



# Tirer parti d'« Une seule santé » pour comprendre et atténuer les risques posés par les virus émergents

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# Remerciements



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VIDO.ORG





# Quelques épidémies récentes d'origine virale



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SARS-CoV (2002-2004)  
9,5 %



SARS-CoV-2 (en cours)  
0,4-15 %



MERS-CoV (en cours)  
35 %



Virus Nipah (en cours)  
40-75 %



Virus Ebola (périodique)  
25-90 %  
~50 % en moyenne



Virus Marburg (périodique)  
24-88 %  
~50 % en moyenne

# Chauves-souris et virus



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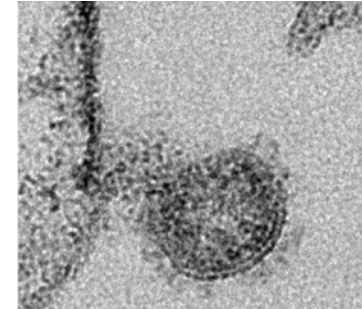


**VIDO**



M. Schaechter

**Filovirus** (Ebola, Marburg)

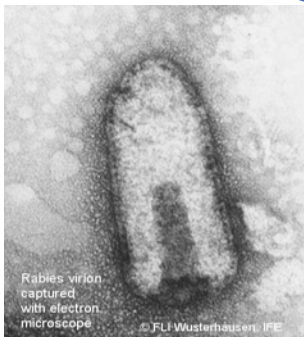


Banerjee *et coll.*  
(2020)

**Coronavirus**  
(SRAS, SRMO, DEP, SADS,  
COVID-19)



Image : Brock Fenton

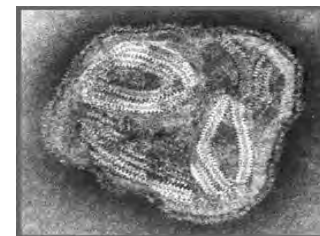


Rabies virion  
captured  
with electron  
microscope  
© FLI Wusterhausen IPE

FLI Wusterhausen

**Lyssavirus**  
(Rage)

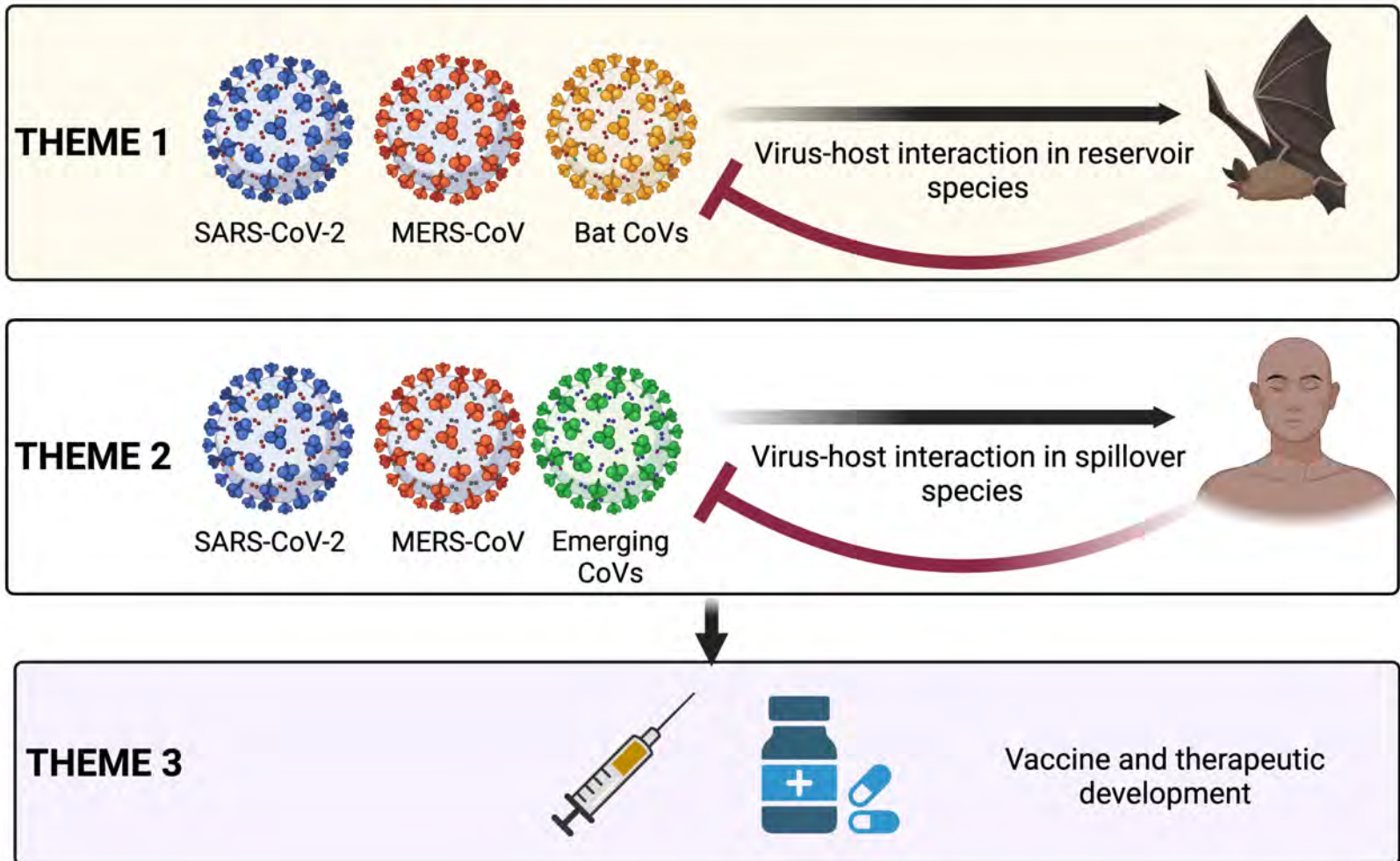
**Paramyxovirus**  
(Nipah, Hendra)



