



# Rabies surveillance and control programs in Cambodia

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# Institut Pasteur du Cambodge - 2018



- The IPC is a **non-profit, international research organization** of public utility under the patronage of the Cambodian Ministry of Health
- The missions of IPC are:
  - 1. Support** to public health
  - 2. Research** in public health in Cambodia and in Southeast Asia
  - 3. Training** in research and public health
- For the past 65 years in Cambodia, the main activities of IPC have been focused on the fight against **infectious diseases and emerging pathogens** in Cambodia and in Southeast Asia.
- Member of the Institut Pasteur International Network
- 230 staff – **4 reference lab** (Influenza, Arboviruses, **Rabies**, Malaria RDT) – 6 research units & platforms – BSL3 & BLS2 facilities, clinical diagnostic laboratory, vaccine center, water and food safety laboratory



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# **RABIES RISKS IN CAMBODIA**



# Dog bites injuries are frequent in Cambodia

- Around 600,000 dog bites per year
  - 3-4 injuries for 100 persons per year
  - 80% are severe injuries (WHO category 3)
  - 60% among children under 17 years old
- ➔ **An extremely high probability of being bitten in a rabies-endemic country**
- Only around 5% consulted a rabies vaccination center
- ➔ **95% individual did not receive proper rabies prophylaxis after dog bites**



*Ponsich A et al., 2016*



# Evidence of virological burden is missing in Cambodia

- **Around 5 millions dogs → ~1 dog for 3 humans**
  - Most not vaccinated against rabies
  - Most are owned dogs, but range freely in the community
- No veterinary surveillance or quarantine
- Biting dogs:
  - Are put down
  - Escape
  - But also consumed for food
- No (or low) virological confirmation despite competent lab



# Rabies caused human death in Cambodia



- Mathematical estimation in 2007
  - Based on data collected from IPC vaccination center (PEP)
- **810 human rabies deaths** in 2007
- **Incidence = 5.8 / 100,000 inhabitants**
- That year: 54 cases notified

*Ly S et al., 2009*

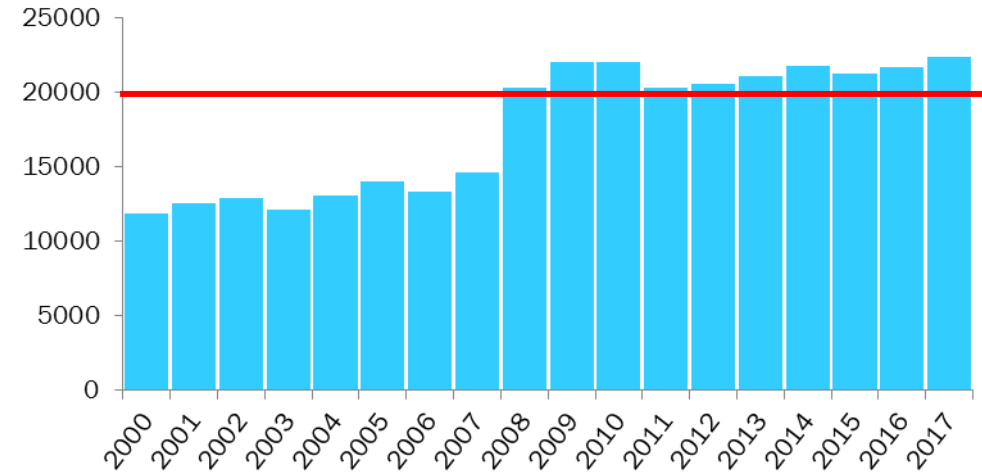




# Rabies Post-Exposure Prophylaxis at IPC

- Since 1995 in Phnom Penh
- **> 20,000 new patients per year since 2008**
- 2017: 22,421 patients
- 60% among children under 17 years old
- 50% from Phnom Penh and Kandal (Southern Cambodia)

New Patients who Received PEP at IPC  
(N= 318,158)



