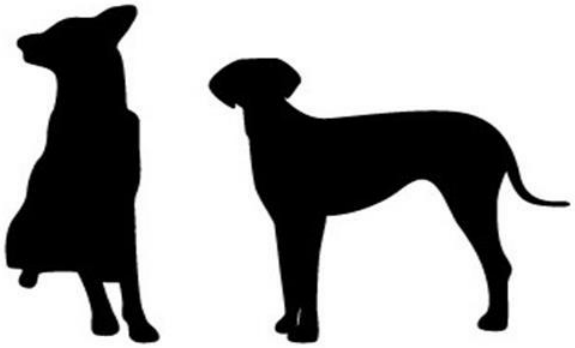
2018 Launching Meeting of OIE Twinning Project for Rabies between Anses-Nancy and AHRI



Preparedness of rabies in Japan by strengthening of surveillance and laboratory network in Asia.

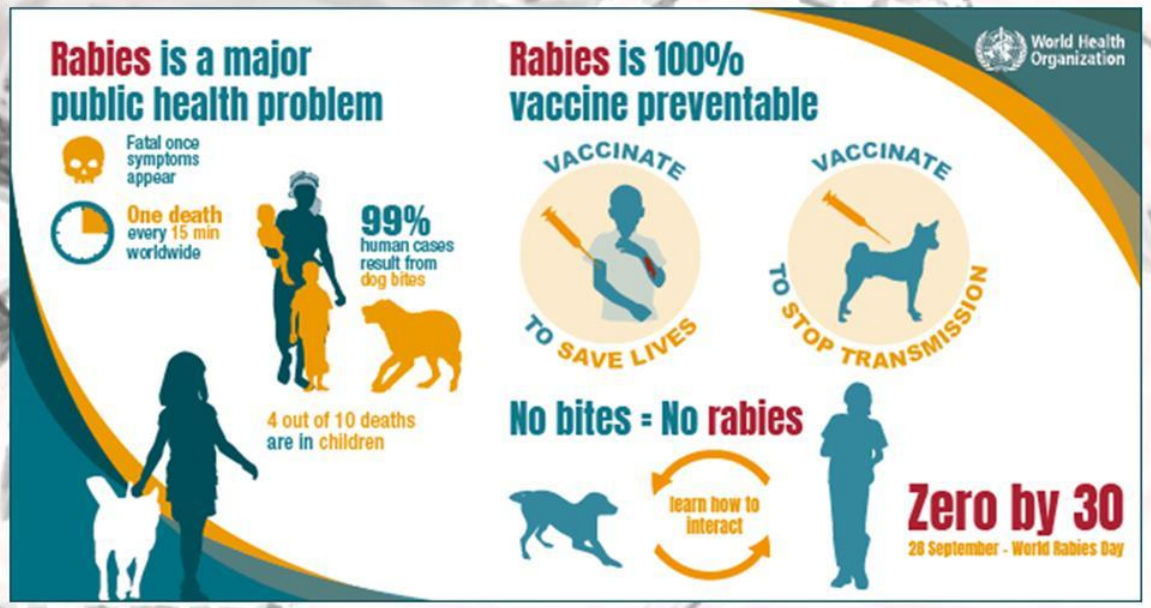
Oct. 17th, 2018

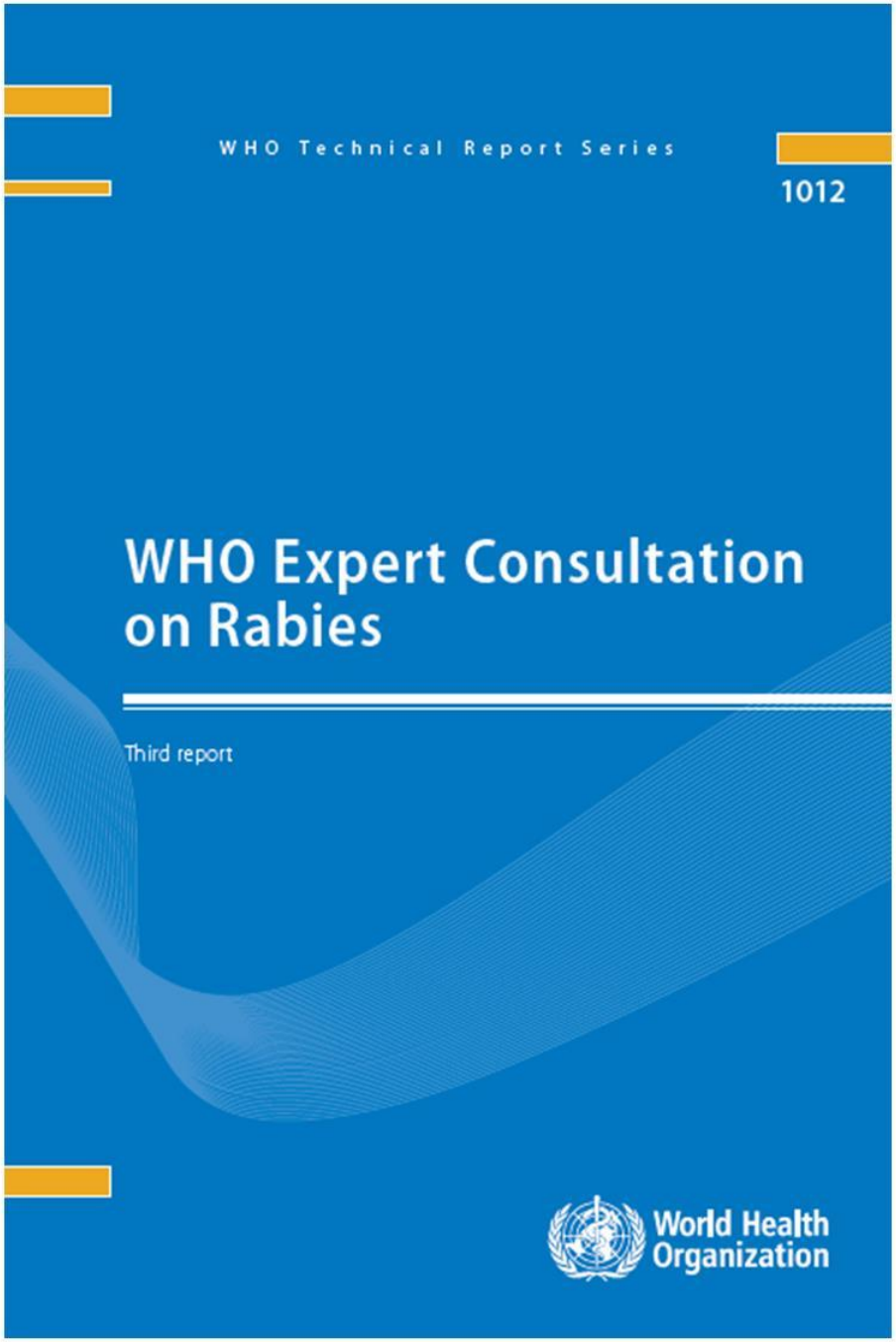
Satoshi Inoue, NIID
Akitoyo HOTTA, NIID

NIID 国立感染症研究所

RESERVOIRS OF RABIES

How to be freeing from rabies in Japan?




WHO Technical Report Series
1012
WHO Expert Consultation on Rabies
Third report
World Health Organization

Phylogroups of Genus *Lyssavirus*

G-I	**RABV:**	***Rabies lyssavirus***
	ABLV:	*Australian bat lyssavirus*
	DUVV:	*Duvenhage lyssavirus*
	EBLV-1:	*European bat lyssavirus 1*
	EBLV-2:	*European bat lyssavirus 2*
	ARAV:	*Araban lyssavirus*
