"Overview of Rabies Epidemiology, prevention and control worldwide"

WHO-MZCP/OIE Intercountry Expert Workshop on "Protecting Humans from Domestic and Wildlife Rabies in the Middle East"

By F.-X. Meslin, World Health Organization, Geneva
Presence / Absence of Rabies* Worldwide - 2005

Rabies Occurrence
- Yellow: Absence
- Orange: Presence
- Gray: No Data

* Including Imported Cases in Humans and Animals

Note: The boundaries and names shown and the designations used on this map do not imply official endorsement by the United Nations.
Large variety of reservoir species

rabies cannot be eradicated
Genotypes and geographic distribution
Rabies – excluding bat rabies - 2005

Countries/areas reporting rabies cases
Countries/areas for which no data are available

Source: OIE & WHO, 2004
USA: total number of animal cases - 2005
Cases of Animal Rabies, 1955-2005

Year

Cases

Total
Domestic
Wild

0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
Bat rabies has emerged as a public health risk in the USA:
from 1980 to 2002, 29 indigenous cases of human rabies cases were reported in the USA - 90% of those were caused by bat rabies virus strains.
Rabies in Canada

In spite of large numbers of cases of animal rabies in Canada, human rabies is rare. From 1945 to 2000 only 22 cases were reported for the whole of Canada. Last case March 2, 2007 in Alberta.

Rabies in the USA and Canada

- Genotype 1 viruses including in bats.
- Many terrestrial species involved in well delimited compartments.
- Bats rabies reported in almost all US States and Canadian provinces.
- Small number of human cases per year. Half of more of them during the past ten years associated with exposure to bats.
- Costs of rabies prevention and control is estimated at $300 million per year in the USA.
Total numbers of rabies cases in dogs and humans, Latin America, 1982 to 2005

![Graph showing the total numbers of rabies cases in dogs and humans, Latin America, 1982 to 2005. The x-axis represents the years from 1982 to 2005, and the y-axis represents the number of cases. The graph includes bars for human cases and dog cases, as well as a line graph indicating the linear trend. Source: SIVIERA, OPAS, 2006.]
Cases of rabies in dogs and number of vaccinated dogs in Mexico
1990 – 2004

Rabies cases in dogs

Vaccinated dogs (Millions)

1990: 7.1
1991: 7.5
1992: 9.1
1993: 9.3
1994: 9.7
1995: 10.6
1996: 10.9
1997: 11.1
1998: 12.6
1999: 13.3
2000: 13.7
2001: 14.9
2002: 15.9
2003: 16.2
2004: 14.5

1990: 30.1
1991: 22.5
1992: 2.106
1993: 2.138
1994: 2.160
1995: 2.138
1996: 2.852
1997: 3.523
1998: 3.855
1999: 4.335
2000: 4.317
2001: 4.244
2002: 4.117
2003: 4.105
2004: 4.076

Vaccinated dogs (Millions)

Rabies cases in dogs
Countries with human rabies cases following dog bites – latin America 2003

Human/dog rabies in 6 (28.6%) out of 21 countries of Latin America

Rabies in wildlife particularly in bats has emerged as a public health risk
In 2004 for the first time the number of human cases following contact with wild animals exceeded the number of cases due to dog bites.
Rabies in Latin America

- All viruses including those originating from bats belong to genotype 1
- Dog and dog mediated human rabies are being brought under control after 20 years of PAHO/WHO coordinated activities in Latin America
- Dog immunization has been the main focus of the international control programme
- Wildlife rabies is emerging as a public health problem: more than half the human cases reported in 2004 were due to contact with wildlife especially vampire bats in Brazil and Peru.
European Countries eliminated dog rabies during first half of 20th century

Epizootic fox rabies wave from 1938 to 1989
Number of rabies cases in animals in European countries where oral immunization of foxes against rabies has been conducted
Rabies in raccoon dogs (*Nyctereutes procyonoides*), Europe

Raccoon dogs are the second most important wildlife species infected with rabies:
Bats rabies in Europe: 2002-2006
Rabies in Europe

- Viruses circulating in carnivora belong to genotype 1 and to genotypes 5 & 6 in bats and new genotypes (8 etc..) are identified in Central Asia
- Domestic and Wild carnivora rabies has been brought under control in most of Western Continental Europe through WHO and EU coordinated activities
- The main tool has been the oral vaccination of foxes
- Autochthonous bat rabies and imported rabies is posing a new public health threat in western Europe where terrestrial rabies has been eliminated.
The first confirmed outbreak of rabies in Africa, believed to have followed the importation of an infected dog from England in 1892, occurred in the eastern Cape Province of South Africa, and was brought under control in 1894.
### Genotype, geographical distribution, reservoir species