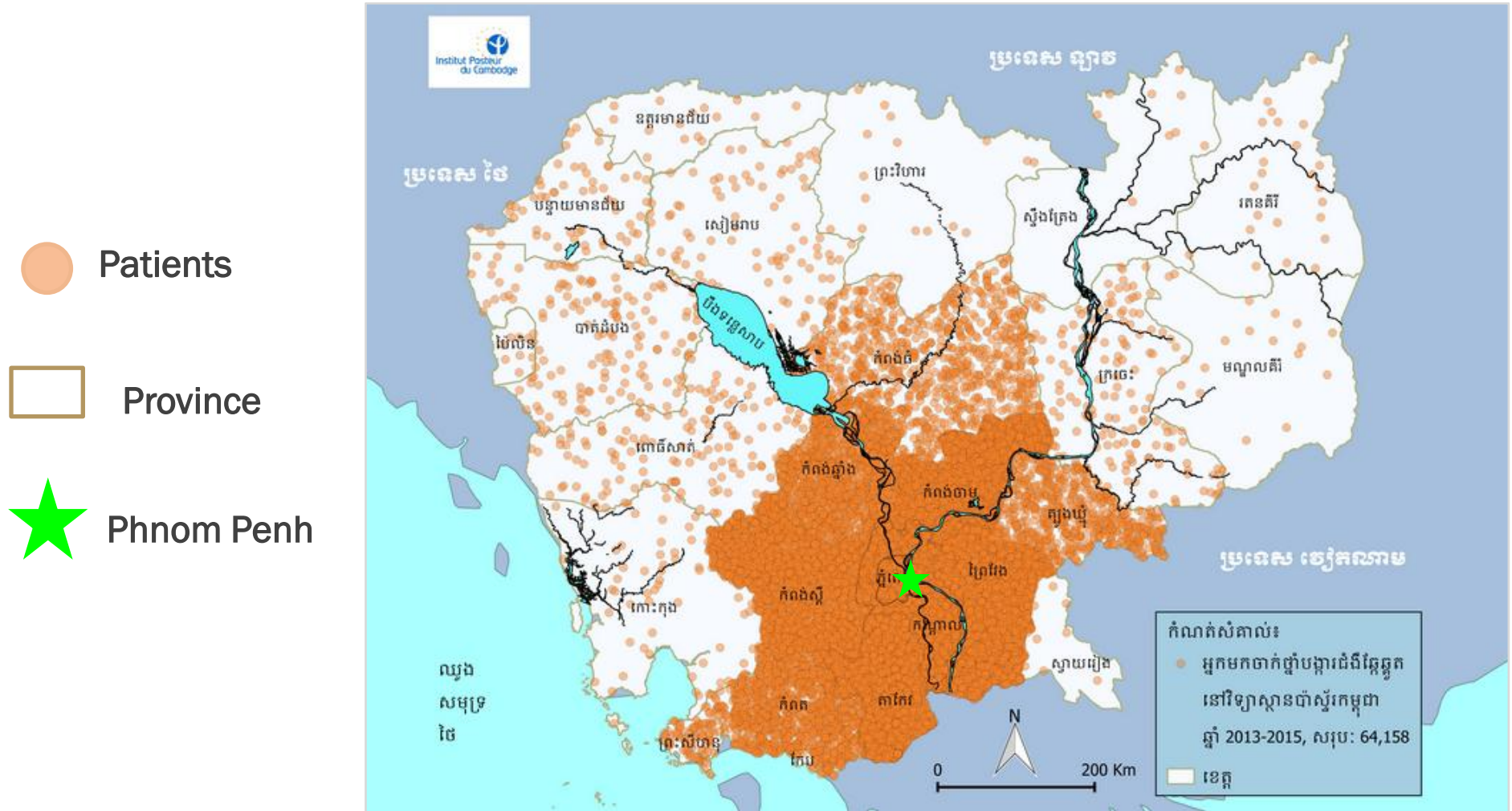
*Rabies Vaccination  
Center, IPC*



# Origins of patients who received Rabies PEP



Data from IPC, 2013-2016, N= 64,158 patients



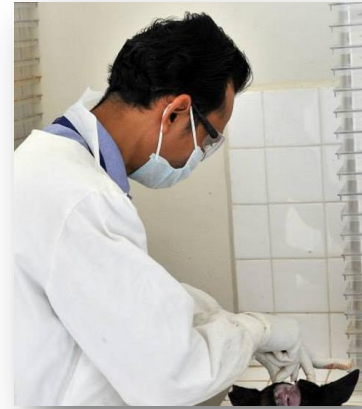




# Rabies diagnosis at IPC

## ■ Lab testing at IPC

- Virology Unit: **reference laboratory for rabies diagnosis**
- Free of charge for PEP patients
- Animal brains (98% from dogs)
  - Cat, swine, cattle, monkey
- Antigen detection: DFAT
- Genome detection: RT-PCR



