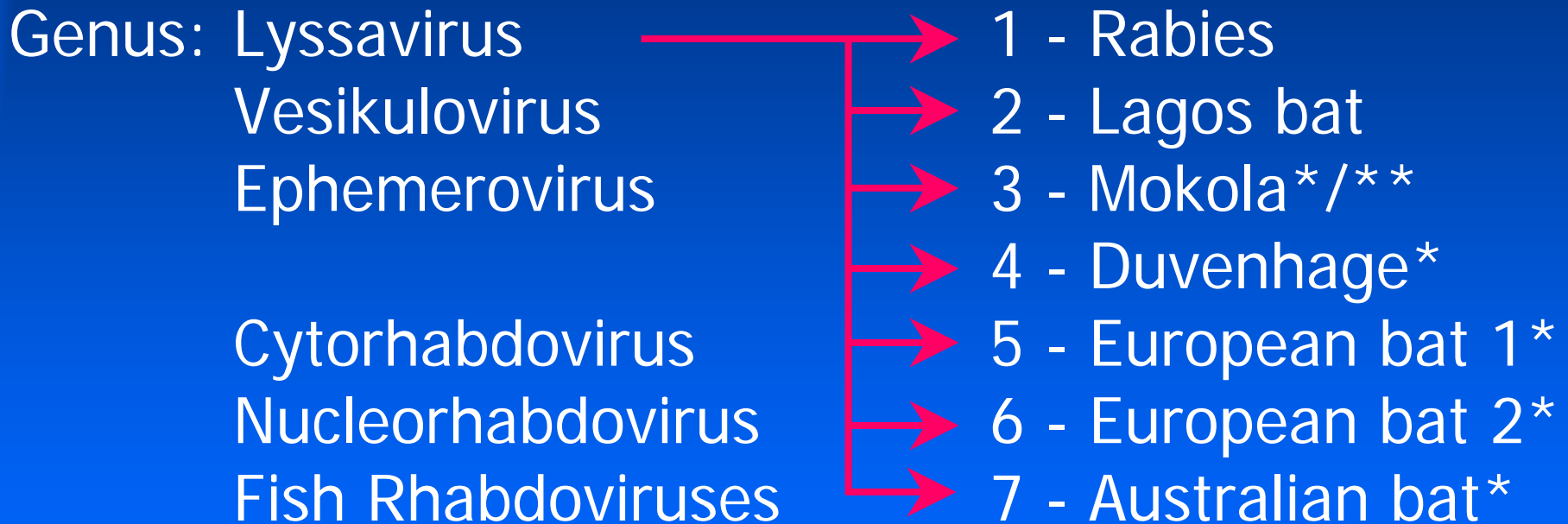
60 x 180 nm



# Rhabdovirus schematisch

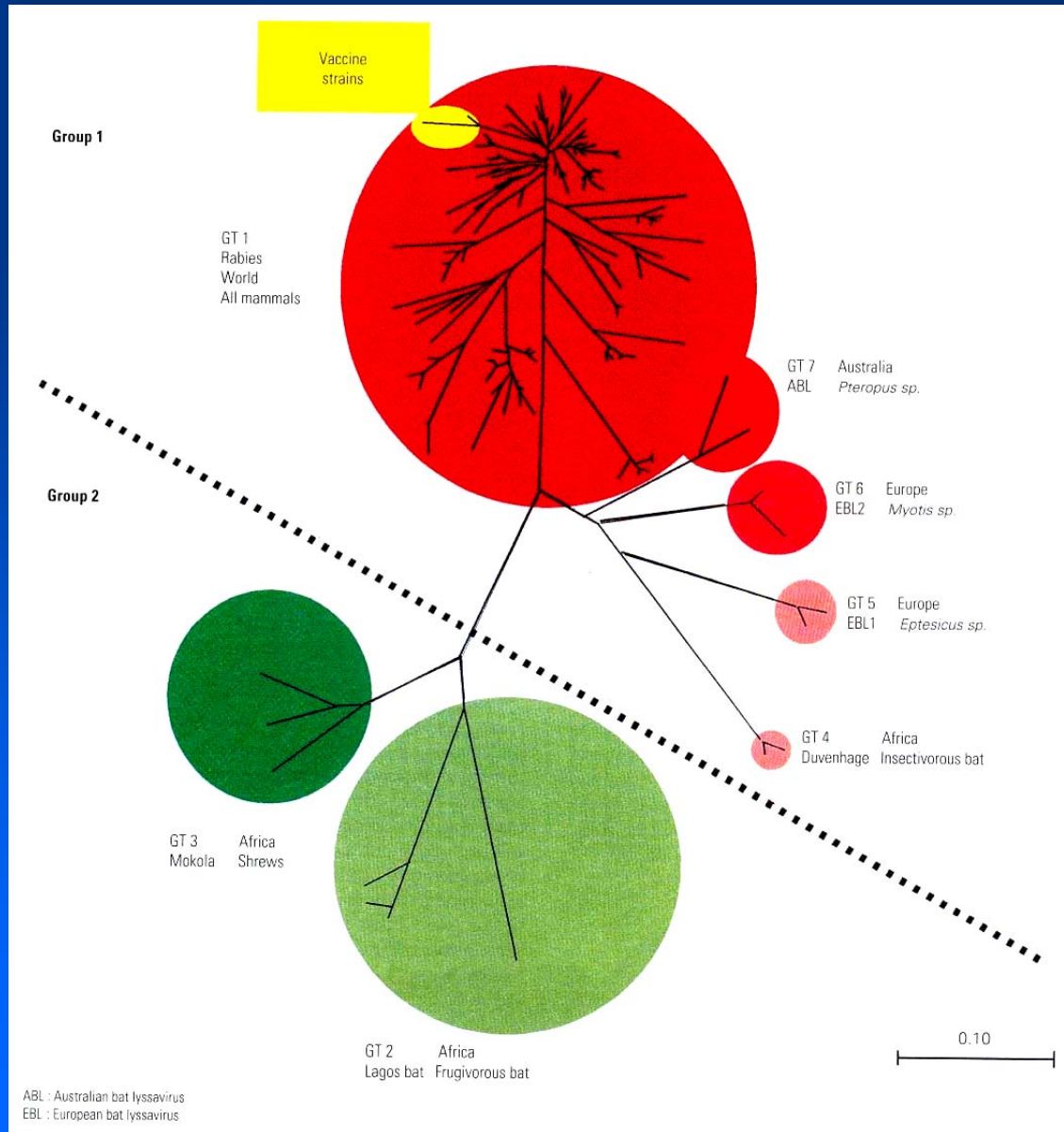


# Familie Rhabdoviridae



\* Einzelfälle beim Menschen, \*\* In Südafrika auch bei Katzen 10

# Kreuzimmunität bei Tollwut-ähnlichen Viren



Vergleich der Nukleotidsequenz des Glykoproteins G



Schweiz:  
Insgesamt 3  
Fledermausisolate  
Von *Myotis* spp.  
-> EBL2/GT6 11

# Tollwutvirus - Kreuzimmunität

Entrez-PubMed - Microsoft Internet Explorer

Adresse [http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list\\_uids=11427255&dopt=Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=11427255&dopt=Abstract)

NCBI PubMed National Library of Medicine NLM

Entrez PubMed Nucleotide Protein Genome Structure PMC Journals Books

Search PubMed for [ ] Go Clear

Limits Preview/Index History Clipboard Details

Display Abstract Show: 20 Sort Send to Text

1: Vaccine. 2001 Jul 16;19(28-29):3834-42. [Related Articles, Links](#)

**ELSEVIER**  
FULL-TEXT ARTICLE

**Experimental utility of rabies virus-neutralizing human monoclonal antibodies in post-exposure prophylaxis.**

Hanlon CA, DeMattos CA, DeMattos CC, Niezgodka M, Hooper DC, Koprowski H, Notkins A, Rupprecht CE.