	KHUV:	*Khujand lyssavirus*
	BBLV:	*Bokeloh bat lyssavirus*
	IRKV:	*Irkut lyssavirus*
	GBLV:	*Gannoruwa bat lyssavirus*
G-II	LBV:	*Lagos bat lyssavirus*
	MOKB:	*Mokola lyssavirus*
	SHIBV:	*Shimoni bat lyssavirus*
G-III	WCBV:	*West Caucasian bat lyssavirus*
	IKOV:	*Ikoma lyssavirus*
	LLEBV:	*Lleida bat lyssavirus*
	TWBLV:	*Taiwan bat lyssavirus*
	KBLV:	*Kotolahti bat lyssavirus*

1956 ~	LBV	Nigeria
1968 ~	MOKV	Nigeria
1970 ~	DUVV	South Africa
1968 ~	EBLV-1	Germany
1985 ~	EBLV-2	Finland
1991 ~	ARAV	Kyrgyzstan
1995 ~	ABLV	Australia
2001 ~	KHUV	Tajikistan
2002 ~	WCBV	Russia
2002 ~	IRKV	Russia
2009 ~	SHIBV	Kenya
2009 ~	IKOV	Tanzania
2009 ~	BBLV	Germany
2011 ~	**LLEBV**	**Spain**
2014 ~	**GBLV**	**Sri Lanka**
2016 ~	**TWBLV**	**Taiwan**
2017 ~	**KBLV**	**Finland**