<http://web.stanford.edu/group/virus/paramyxo/2005/>



## The Laboratory of Zoonotic Viruses and Comparative Immunology (#LZCI) Vaccine and Infectious Disease Organization





Rousette de Malaisie

## Yinpterochiroptera

### Mégachiroptères



Chauve-souris géante d'Inde  
1,8 m d'envergure  
1,6 kg

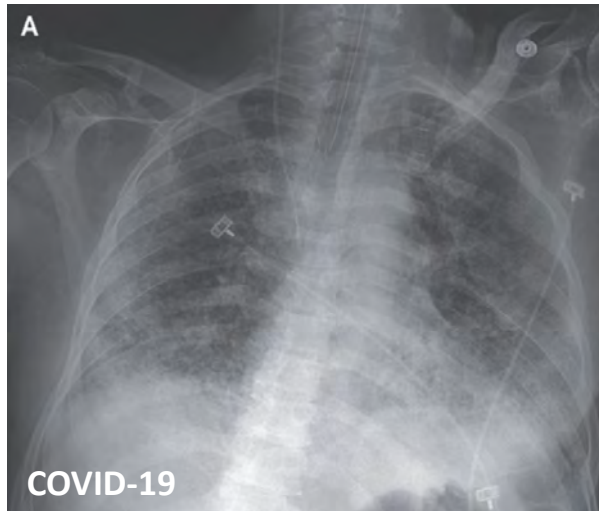
## Yangochiroptera

### Microchiroptères



Kitti à nez de porc  
15 cm d'envergure  
2 g

# La pathologie du SRAS, du SRMO et de la VDEP est due à une inflammation



« La radiographie thoracique (panneau A) montre des opacités en verre dépoli et des consolidations bilatérales ». Berlin *et coll.*, *NEJM*, 2020  
Successful treatment of suspected organizing pneumonia in a patient with **Middle East respiratory syndrome** coronavirus infection: a case report.  
*Kim I, Lee JE, Kim KH, Lee S, Lee K, Mok JH.*  
*J Thorac Dis.*  
Oct. 2016;8(10):E1190-E1194.

Pathology and pathogenesis of **severe acute respiratory syndrome**. *Gu J, Korteweg C. Am J Pathol. Avr. 2007;170(4):1136-47.*