<table>
<thead>
<tr>
<th>Genotypes or Species</th>
<th>Geographic distribution</th>
<th>Animal species</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Rabies (+ vaccine strains)</strong></td>
<td>Worldwide, except: Australia, British Islands, Ireland, New Zealand, Japan, Scandinavia, Hawaii</td>
<td>Man, wild and domestic carnivores and herbivores, hematophagous bats and frugivorous bats</td>
</tr>
<tr>
<td><strong>2. Lagos bat</strong></td>
<td>Nigeria, Central African Republic, South Africa, Zimbabwe, Guinea, Senegal, Ethiopia, Egypt</td>
<td>Frugivorous bats, cats, dog</td>
</tr>
<tr>
<td><strong>3. Mokola</strong></td>
<td>Nigeria, Central African Republic, Zimbabwe, Cameroon, Ethiopia</td>
<td>Man, shrews, cats, dogs, rodents</td>
</tr>
<tr>
<td><strong>4. Duvenhage</strong></td>
<td>South Africa, Zimbabwe</td>
<td>Man, insectivorous bats</td>
</tr>
<tr>
<td><strong>5. European bat lyssavirus 1 (EBL1)</strong></td>
<td>Europe</td>
<td>Man, stone marten, sheep, insectivorous bats</td>
</tr>
<tr>
<td><strong>6. European bat lyssavirus 2 (EBL2)</strong></td>
<td>Europe</td>
<td>Man, insectivorous bats</td>
</tr>
<tr>
<td><strong>7. Australian bat lyssavirus (ABL)</strong></td>
<td>Australia</td>
<td>Man, insectivorous bats, frugivorous bats</td>
</tr>
<tr>
<td><strong>8., 9., 10.</strong></td>
<td>Central Asian Republic, west caucase</td>
<td>Insectivorous bats</td>
</tr>
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An increasing incidence of reported rabid bite injuries in Tanzania

Large scale spread across Tanzania from 2000 to 2004

Bites from suspected rabid dogs per million, 2001-2004
## Cattle deaths

<table>
<thead>
<tr>
<th>Year</th>
<th>Agropastoral</th>
<th>Pastoral</th>
<th>Incidence/100,000 cattle</th>
</tr>
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<tbody>
<tr>
<td>2002</td>
<td>0</td>
<td>1</td>
<td>0.00</td>
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<tr>
<td>2003</td>
<td>10</td>
<td>43</td>
<td>9.50</td>
</tr>
<tr>
<td>2004</td>
<td>40</td>
<td>10</td>
<td>37.03</td>
</tr>
<tr>
<td>2005</td>
<td>10</td>
<td>0</td>
<td>9.02</td>
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<tr>
<td>2006</td>
<td>7</td>
<td>0</td>
<td>6.16</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Average incidence*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12.34</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>25.13</td>
</tr>
</tbody>
</table>
Distribution of rabies in the Republic of South Africa
The main vector

1 Allerton Veterinary Laboratory - Pietermaritzburg - Kwazulu-Natal – SOUTH AFRICA
Rabies in Africa

- Circulating viruses belong to genotype 1 as well as genotypes 2, 4 (in bats) and 3 (reservoir unknown)
- Dog rabies remains the main problem
- Incidence of the disease in humans and animals is underestimated in most parts (except north Africa and Southern tip)
- Little animal rabies control activities ongoing
- Quantities of human rabies vaccines used are sub-optimal
Rabies is maintained and transmitted by dogs in Asia.
Children aged less than 15 years are involved in 40% of the cases.
Rabies in Asia

- Viruses belong to genotype 1 with the exception of ABLV (genotype 7) found in bats.
- Dog rabies is the main problem in Asia and bat rabies is only reported in Australia.
- Some dog rabies control activities ongoing in most countries although none has freed itself of rabies during the past 35-40 years.
- Large number of PEP are administered using both imported and locally manufactured human vaccines.
- Rabies has re-emerged as a public health problem in some Asian countries.
Lack of dog rabies control: human rabies re-emerging in China

Incidence of human dog-mediated rabies in China by Region and by Year (1950-2004)
Lack of dog rabies control: human rabies re-emerging in Vietnam

Rabies spreading in Indonesia

NUMBER OF HUMAN RABIES IN INDONESIA, 2000

- One human rabies
- Five human rabies
- Ten human rabies
- Rabies affected area
- Rabies free area
- Has been free since 1997
Worldwide more than 98% of the human rabies deaths follow exposure to a rabid dog!
If rabies is present on all continents the burden of human rabies is not.
Estimated Annual Human Rabies Deaths in Africa and Asia

India: ~ 19,000
China: ~ 2,500

Knobel et al., Bulletin
WHO, 83: 360-368, 2005
Thank you for your attention