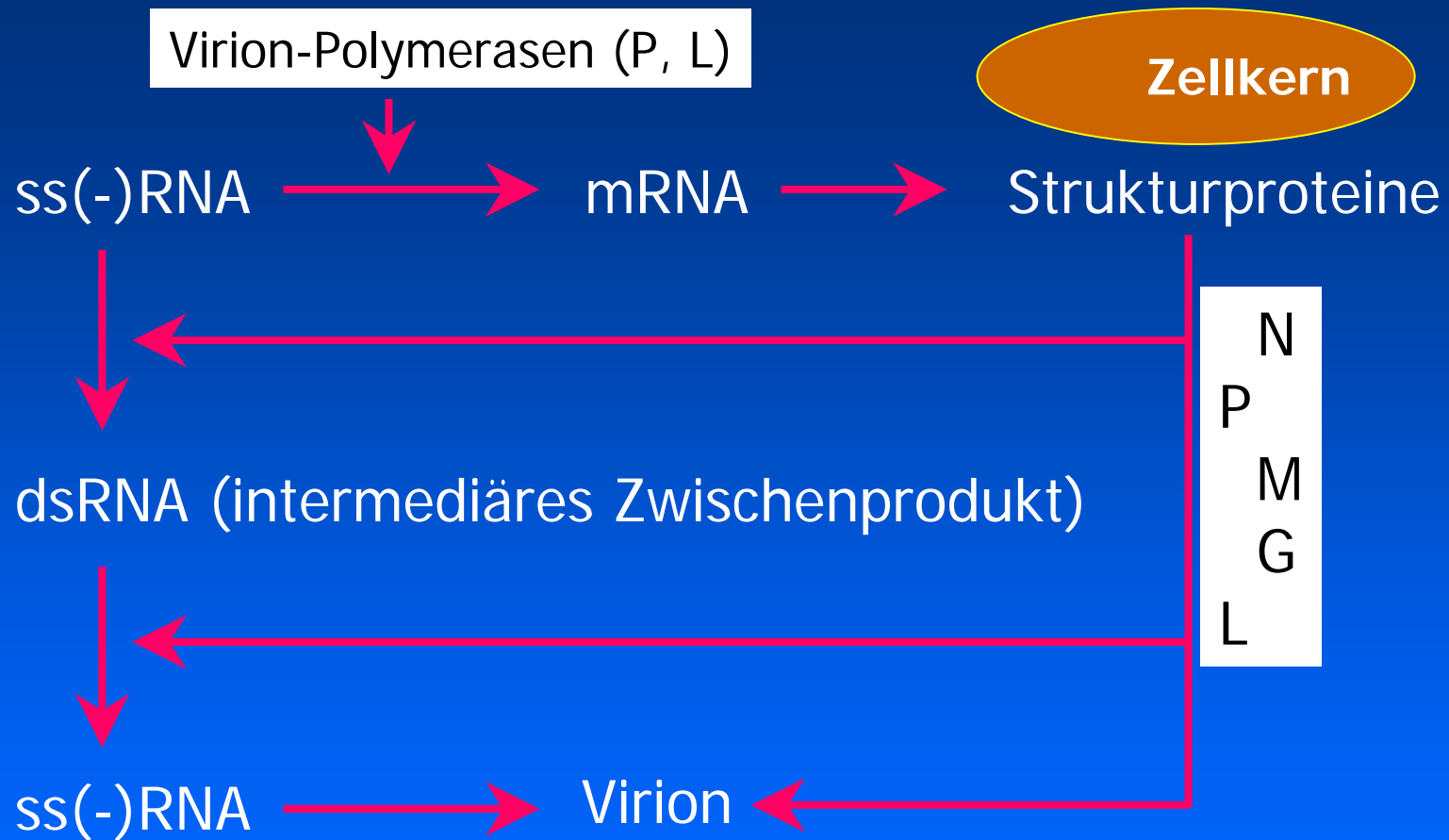
Centers for Disease Control and Prevention, Rabies Section MS-G33, 1600 Clifton Road NE, Atlanta, GA 30333, USA.  
cfh8@cdc.gov