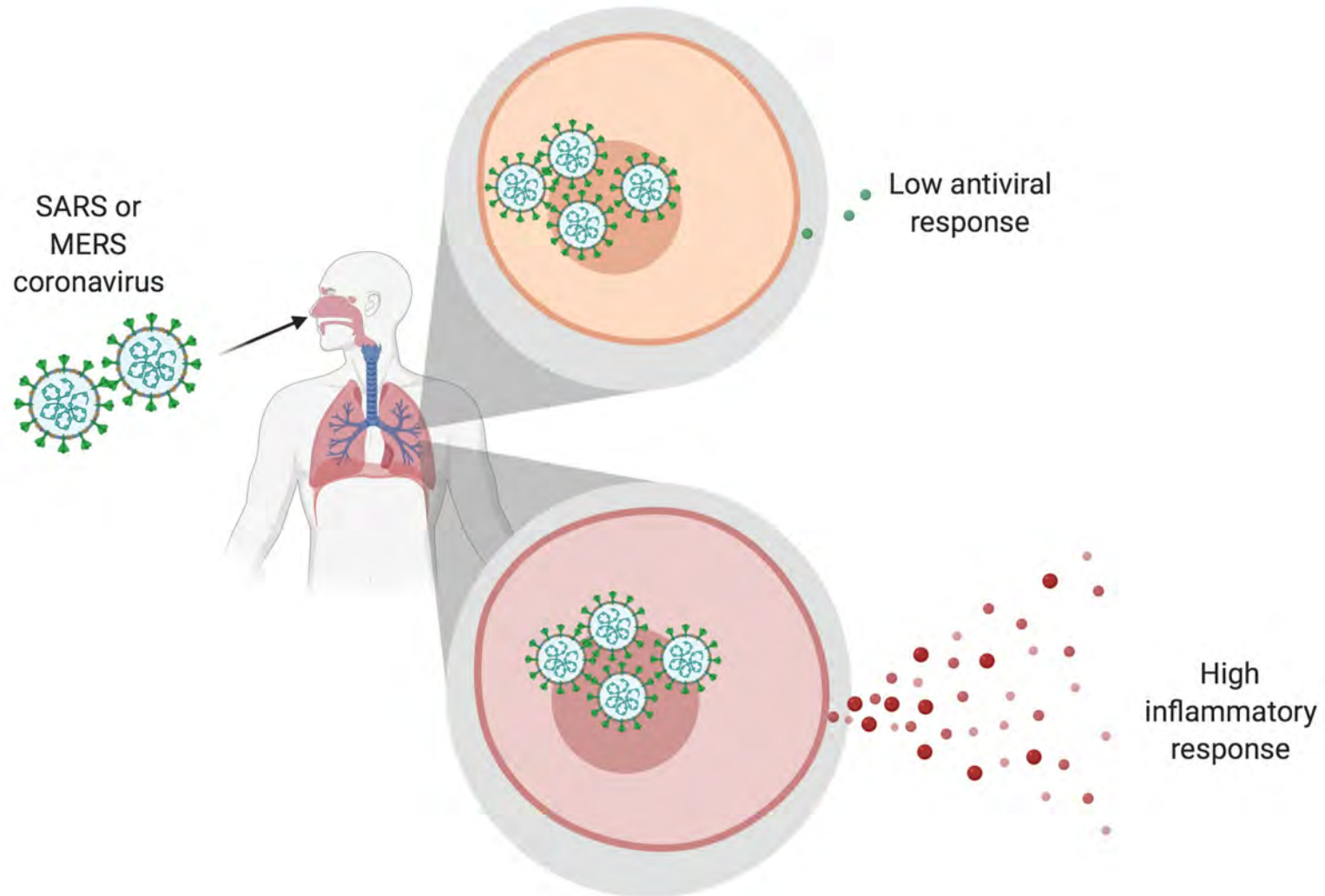
Delayed induction of proinflammatory cytokines and suppression of innate antiviral response by the novel **Middle East respiratory syndrome coronavirus**: implications for pathogenesis and treatment. *Lau SK, et coll. J Gen Virol. Déc. 2013;94(Pt 12):2679-90.*

**Porcine epidemic diarrhea virus** E protein causes endoplasmic reticulum stress and up-regulates interleukin-8 expression.