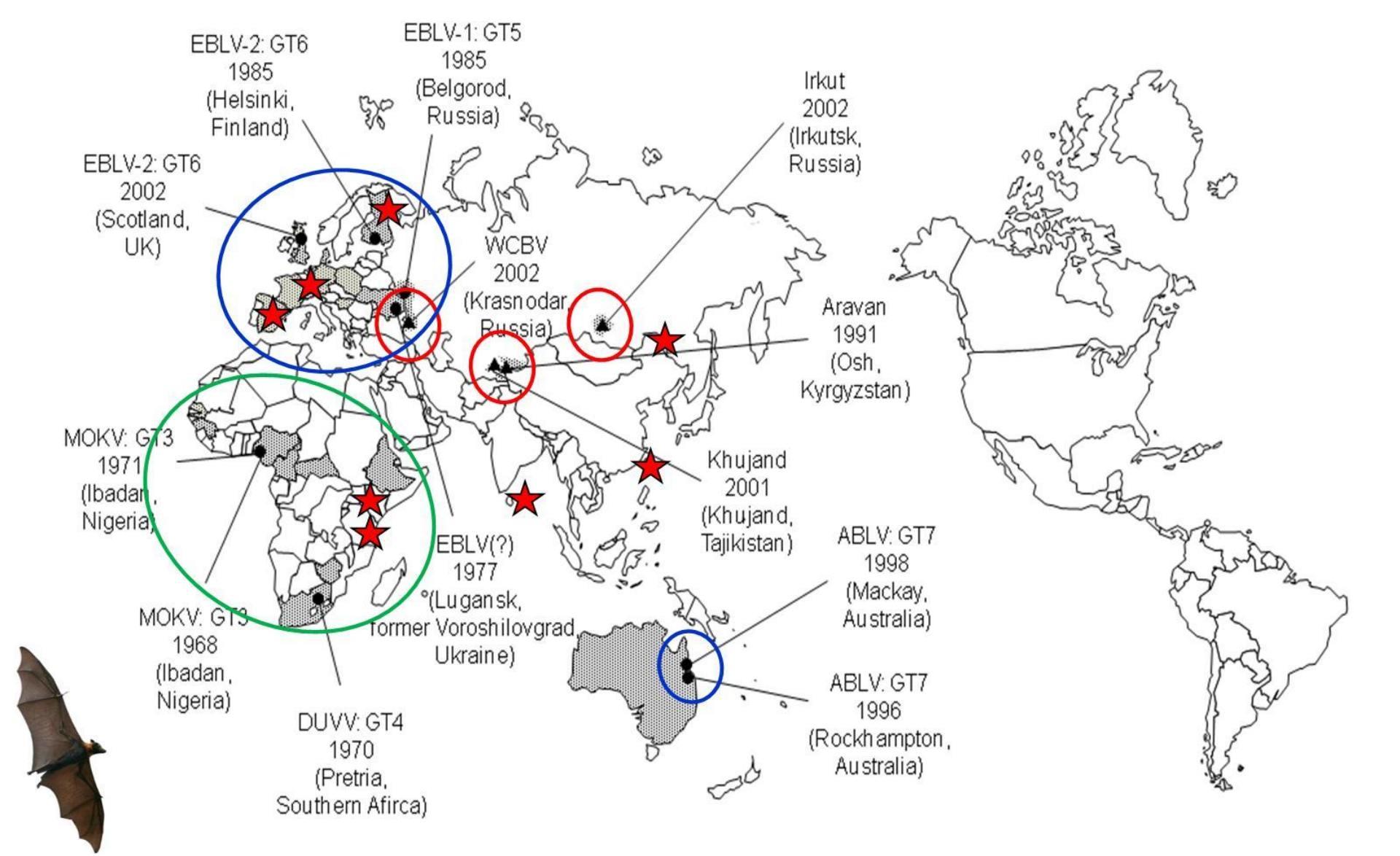


Fig. 1. The geographical distribution of lyssaviruses (GT2-GT7) and novel new lyssaviruses.