## ■ Participation to Inter-laboratory test for Rabies diagnostic

- Organised by the Nancy Laboratory for Rabies and Wildlife from ANSES, France (European Union Reference Laboratory (EURL) for Rabies)

## ■ Perspective: set-up of seroneutralization assays

- FAVN assay with support from ANSES Nancy (dog samples; in progress)
- RFFIT assay with support from Institut Pasteur, Paris (human samples)

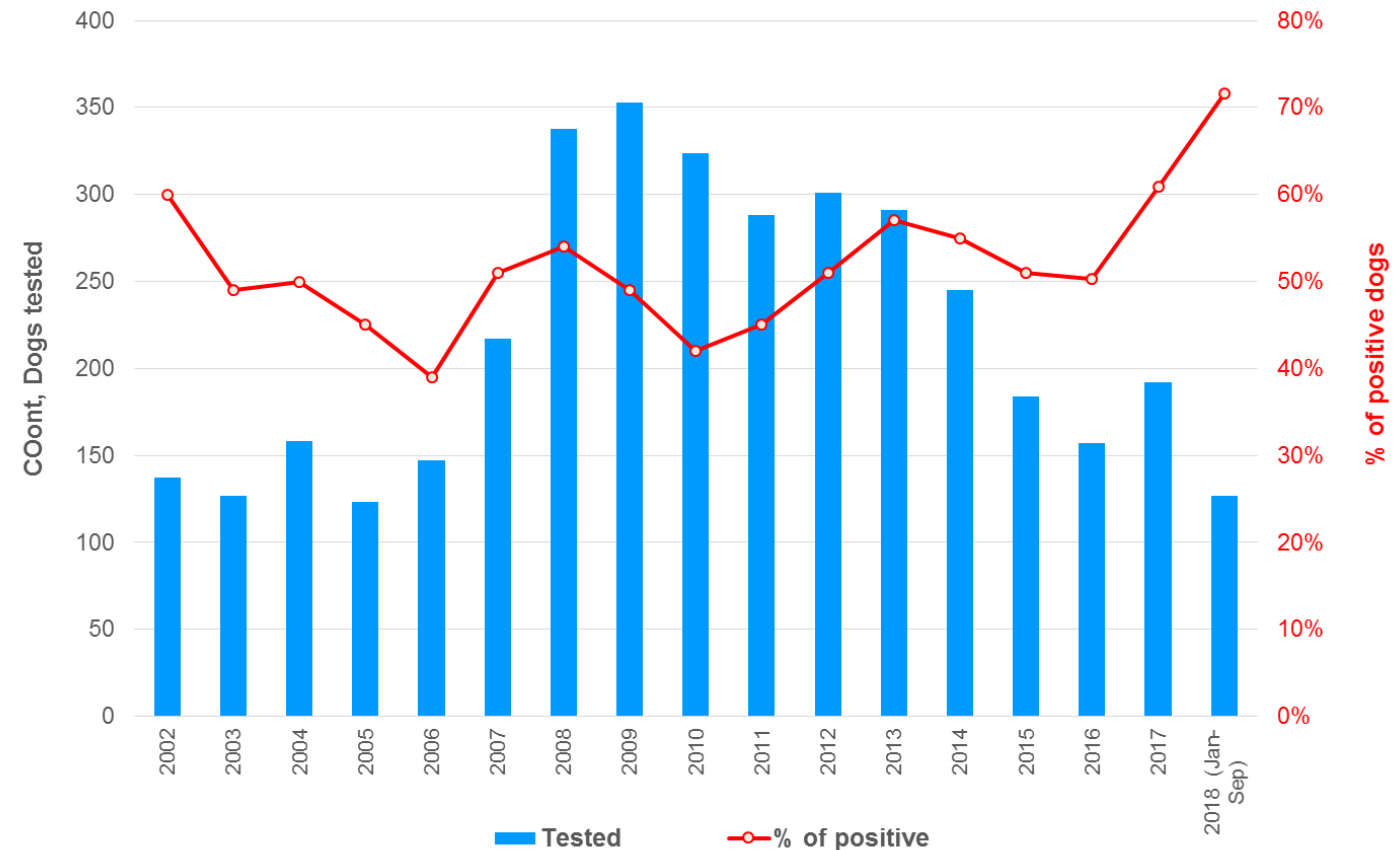
# Dogs tested positive for Rabies



## Results in dogs, 2002-2017

- 226 samples per year
- 50% positive for rabies virus
- Around 2 positive dogs per week

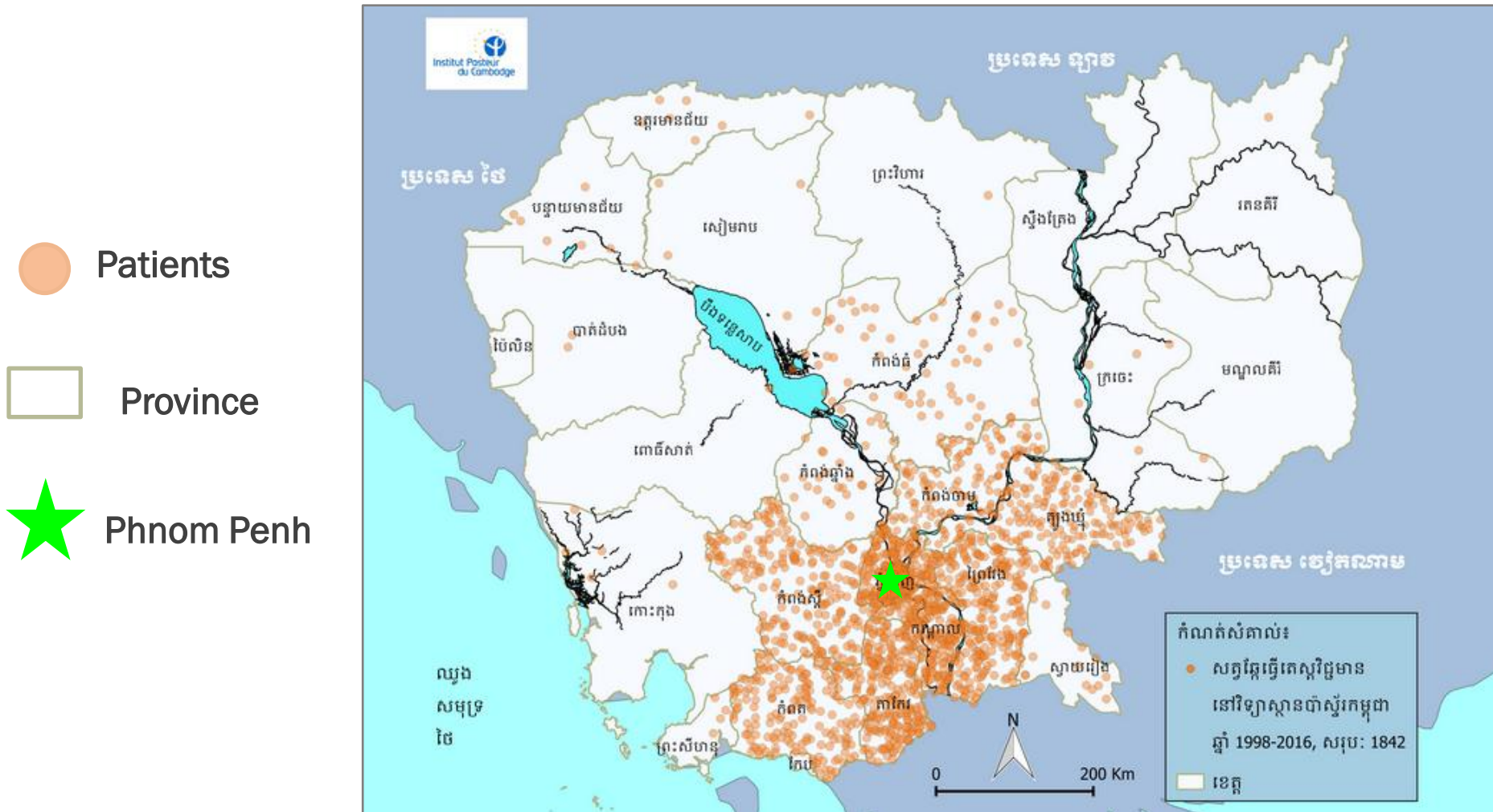
Testing in Dogs for Rabies, Institut Pasteur in Cambodia  
(Direct Immunofluorescence Assay)



