Global Scenario of Rabies

Changchun Tu

OIE Reference Laboratory for Rabies,
Changchun Veterinary Research Institute,
Chinese Academy of Agricultural Sciences,
Changchun, China
1949: Established and merged in 1953 into Academy of Military Medical Sciences (AMMS) in Beijing

1964: moved to Changchun, merged with Changchun University of Animal and Agricultural Sciences (CUAAS).

Late 1980’s: Sister relationship with Kitasato University, Towada, Aomori

2005: joined in Chinese Academy of Agricultural Sciences (CAAS).

Historically, the institute was established to deal with equine infectious anemia and in 1980’s its veterinary focus was expanded to cover a wide range of animal infectious diseases including zoonoses.
CVRI

- PATHOLOGY AND COMPARATIVE MEDICINE
- ANIMAL VIROLOGY
- BACTERIOLOGY
- PARASITOLOGY
- FOOD SAFETY
- VETERINARY INFORMATION
- PHARMACEUTICAL GENETIC ENGINEERING
Our RL for Rabies

- Rapid response to the outbreak
- Epidemiology and routine surveillance
- Laboratory diagnoses
- Vaccination assessment
- R & D (including CSFV and bat viruses)
- Technical training
- Consultation and advise
Technical capacity

Standard and new methods for rabies diagnoses were used, which includes:

- **Sampling:** brain tissues and saliva swabs;
- **FAT:** Using lab made or WHO recommended FITC-conjugated mAb (Fujirebio);
- **Molecular detection and phylogenetic analysis**;
- **MIT**;
- **RTCIT (N2A and BHK-21 cell lines)**;
- **LyssaChip:** Detection and differentiation of all 7 major species (genotypes)
- **FAVN**
Our website

http://cvrirabies.bmi.ac.cn
Global cases: Asia: ~31 000 (56% ), Africa: ~ 24 000 (44%),
North America and Europe: <50, Latin America<40, Middle East <100;

(WHO)
widespread, neglected and under-reported zoonosis
110 of 178 OIE Member Countries are considered endemically infected with rabies
>99% human cases in Asia and Africa, in less developed countries.
>99% human rabies transmitted by rabid dogs
In Latin America incidence of human rabies decreasing in areas with successful dog rabies control (PAHO)
The principal hosts are members of the orders chiroptera (bats) or carnivora.
In North America and Europe only 0.1–5.0% of cases reported are in dogs.
In large parts of Asia, Africa and Latin America, rabies in dogs is >95% of all diagnosed cases.
The control and elimination of rabies in dogs, through vaccination remains the only cost-effective way to sustainably protect humans from contracting the disease.
Fifteen lyssaviruses have been reported and different variants of rabies viruses and/or rabies-related lyssaviruses occur on all continents, except Antarctica.
Lyssaviruses

1. Rabies virus:
2. Lagos bat virus (LBV)
3. Mokola virus (MOKV)
4. Duvenhage virus (DUUV)
5. EBLV1
6. EBLV2
7. ABLV
8. Aravan (ARAV)
9. Khujand (KHUV)
10. Irkut (IRKV)
11. West Caucasian bat virus (WCBV)
12. Shimoni bat virus (SHIBV)
13. Bokeloh bat lyssavirus (BBLV)
14. Ikoma lyssavirus (IKOV)
15. Lleida bat lyssavirus (LLEBV)

Ceballos et al., EID (2013), 19:793-5
Human rabies in Asia: ~ 31,000 death per year.
Rabies situation in Asia

- Not much has changed:
  - Rabies free countries or regions: Japan, Singapore, Malaysia, HK, Macao.
  - Endemic with slow increase: most of other countries
- Continued and sustained improvement: Thailand, Philippines, Indonesia, China
- Increased endemic: Vietnam
- Re-emerging: Chinese Taiwan
- South Korea: No human and dog cases, but wildlife rabies spreads.
- Mongolia: Only a few human cases, but the most of them were caused by wildlife.
A neglected zoonotic disease

Most human rabies in poor rural areas: e.g. >85% (China) and 95% (India) in rural areas

Man and children (<15 years-old) are main infected groups

Dogs are major sources, responsible for 95% human cases

Domestic animals are affected

Human cases transmitted by wildlife: China (ferret badgers and bats), Mongolia (fox and wolf)

Wildlife rabies: Nepal (mongoose, jackal and fox), South Korea (raccoon dog), China (ferret badger and bat), Mongolia (fox and wolf)

First lyssavirus than rabies virus, Irkurt virus has been isolated from bats in Northeast China (PLoS Negl Trop Dis. 2013 Mar;7(3):e2097)
Rabies in China

- most endemic in south
- mainly in rural area (90%)
- transmission source: rural dogs, 95%
Rabies in China

• Human rabies deaths between 1950 to 2010 (MOH, China)

(China CDC)
## Rabies in China

<table>
<thead>
<tr>
<th>Year (Year)</th>
<th>死亡人数（卫生部）</th>
<th>Human Cases (MoH)</th>
<th>死亡动物数（农业部）</th>
<th>Animal Cases (MoA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>1159</td>
<td>-</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>2003</td>
<td>1980</td>
<td>300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>2651</td>
<td>57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>2546</td>
<td>134</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>2649</td>
<td>157</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>3303</td>
<td>79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>2378</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>2108</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>1988</td>
<td>27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>1896</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>1326</td>
<td>147</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>1066</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*卫生部（MoH）: 官方统计（Official Report）*