: distribution of new lyssaviruses

● : location of human case

▲ : isolated place of novel new lyssaviruses

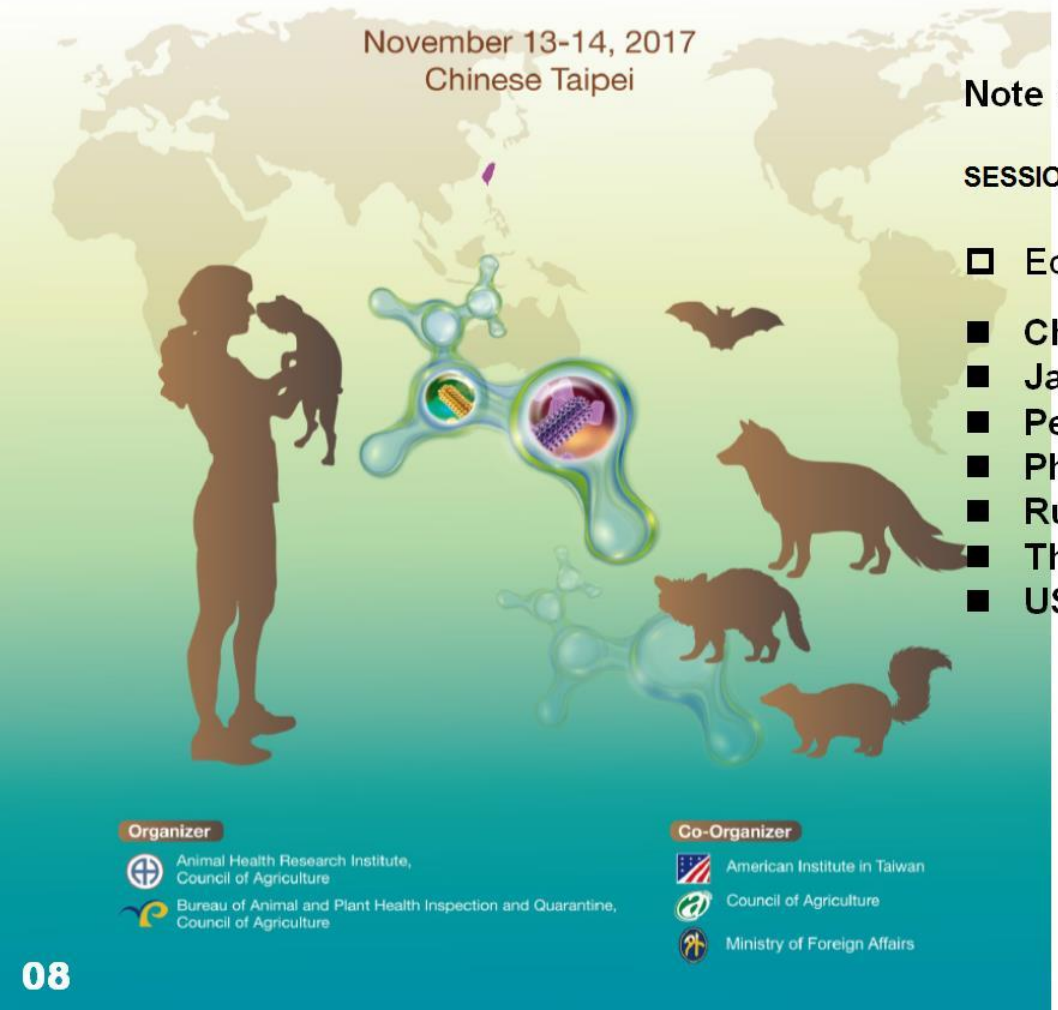
Lyssavirus isolated from Japanese *Pipistrelle*, Taiwan

A putative new lyssavirus was found in 2 **Japanese pipistrelles** (*Pipistrellus abramus*) in Taiwan in 2016 and 2017. The concatenated coding regions of the virus showed 62.9%–75.1% nucleotide identities to the other 16 species of lyssavirus, suggesting that it may be representative of a new species of this virus.

Photo by Bat Conservation Society of Taipei

Emerging Infectious Diseases • www.cdc.gov/eid
Vol. 24, No. 4, April 2018

2017 Wildlife Rabies Workshop



Note for the representative participant for reporting

SESSION 3: APEC member economies' reports on rabies

Economy	Representative for reporting
Chilie	Dr. Veronica Ung Peredo
Japan	Dr. Satoshi Inoue
Peru	Dr. Sergio Recuenco-Cabrera
Philippines	Dr. Ma. Gracia Flores
Russia	Dr. Mikhail Shulpin
Thailand	Dr. Piyanart Lekcharoensook
USA	Dr. MacDonald Farnham

NIID 国立感染症研究所

Surveillance on rabies

(including lyssavirus)

Although there is debate about the estimated health burden of rabies, the estimates of direct mortality and the DALYs due to rabies are among the highest of the neglected tropical diseases. Poor surveillance, underreporting in many developing countries, frequent misdiagnosis of rabies, and an absence of coordination among all the sectors involved are likely to lead to underestimation of the scale of the disease. It is clear, however, that rabies disproportionately affects poor rural communities, and particularly children. Most of the expenditure for post-exposure prophylaxis is borne by those who can least afford it. As a result of growing dog and human populations, the burden of human deaths from rabies and the economic costs will continue to escalate in the absence of concerted efforts and investment for control.