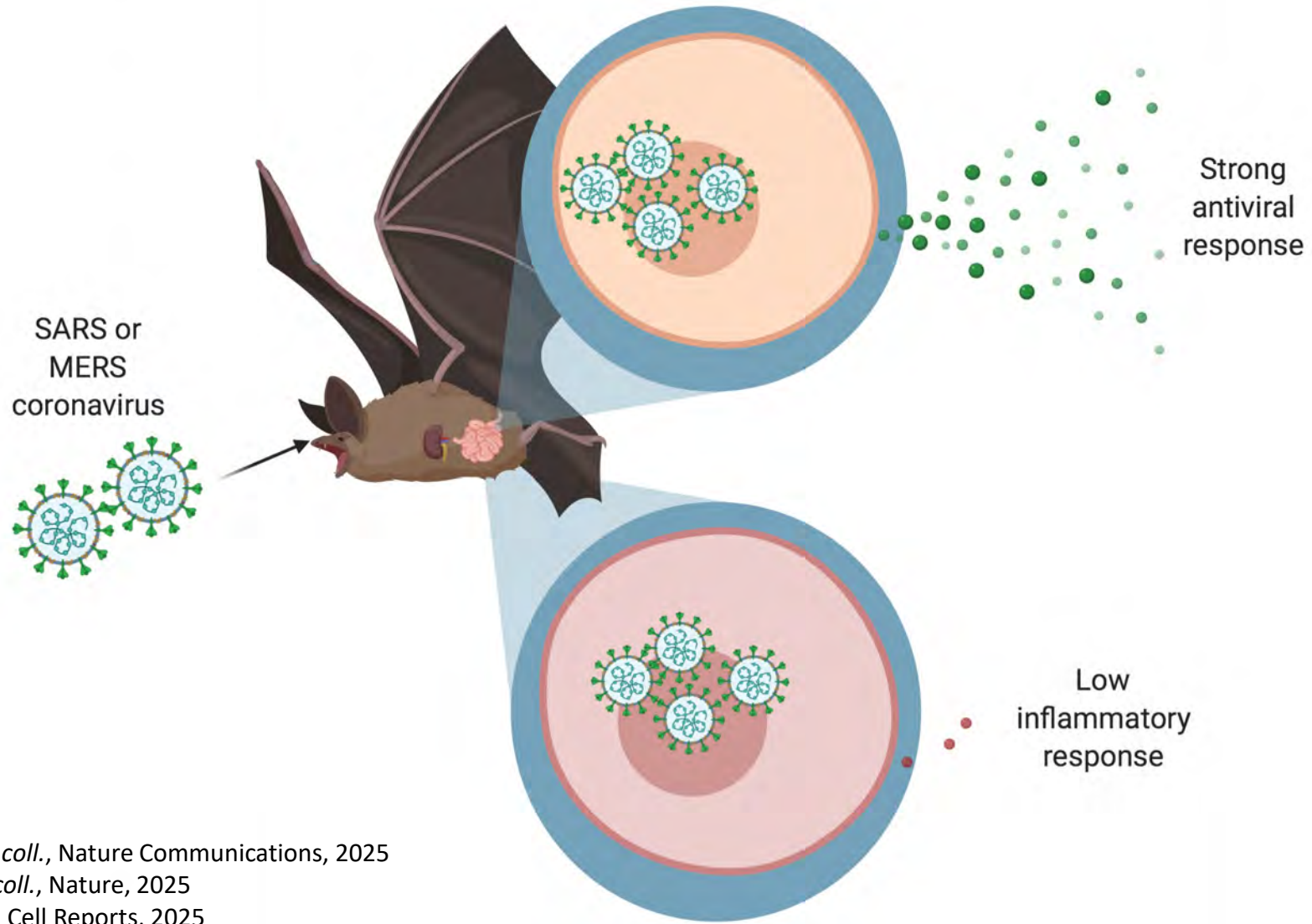
*Xu et coll.*



# Les coronavirus du SRAS et du SRMO provoquent une forte inflammation dans les cellules humaines



# MERS-CoV et SARS-CoV-2 provoquent une faible inflammation dans les cellules de chauve-souris



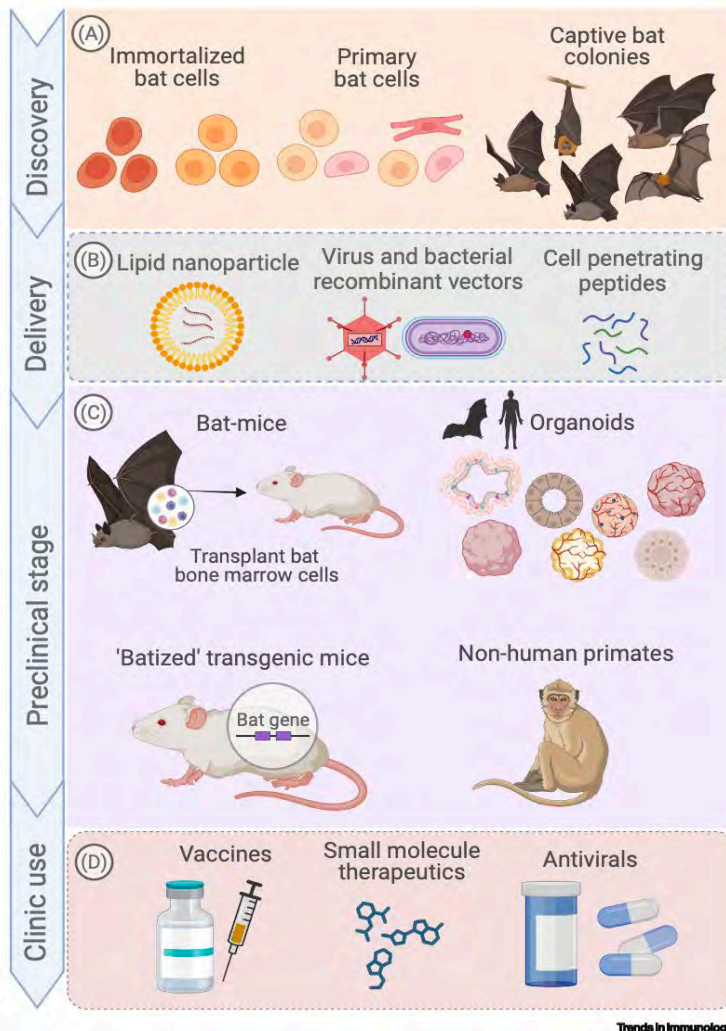
Gonzalez *et coll.*, Nature Communications, 2025  
Morales *et coll.*, Nature, 2025  
Baid *et coll.*, Cell Reports, 2025