# Origins of lab confirmed Rabid dogs



Data from IPC, 1998-2016, N=1,842 samples





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# **IMPROVEMENT OF RABIES PREVENTION IN CAMBODIA**





# Improving rabies PEP accessibility in Cambodia

Reduce **distance**  
so people don't have to travel  
and make hard choices



Reduce **duration**  
so people don't have to travel  
pay taxis several times



Reduce **cost**  
so people don't have to  
contract debts to get PEP







# Improving rabies PEP accessibility in Cambodia

## Reduce **distance**

so people don't have to travel  
and make hard choices



## ■ **Objective**

- Facilitate access to rabies PEP
  - By bringing rabies PEP center closer to the Cambodian population
- ➔ Reduce number of human rabies death by half over 5 years

## ■ **How?**

- Opening a second Rabies Prevention Center

## ■ **Where?**

- In Northwestern Cambodia: Battambang province

# Improving rabies PEP accessibility in Cambodia

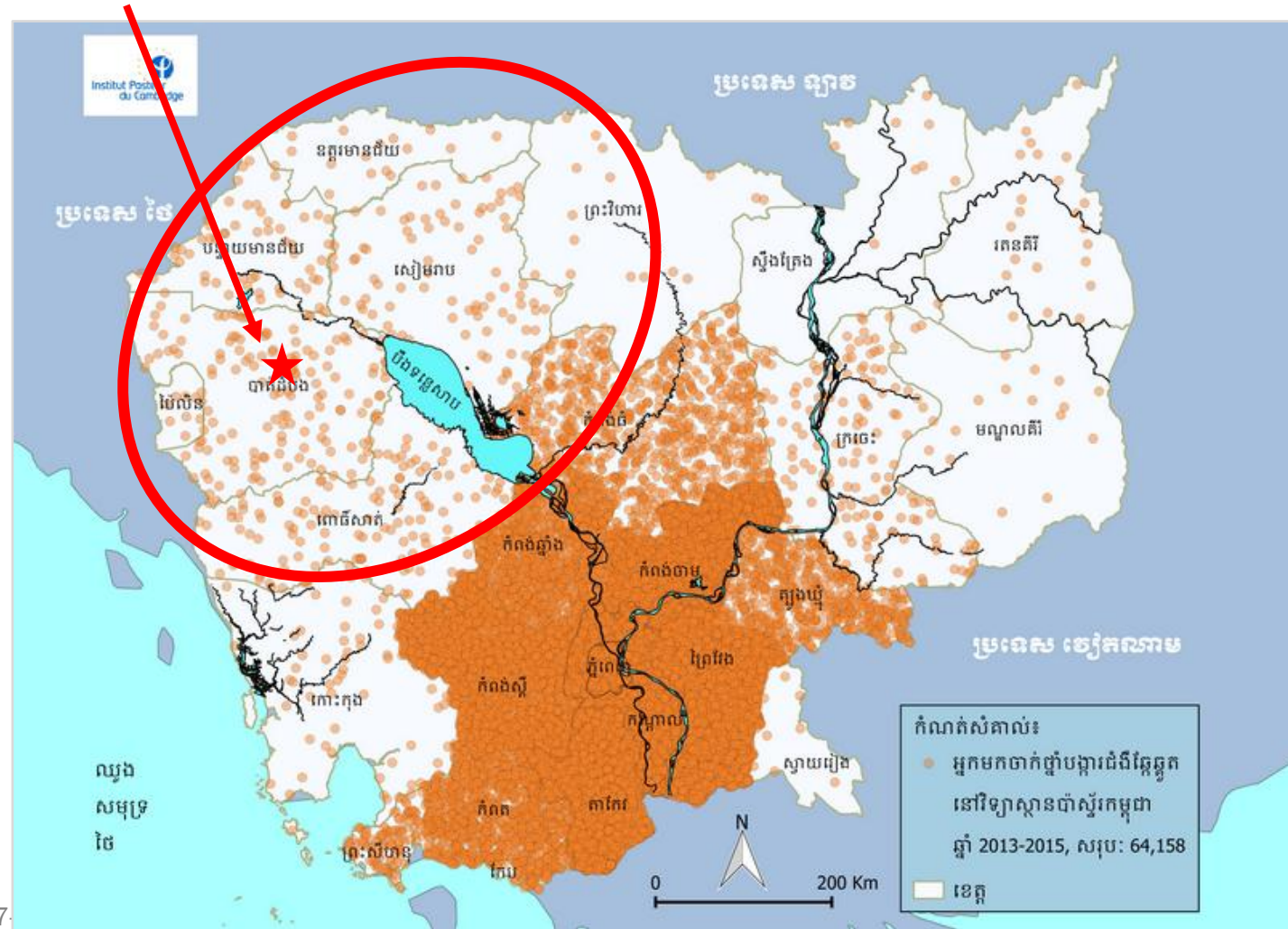


Reduce **distance**

so people don't have to travel  
and make hard choices



## Battambang province





# Opening of the center

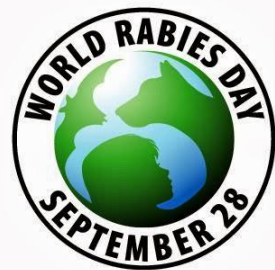


Facebook.com/RabiesIPC

- Open to public on 27 July 2018



- Inauguration 27-28 September 2018



# Communication, Education and Information on rabies and its prevention



- The most deadly disease known
- No cure, only palliative care
- 100% lethal disease

**Human Rabies is 100% preventable by vaccination after infections caused by animals**

An acute neurological syndrome due to a virus