Since the first WHO Expert Consultation on Rabies in 2004, WHO and its network of collaborating centres on rabies, specialized national institutions, members of the WHO Expert Advisory Panel on Rabies and partners such as the Gates Foundation, the Global Alliance for Rabies Control and the Partnership for Rabies Prevention, have been advocating the feasibility of rabies elimination regionally and globally and promoting research into sustainable cost-effective strategies. Those joint efforts have begun to break the cycle of rabies neglect, and rabies is becoming recognized as a priority for investment.

This Consultation concluded that human dog-transmitted rabies is readily amenable to control, regional elimination in the medium term and even global elimination in the long term. A resolution on major neglected tropical diseases, including rabies, prepared for submission to the World Health Assembly in May [illegible]ons at securing Member States' commitment to the control, [illegible]nation or eradication of these diseases. Endorsement of the [illegible]olution would open the door for exciting advances in rabies [illegible]prevention and control.

9 789241 209823

982

WHO Expert Consultation on Rabies

WHO Technical Report Series

WHO

WHO Technical Report Series

982

WHO Expert Consultation on Rabies

Second report

World Health Organization

RABIES-FREE COUNTRIES OR AREAS

- Three levels -

1. **Dog-rabies free**
2. **Wildlife (excluding bats) rabies-free**
3. ***Lyssavirus*-free.**

- WHO: Technical Report Series 982: WHO expert consultation on rabies – 2nd report, 2013.
- OIE: Terrestrial animal health code [vol. 2, chapter 8.10: Rabies], 2011.

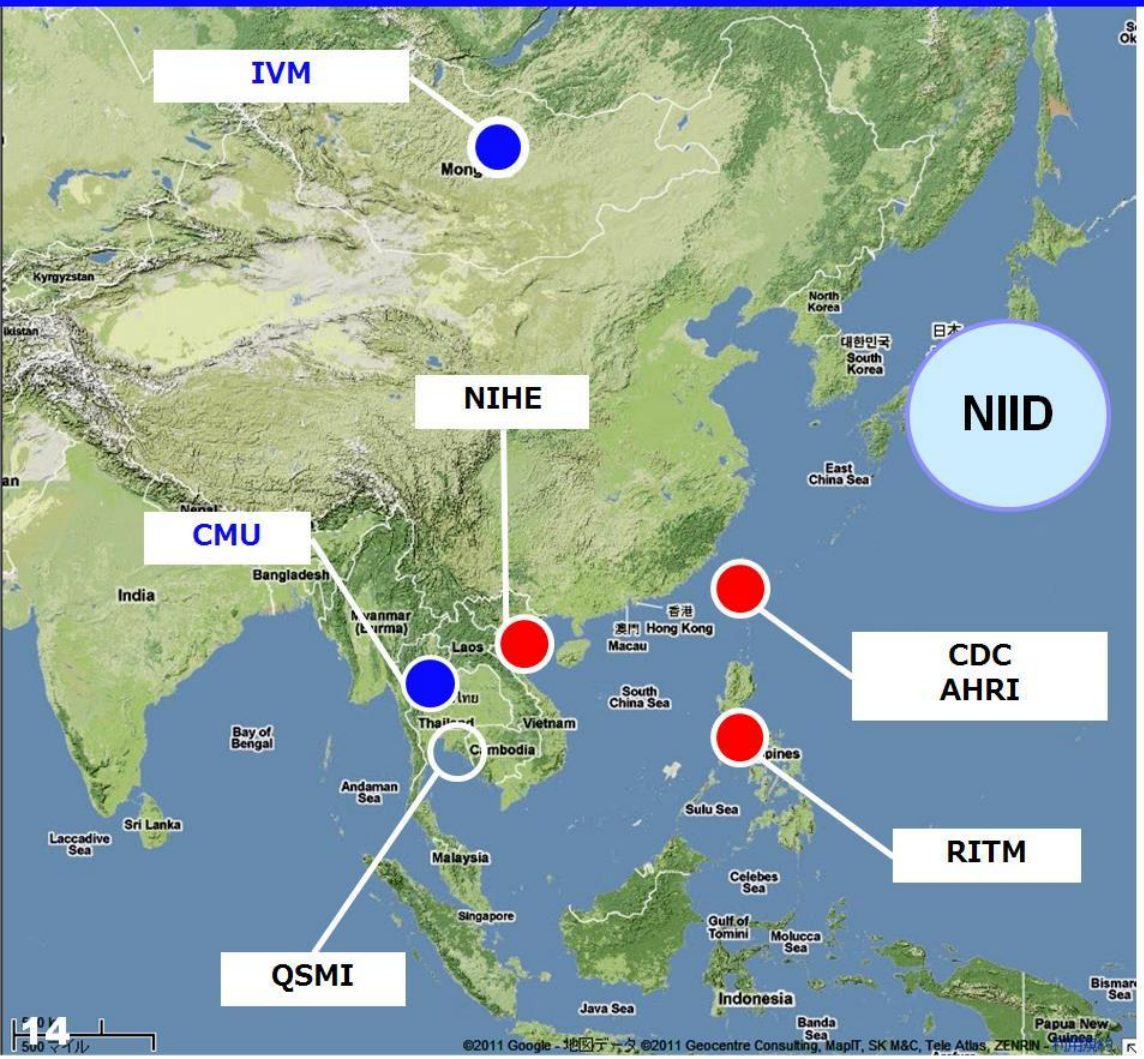
REQUIREMENTS TO ALL THREE FREE DEFINITIONS