Rabies immune globulin (RIG) is essential for post-exposure prophylaxis but is expensive and not widely available. Rabies virus-neutralizing human monoclonal antibodies (Mabs) were evaluated in vitro and in a Syrian hamster model as a potential future alternative. Seven Mabs neutralized representative rabies virus variants. However, a European bat lyssavirus was not neutralized by either Mabs or RIG. Moreover, Duvenhage virus was neutralized by RIG, but not by Mabs, and Lagos bat and Mokola viruses were neutralized by one Mab but not by RIG. In hamsters, one Mab resulted in protection that was comparable to human RIG. These results suggest that Mabs may provide a promising alternative to RIG.

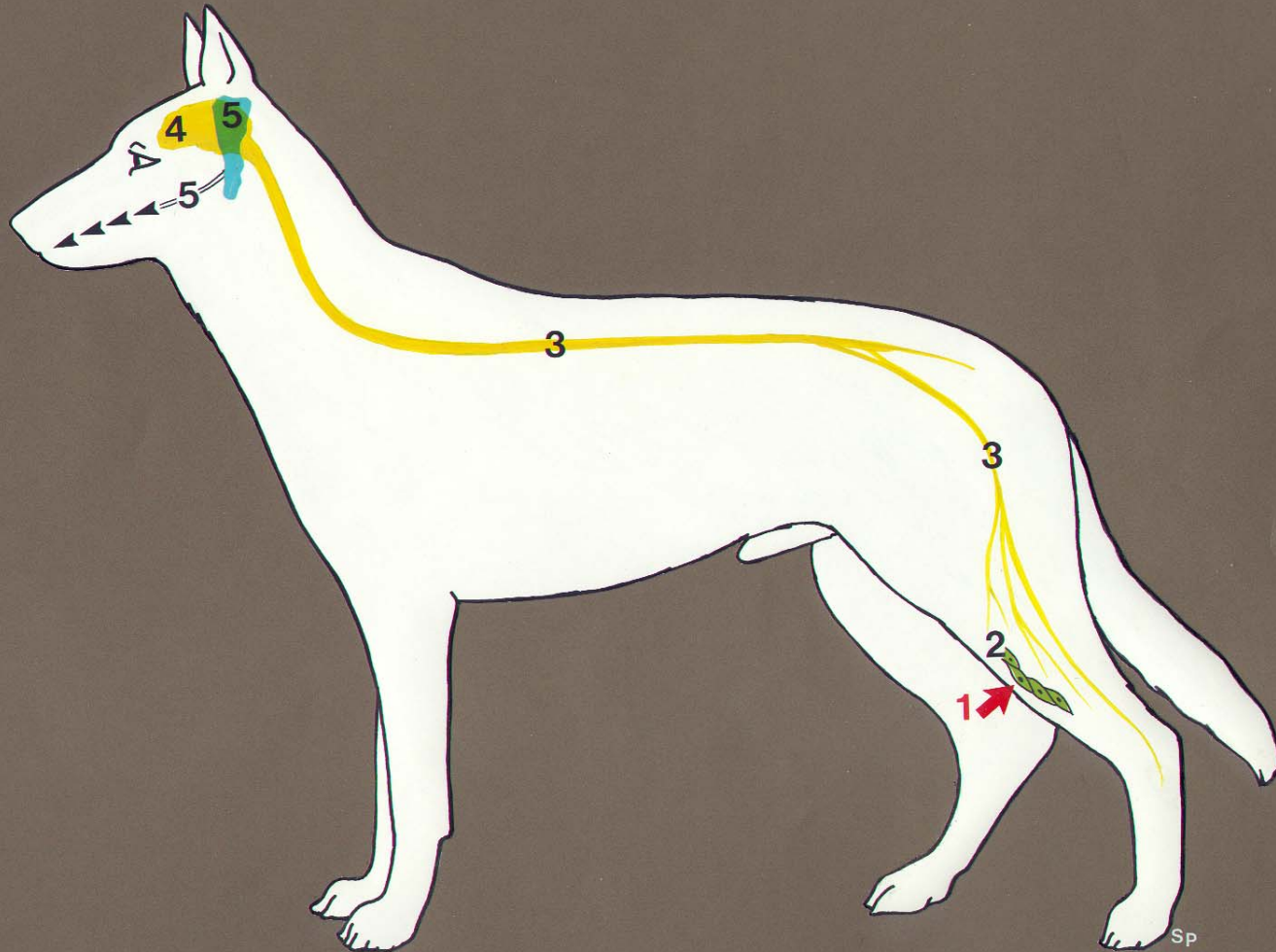
PMID: 11427255 [PubMed - indexed for MEDLINE]