Infects domestic and wild animals

Spreads to people through close contact with animal infected saliva via bites or scratches

**In Cambodia around 800 deaths a year**

**Implementation of Cambodia Rabies National Control Program in progress (MoH, MAFF)**

**As an ASEAN Member State, Cambodia has committed to eliminate rabies by 2025**

## RABIES AND DOGS

- In Cambodia rabies mostly transmitted by dogs
- More than 4 million dogs in Cambodia Most of them not vaccinated
- Most dogs in Cambodia have owners, only few are stray dogs

## WHEN BITTEN WHAT TO DO ?

- You have to seek for vaccination against rabies immediately for example at Pasteur Phnom Penh
- The intradermal vaccination consists of 4 sessions (Day 0, 3, 7 and 28) for a total cost of 12 USD Immunoglobulins are required in addition to the vaccine in case of severe wound
- More than 20 000 patients per year are vaccinated at Pasteur Phnom Penh Children under 17 years old : 60%







# Improving rabies PEP accessibility in Cambodia

- Post-exposure prophylaxis
  - 4 sessions
    - Day 0, D3, D7, D21/28
  - With or without immunoglobulins
- ➔ Reduce the number of injection

➔ **Prospective documentation of antibody response after 3 and 4 sessions in people bitten by tested dog**

## Reduce **duration**

so people don't have to travel  
pay taxis several times



## Reduce **cost**

so people don't have to  
contract debts to get PEP





# New PEP protocol recommended by WHO



Table 1 **Post-exposure prophylaxis (PEP) by category of exposure**  
 Tableau 1 **Prophylaxie post-vaccinale par catégorie d'exposition**