- **Rabies:** Notifiable for all animals and humans.
  Surveillance (continuous and effective).
- **Diagnosis:** Ready access.
  Techniques recommended by WHO / OIE.
- **Statistics:** Significance with adequate sample size.
  Suspected cases in the main animal species.
- **Samples:** Collected throughout the country.
- **An effective import policy.**

Rabies prevention in Japan

- **Network (Inter- & Intra-national)**
- **Evaluated diagnosis**
- **Surveillance**
- **Practical experiences**

Laboratory network in Asia



Vietnam
National Institute of Hygiene and Epidemiology

Philippines
Research Institute for Tropical Medicine

Thailand
Queen Saovabha Memorial Institute
Chiang Mai University

Taiwan
Taiwan CDC
Animal Health Research Institute

Mongol
Institute of Veterinary Medicine

VISUAL AIDS FOR LEARNING OF RABIES

J Med Assoc Thai 2005; 88(3): 419-2

Six Criteria for Rabies Diagnosis in Living Dogs

Veera Tepsumethanon, DVM*, Henry Wilde, MD, FACP*,
Francois X Meslin, DVM**

Queen Saovabha Memorial Institute, Thai Red Cross Society,
(WHO Collaborating Center for Research on Rabies Pathogenesis and Prevention)
** World Health Organization, Geneva, Switzerland

Objective:
The authors studied the predictive value of six criteria for clinical diagnosis of rabies in living dogs.

Design:
Identify and test the criteria in a retrospective and prospective study.

Material and Method:
Both studies were conducted at the Rabies Diagnostic Unit, Queen Saovabha Memorial Institute, Thai Red Cross Society, Bangkok. The authors reviewed 1,170 dogs that were kept under observation for 10 days after they exhibited abnormal behavior. To test the predictive value of the six criteria, a prospective study involving 450 rabies suspected dogs was also performed.

Results and Conclusion:
The six criteria demonstrated 90.2% sensitivity, 96.2% specificity and 94.6% accuracy for the clinical diagnosis of rabies. They can be used for a presumptive diagnosis and may help in prioritizing post-exposure treatments and institute urgent rabies control measures.

VISUAL AIDS FOR LEARNING OF RABIES

RT-LAMP

Jpn J Infect Dis 2009; 62: 187-191

Rapid Detection of Rabies Virus by Reverse Transcription Loop-Mediated Isothermal Amplification

Boldbaatar Bazartseren [1)], Satoshi Inoue [1)2)], Naoko Sugiura [2)], Akira Noguchi [1)], Jun Ryan C. Orbina [3)], Catalino Demetria [3)], Mary Elizabeth Miranda [3)], AkioYamada [1)2)])

1) Department of Veterinary Science, National Institute of Infectious Diseases, Japan
2) The United Graduate School of Veterinary Science, Gifu University, Japan
3) Depatment of Health, Research Institute for Tropical Medicine, the Philippine

Abstract: In this study, reverse transcription loop-mediated isothermal amplification (RT-LAMP) was established which can detected 10^3 copies of viral RNA corresponding approximately 5 fg of RNA. RT-LAMP with Phil primer set designed according to the nucleotide sequences obtained from a Kyoto patient contacted rabies in the Philippines was able to amplify all 16 street viral sequences derived from the Philippines.
The specificity of RT-LAMP products was easily confirmed by digestion with *RsaI* restriction enzyme. The reaction of RT-LAMP could be completed within 1 h and could be conducted under isothermal conditions using a conventional water bath or heat blocks, indicating that RT-LAMP is ideal for diagnosis of rabies in developing countries.
Although further study is required to establish more universal RT-LAMP primers applicable to viruses from other regions or countries, the fast, easy, simple, sensitive and specific RT-LAMP method established here might be useful for rabies diagnosis and can facilitate studies of rabies epidemiology where rabies is enzootic particularly in developing countries.