Start EndNote 6 Dokument1 - Microsoft W... 07:01

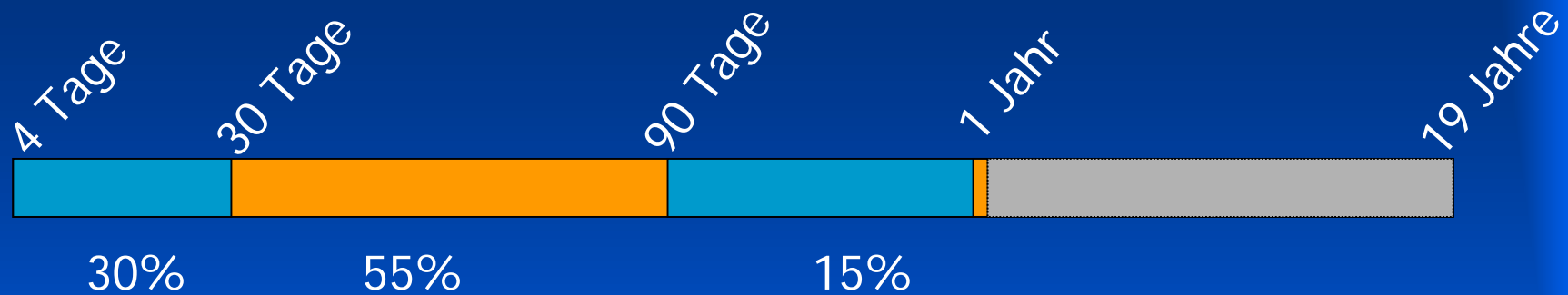
# Strategie der Virusvermehrung



# Pathogenese



# Inkubationszeit



Abhängig von:

- Eintrittspforte
- Virusmenge
- Virusstamm (Virulenz)

# Diagnostik, Übersicht

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## Direkter Virusnachweis:

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Viruseigenschaft	Methode
<b>Form, Grösse</b>	Morphologie (EM), Histologie (EiK)
<b>Infektiosität</b>	Zellkultur, Tierversuch
<b>Antigenität</b>	Immunfluoreszenz, Enzym-Immunoassay*
<b>Genom</b>	Gensonden, RT-PCR

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\* Hirn- oder Speicheldrüsengewebe, beim Menschen: Corneaabstrich, Hautbiopsie

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**Indirekter Virusnachweis:** meist erst terminal positiv