	<b>Category I exposure – Exposition de catégorie I</b>	<b>Category II exposure – Exposition de catégorie II</b>	<b>Category III exposure – Exposition de catégorie III</b>
<b>Immunologically naive individuals of all age groups – Individus jamais encore immunisés quel que soit le groupe d'âge</b>	<p>Washing of exposed skin surfaces. – Lavage des surfaces cutanées exposées.</p> <p>No PEP required. – Aucune PPE n'est requise.</p>	<p>Wound washing and immediate vaccination: – Lavage de la plaie et vaccination immédiate:</p> <ul style="list-style-type: none"> <li>2-sites ID on days 0, 3 and 7<sup>73</sup> – Injections ID en 2 sites aux jours 0, 3 et 7<sup>73</sup></li> </ul> <p><b>or – ou</b></p> <ul style="list-style-type: none"> <li>1-site IM on days 0, 3, 7 and between day 14–28<sup>74</sup> – Injections IM en 1 site aux jours 0, 3, 7 et entre 14 et 28 jours<sup>74</sup></li> </ul> <p><b>or – ou</b></p> <ul style="list-style-type: none"> <li>2-sites IM on days 0 and 1-site IM on days 7, 21<sup>75</sup> – Injections IM en 2 sites au jour 0 et en 1 site aux jours 7, 21<sup>75</sup></li> </ul> <ul style="list-style-type: none"> <li>RIG is not indicated. – L'immunoglobuline antirabique n'est pas indiquée.</li> </ul>	<p>Wound washing and immediate vaccination – Lavage de la plaie et vaccination immédiate</p> <ul style="list-style-type: none"> <li>2-sites ID on days 0, 3 and 7<sup>73</sup> – Injections ID en 2 sites aux jours 0, 3 et 7<sup>73</sup></li> </ul> <p><b>or – ou</b></p> <ul style="list-style-type: none"> <li>1-site IM on days 0, 3, 7 and between day 14–28<sup>74</sup> – Injections IM en 1 site aux jours 0, 3, 7 et entre 14 et 28 jours<sup>74</sup></li> </ul> <p><b>or – ou</b></p> <ul style="list-style-type: none"> <li>2-sites IM on days 0 and 1-site IM on days 7, 21<sup>75</sup> – Injections IM en 2 sites au jour 0 et en 1 site aux jours 7, 21<sup>75</sup></li> </ul> <ul style="list-style-type: none"> <li>RIG administration is recommended. – L'administration d'immunoglobuline antirabique est recommandée.</li> </ul>

**One-week, 2-site ID regimen**  
**Institut Pasteur du Cambodge regimen: 2-2-2-0-0**  
**Duration of entire PEP course: 7 days**

World Health Organization. Rabies vaccines: WHO position paper. *Wkly Epidemiol Rec* 2018; 2018: 201–20.



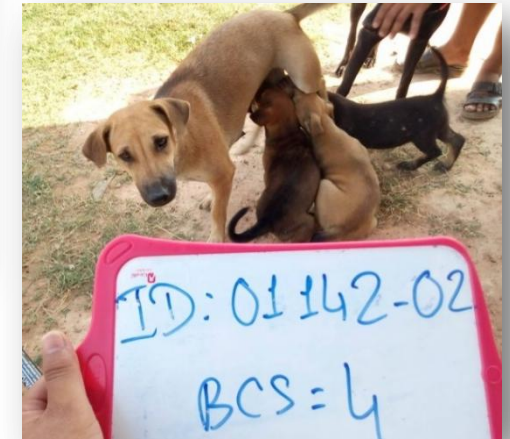
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du Cambodge