*农业部（MoA）: 兽医公报（Official Veterinary Bulletin）*
Rabies in Philippines

- Distributed in 17 regions
- Ranks 6th in the world
- National Rabies Prevention and Control Program

Animal Bites and Human Rabies Cases in the Philippines

From Dr. LEONILO R. RESONTOC
Dog rabies significantly declined in the country by more than 80% from 2,550 cases in 2001 to 474 cases in 2011

From Dr. LEONILO R. RESONTOC
Rabies in Viet Nam

From Dr. Hoang Van Tan
Rabies in Viet Nam


From Dr. Hoang Van Tan
Risk factors for rabies endemic in Asia

- Low political will and commitment
- Low awareness
- Limited or no funding to support
- Poor dog management and low vaccination coverage
- Poor IEC (Information, Education and Communication)
- Lack of technical capacity and experts
- Less surveillance and under reported
- Unclear epidemiology (dogs and wildlife rabies)
- High cost of human vaccine and limited accessibility of PEP in poor and rural areas
- Competing priorities (FMD, PRRS, HPAI)
# Dog vaccination coverage

<table>
<thead>
<tr>
<th>Countries</th>
<th>Total #</th>
<th>Vaccinated</th>
<th>Coverage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>6.5 m</td>
<td>4.8 m</td>
<td>74</td>
</tr>
<tr>
<td>Vietnam</td>
<td>6 m</td>
<td>3 m</td>
<td>50</td>
</tr>
<tr>
<td>Thailand</td>
<td>8 m</td>
<td>4.7 m</td>
<td>59%</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>2.5 m</td>
<td>1 m</td>
<td>43</td>
</tr>
<tr>
<td>Philippines</td>
<td>8 m</td>
<td>1.6 m</td>
<td>21</td>
</tr>
<tr>
<td>China</td>
<td>&gt;100 m</td>
<td>?</td>
<td>&lt;30</td>
</tr>
<tr>
<td>Laos</td>
<td>NA</td>
<td>NA</td>
<td>47</td>
</tr>
<tr>
<td>Nepal</td>
<td>1.9 m</td>
<td>0.015 m</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Myanmar</td>
<td>0.11 m</td>
<td>0.02 m</td>
<td>2</td>
</tr>
</tbody>
</table>

Adopted from Dr. Zhen F. Fu
Recommendations for Rabies Control

- Raising political will and commitment: All governments consider rabies control as a high priority and ensure that national legislation provides for rabies to be a notifiable disease.
- Funding should be made available
- Increase public awareness and promote responsible dog-ownership through communication and education.
- Implement mass dog vaccination campaign to secure high vaccination coverage.
- Improve infrastructure and laboratory capacity
- Laboratory training programmes should be encouraged to further improve diagnostic capability in laboratories in ASEAN
- Strengthen multi-sector coordination and collaboration at different levels (national, provincial, district)
- International support (FAO/WHO/OIE/NGOs)
- Increase accessibility to PEP
Rabies control

Country examples

China
Indonesia
Philippines
MoA: Rabies Immunization and Surveillance implemented since 2005
Established laboratory capacity at national and provincial levels
Sufficient production of vaccines and RIGs
Support scientific studies
MoH: Improved accessibility to PEP in most cities and counties; National Rabies Surveillance Program has established surveillance spots in 15 highly endemic provinces
MoPS: Responsible for dog management. In urban areas, a well-established dog registration with vaccination is in place at the owner’s expense
Promote mass vaccination of dogs in rural areas.
China

- Purified cell culture vaccine and RIG used for human PEP, >15 million person accept PEP or PET.
- Live vaccines: Single Flury LEP vaccine (2 US cents/dog); Combined vaccine (ERA, canine distemper, canine adenovirus, parvovirus and parainfluenza)
- Imported killed vaccines: from Intervet, Merial, Fort Dodge and RabVac (3 US$/dog)
- Domestic killed vaccines: licensed in 2011. using CVS-11, Flury LEP or PV strain (0.9 US$/dog)
- Genetically modified vaccines for oral route.
Indonesia

- Regulations in place and Committee established
- Human cases declines
- Nine provinces free of rabies.
- Integrated control programe in Bali successfully reduce the number of animal and human cases,
  - integrated bite case management
  - mass dog vaccination

Endemic
**Elminination of Rabies in the Philippines Conceptual Framework**

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>80% of total dog population</td>
</tr>
<tr>
<td>2014</td>
<td>Remaining 20% from 2013 plus 10% new born dogs</td>
</tr>
<tr>
<td>2015</td>
<td>Booster of year 2013</td>
</tr>
</tbody>
</table>

**Strict Dog Control Measures**
- (Dog Population Control – castration, control of dog movement/ Dog Impounding/leashing/policy dog entry)

- Decrease Canine Rabies
- Decrease Human Rabies
- Rabies-Free Philippines

From Dr. LEONILO R. RESONTOC
Elimination of Rabies Framework developed and endorsed by ASEAN secretariat (by 2020)

It includes two parts: the national rabies elimination strategy and implementation; technical support from international side

Viet Nam appointed to be the leading country
Recommendations for international organizations

- Promote mass dog vaccination by funding
- Help establish laboratory techniques
- Help develop sample collection and shipment
- Support technical training of lab staff
- Publish materials (brochure, flyers, post, animation, multimedia, etc)
Thank you