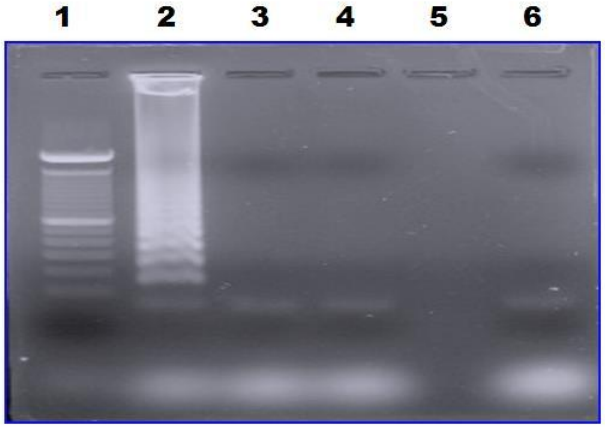
INITIAL DEVELOPMENT OF RT – LAMP TECHNIQUE FOR RABIES VIRUS DIAGNOSIS

Nguyen Vinh Dong[1], Ngo Chau Giang[1], Nguyen Tuyet Thu[1], Satoshi Inoue[2],

[1]National Institute of Hygiene and Epidemiology, Hanoi, Vietnam.
[2]National Institute of Infectious Diseases, Japan.

Sensitivity

Specificity



1: Marker
2: Vnukovo rabies strain
3: Namdinh virus
(viral encephalitis in child)
4: Jananese Encephalitis strain
6: Negative control

SURVEILLANCE

Emerging Infectious Diseases • Vol. 20, No. 1, January 2014

Rapid Bat Lyssaviruses, Northern Vietnam

National Institute of Hygiene and Epidemiology, Hanoi, Vietnam
A.T.K. Nguyen, T.T. Nguyen, D.V. Nguyen,G.C. Ngo
National Institute of InfectiousDiseases, Tokyo, Japan
A. Noguchi, S. Inoue
Institute of Ecology and Biological Resources, Hanoi
V.D. Thong
World Health Organization Vietnam Country Office, Hanoi
B. Olowokure

EID 8:258-262, 2002

Serologic Evidence of Lyssavirus Infections among Bats, the Philippines

P.M.Arguin, et al. (Center for Disease Control and Prevention, USA)

EID 10:2231-34, 2004

Serologic Evidence of Lyssavirus Infection in Bats, Cambodia

J-M.Reynes, et al. (Intitute Pasteur du Cambodge, Cambodia)

EID 11:232-6, 2005

Survey for Bat Lyssaviruses, Thailand

B.Lumlertdacha, et al. (Thai Red Cross Society, Thailand)

VECTOR-BORNE and ZOONOTIC DIS 11:232-6, 2005

ThailandSeroprevalence of Rabies Virus Antibodies in Bats from Southern China

Y.Jiang, et al. (Institute of Veterinary Sciences, China)

Journal of Virological Methods 237 (2016) 40–46

Contents lists available at ScienceDirect

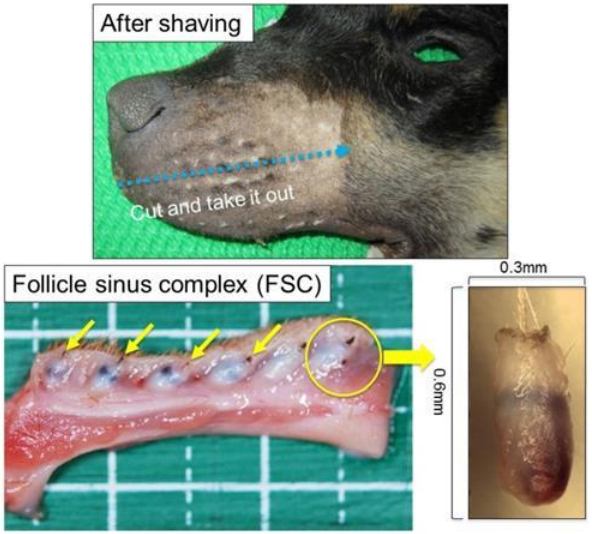
Journal of Virological Methods

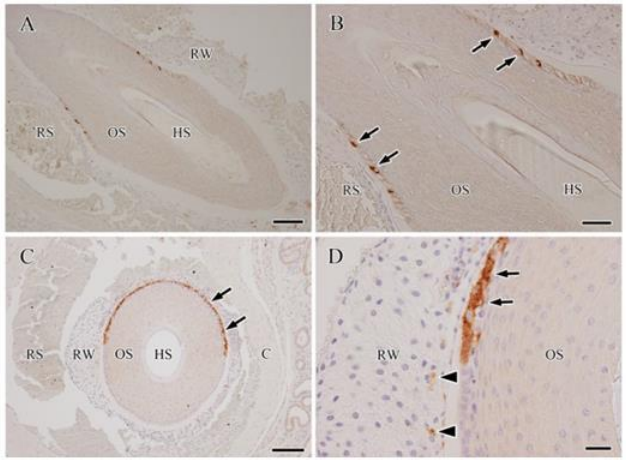
journal homepage: www.elsevier.com/locate/jviromet