# **RECENT AND CURRENT RESEARCH ACTIVITIES IN ANIMAL**

# Study of dog population, vaccination coverage and bite risk factors

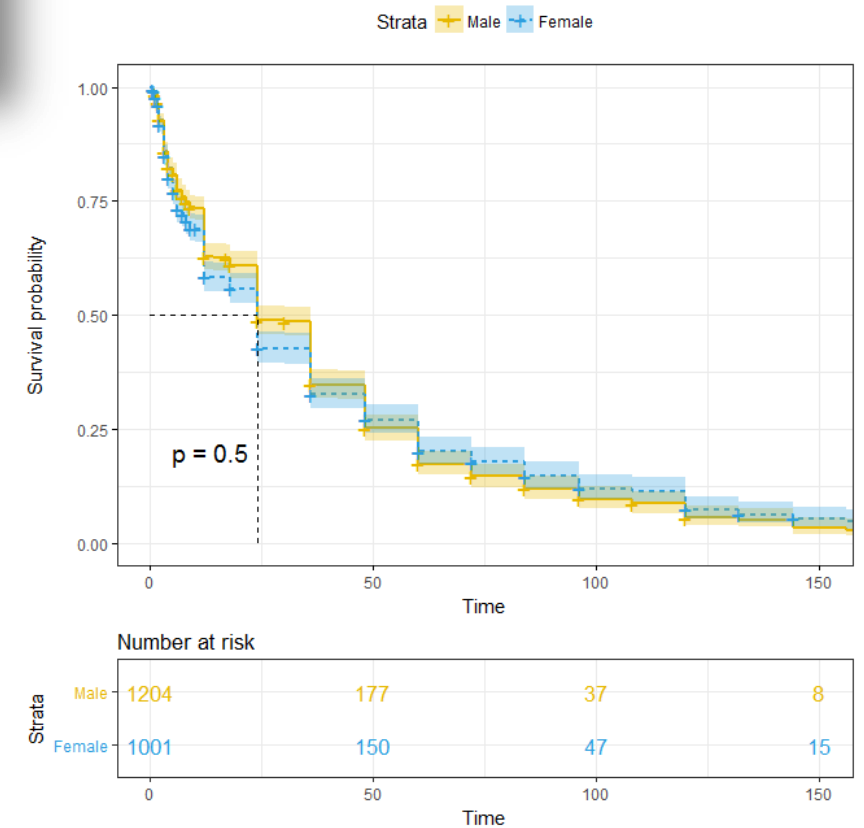


- 2 Cambodian provinces (10 villages): 2017-2019
  - Kandal and Battambang
- **2 year follow-up**, with door to door census
- Dog identification, vaccination and sampling
- **Questionnaires**
  - Dog characteristics
  - Dog use
  - Dog slaughter value chain
  - **Assessment Knowledge, Attitude and Practice of dog owners, animal health and public health professionals towards rabies**
  - Bite incidence
  - Bite risk factors



# Preliminary result in Kandal

- 5,400 identified dogs
- Ratio dog/human : 1:4
- High turn-over rate
- Dog trade and consumption
- Bite incidence rate : 2-4%/year
- **Risk of being bitten increases**
  - With number of dog per family
  - Where dogs are sold for consumption
  - With number of children < 15 years old
- **Good acceptability for dog vaccination**
- **But poor knowledge of rabies**



## Survival rate

1 y/o : 0.62 (IC 0.59–0.65)

2 y/o : 0.49 (IC 0.46–0.52)

5 y/o : 0.19 (IC 0.17–0.23)

# Way forward

- Neutralization assay: FAVN tests → vaccination coverage dynamic
- Modelling → adapted vaccination strategies
- Phylogeographic models → better understanding of spread mechanisms of rabies virus
- Many dogs are aggressive and can not be handled, even by owners → evaluation of oral vaccination may be useful completing parenteral vaccination
- **Involvement of all stakeholders and inter-sectoral collaboration**





# National Plan to Fight against Rabies



National Guideline for Rabies Surveillance,  
Prevention and Control for Cambodia

December 2017

Ministry of Health

Ministry of Agriculture, Forestry and  
Fisheries



**ព្រះរាជាណាចក្រកម្ពុជា**  
**ជាតិ សាសនា ព្រះមហាក្សត្រ**



**សៀវភៅមគ្គុទ្ទេសក៍ជាតិស្តីពី**  
**ការអង្កេតតាមដាន ការបង្ការ**  
**និងការប្រយុទ្ធនឹងជំងឺឆ្លងកូរ៉េនៃកូរ៉េន**

**កម្ពុជា**

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# In conclusion



- Stating the obvious
  - Rabies, as neglected disease, is still a major public health concern in Cambodia
- ➔ **Fund raising remains challenging**
- ➔ **Funds and vaccines to study dog population dynamic and define the best vaccination strategy for Cambodia**

- ✓ Institut Pasteur du Cambodge
- ✓ Ministry of Health
- ✓ Ministry of Agriculture, Forestry and Fisheries
- ✓ Ministry of Education, Youth and Sports
  - **Aim to decrease the number of death from 800 to 400 deaths per year**
  - **Save 2,000 lives in 5 years**
  - **Help to reach national coverage of rabies prevention**



# Acknowledgements



- Didier Fontenille
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**anses**  
alimentation, environnement, travail



- Hervé Bourhy

- Florence Cliquet

## Thank you for your attention