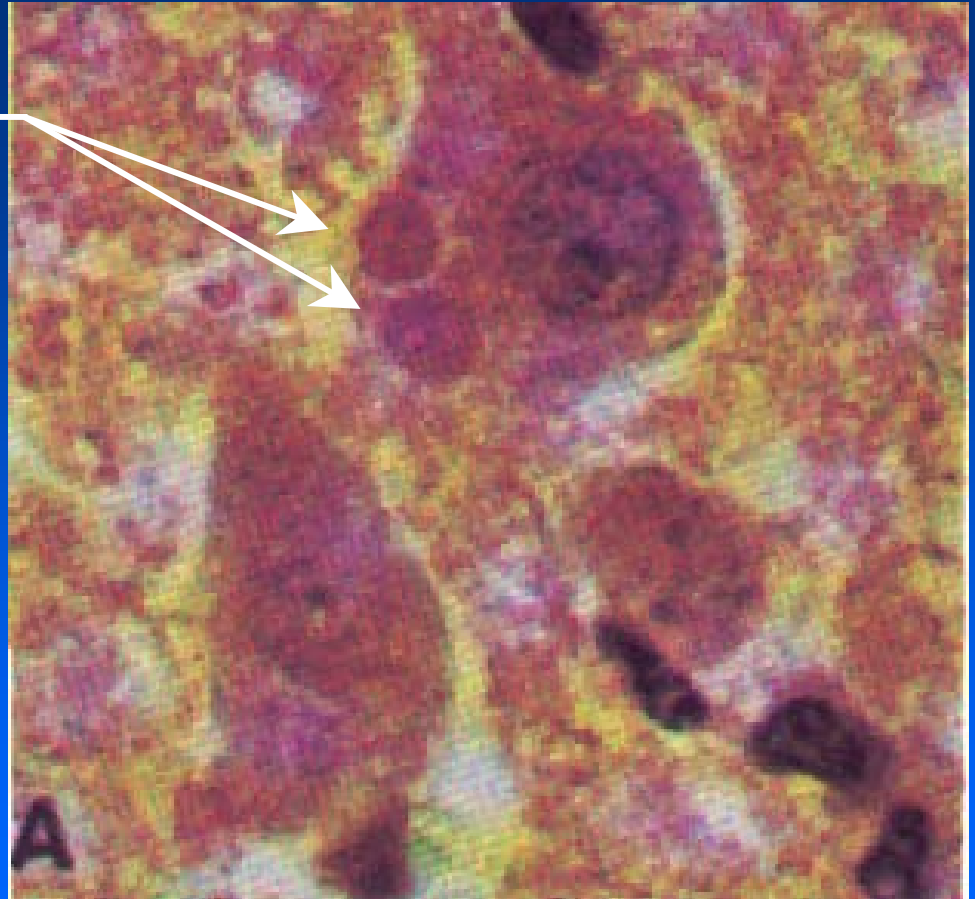
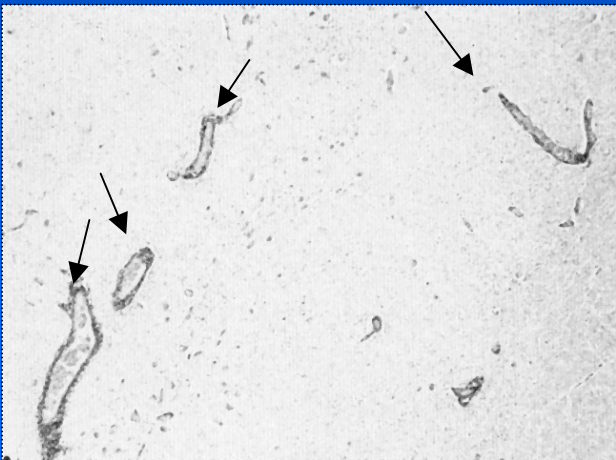
# Histologie