Localization of the rabies virus antigen in Merkel cells in the follicle-sinus complexes of muzzle skins of rabid dogs

Taichi Shimatsua, Harumi Shinozakia, Kazunori Kimitsukia, Nozomi Shiwaa, Daria L. Manalob, Rodolfo C. Perezb, Joselito E. Dilig b, Kentaro Yamadac, Hassadin Boonsrirojd, Satoshi Inouee, Chun-Ho Parka,

Kitasato University , Japan; Research Institute for Tropical Medicine, The Philippines; Oita University, Japan Mahanakorn University of Technology, Thailand; National Institute of Infectious Diseases, Japan





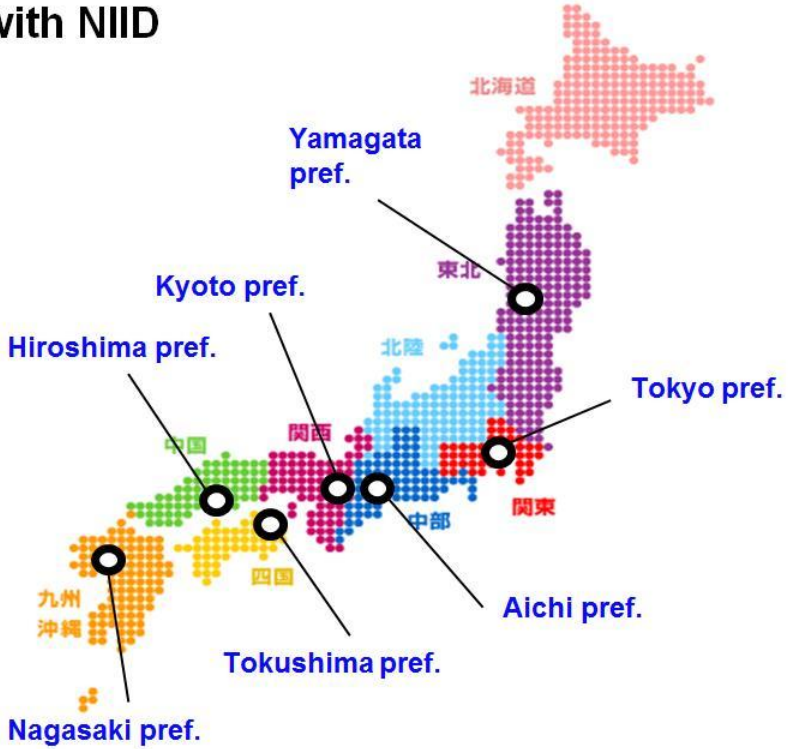
Japan:
- Kitasato U.: T.Shimatsua, H.Shinozakia, K.Kimitsukia, N.Shiwaa, C-H.Park
- Oita U.: K.Yamada
- NIID: S.Inoue

Philippines:
- RITM: D.L. Manalo, R.C. Perez, J.E. Dilig

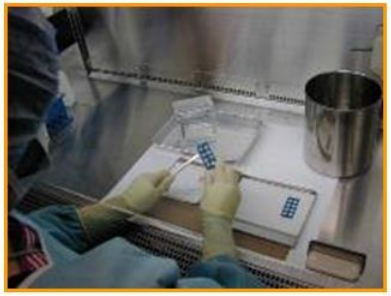
Thailand
- Mahanakorn U. Tech: H.Boonsriro

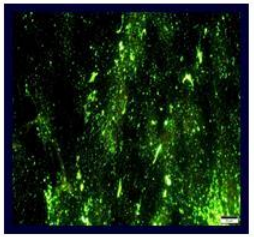
Laboratory Network for Rabies Diagnosis in JAPAN

Reference center (RC) for rabies tests with NIID



Municipal animal control facilities





<u>RCs & other Institute of Public Health with NIID</u>

Establish rabies test at IPH.
Storing and quality check of Posi. control.
Evaluation of SOP and Diagnostics.
Report to National government and NIID.

- Conduct workshops about brain sampling and rabies test.
- Supply dissection kit to each participated local government.
- Explain how to prevent biohazard.

Laboratory Network for free from rabies in JAPAN

- **Introduction of Novel diagnosis to the regional laboratories.**
- **Development of Laboratory network model.**
- **Improving Laboratory-based surveillance**

  RITM (Philippines), NIHE (Vietnam), CMU (Thailand), etc.

Rabies : The Oldest Infectious Disease

Thank you for your attention !