Tollwut - Mensch - Gehirn

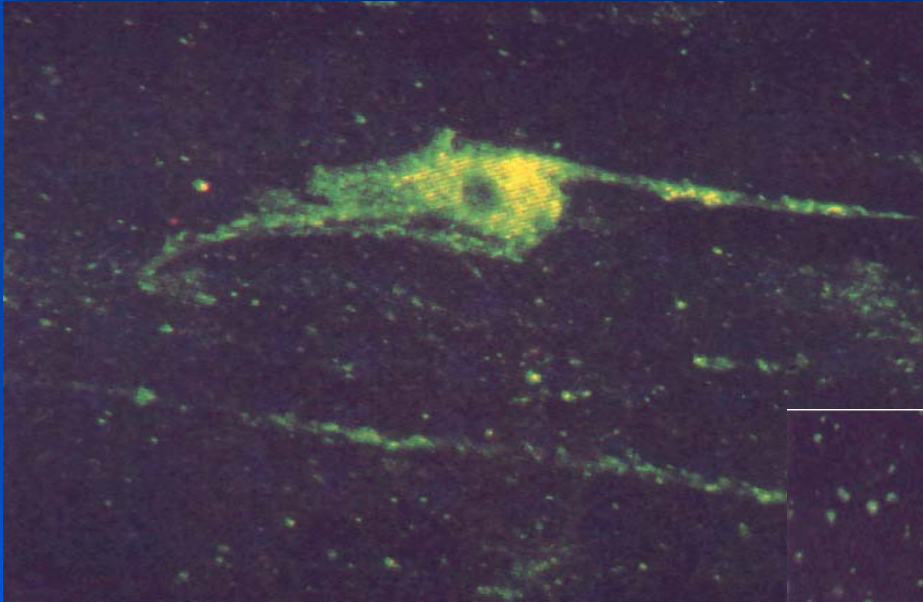
HE-Färbung

Negri-Körperchen  
(intrazytoplasmatisch)

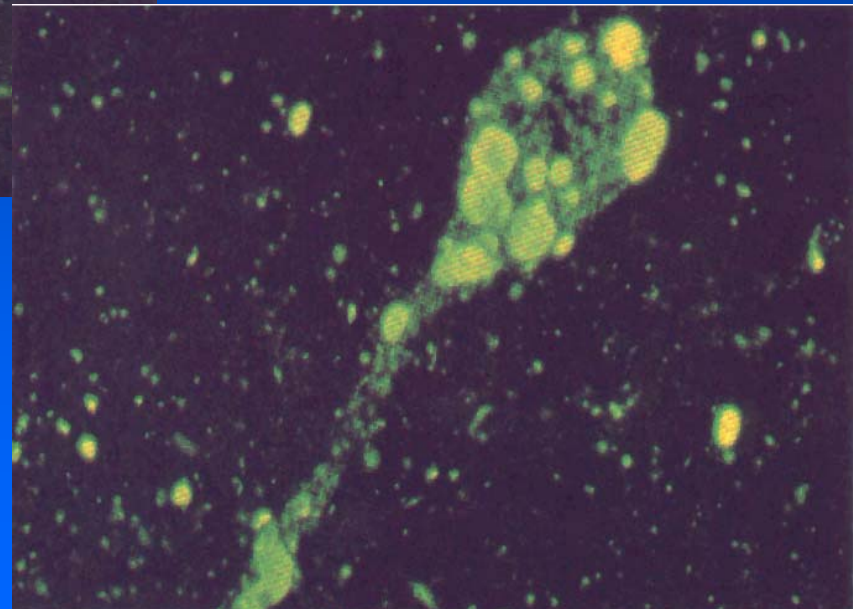
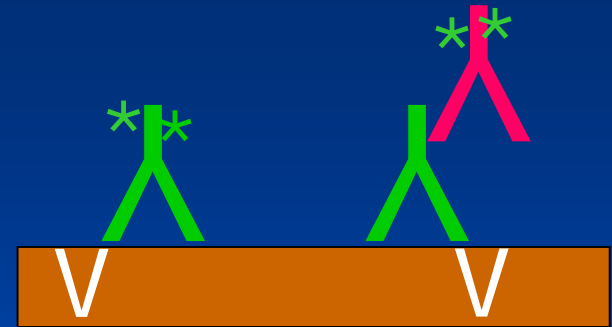
Perivaskuläre mononukleäre  
Zellinfiltrate



# Immunfluoreszenz



Tollwut  
Rind  
Gehirn



# Immunprophylaxe Tiere

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Inaktivierte Impfstoffe für Haustiere

Impfobligatorium für Hunde abgeschafft

MLV-Vakzine, Vektorimpfstoffe für Füchse

# Immunprophylaxe Mensch

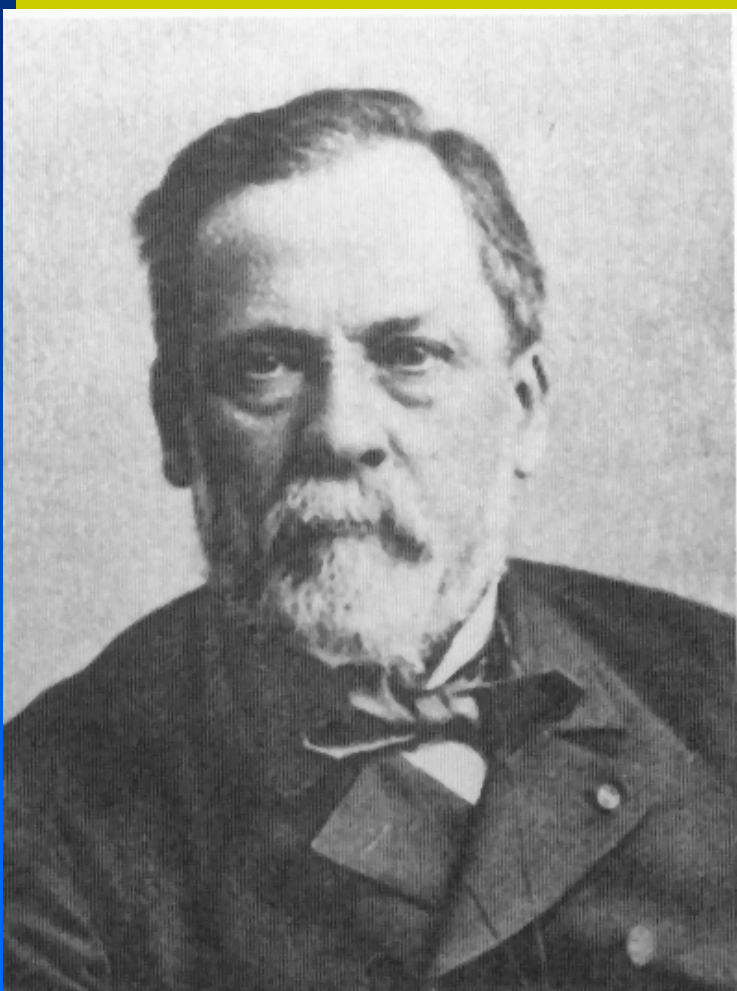
Impfstoffe für die prä- und postexpositionelle Impfung:  
Lyssavac N Berna<sup>®</sup> (purified duck embryo vaccine)  
Tollwutimpfstoff Mérieux<sup>®</sup> (Human Diploid Cell Vaccine)

## Präexpositionelle Vakzination:

3 Impfungen i.m. an den Tagen 0, 7, 21 (oder 28) mit  
Überprüfung des Antikörpertiters 1-3 Wochen später;  
Booster-Impfungen nach jeweils 1 bis 2 Jahren

- a** Postexpositionelle Vakzination (einschliesslich Ig):  
2 Impfungen i.m. an den Tagen 0, 3 für Geimpfte
- b** 6 Impfungen i.m. an den Tagen 0, 3, 7, 14 und 30.

# 1885 erste postexpositionelle Tollwutimpfungen



**Louis Pasteur**

1822 to 1895

**Video**

100 Jahre Tollwut-  
Impfung: 1885-1985