# Pouvons-nous découvrir de nouvelles thérapies inspirées des chauves-souris?

## Key figure

Model for 'bench-to-bedside' translational pipeline derived from bat research



CellPress

Trends in  
Immunology

Opinion

## The translational potential of studying bat immunity

Kaushal Baid,<sup>1</sup> Aaron T. Irving,<sup>2,3,4,5</sup> Nolwenn Jouvenet,<sup>6</sup> and Arinjay Banerjee<sup>1,7,8,9,10,\*</sup>

Trends in Immunology

**nature microbiology**

Perspective

<https://doi.org/10.1038/s41564-025-02020-9>

## **A One Health approach to understanding and managing Nipah virus outbreaks**

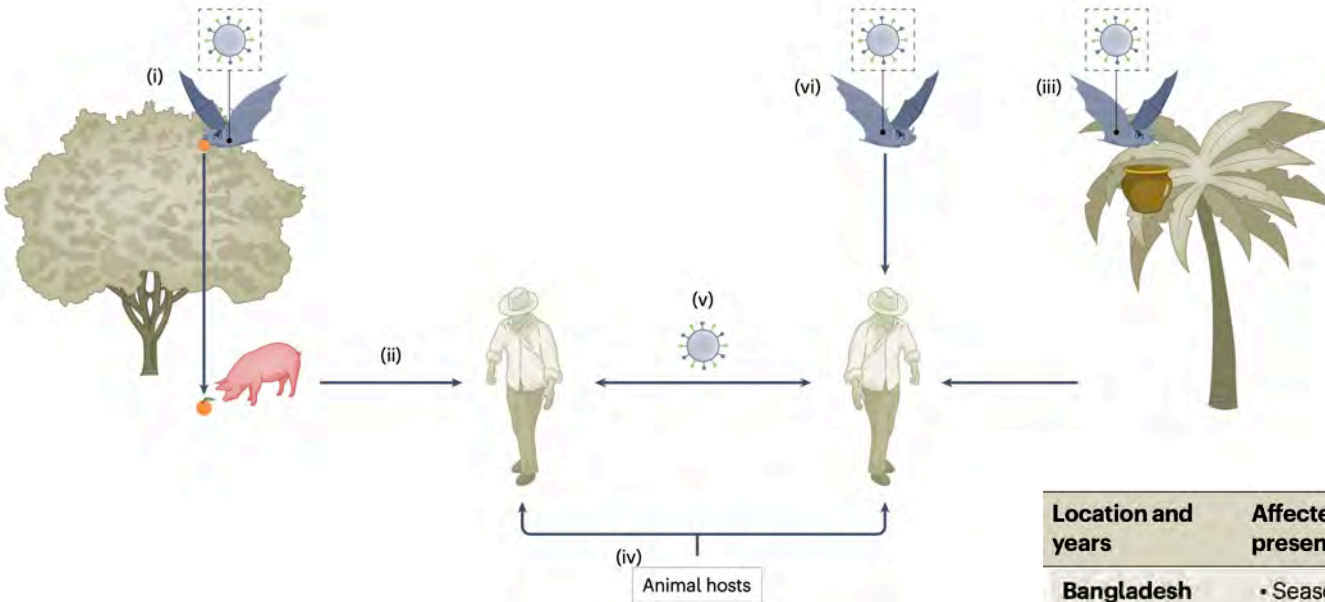
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Pragya D. Yadav <sup>1,15</sup>, Kaushal Baid <sup>2,15</sup>, Deepak Y. Patil<sup>1</sup>, Tahmina Shirin<sup>3</sup>,  
Mohammed Ziaur Rahman<sup>4</sup>, Alison J. Peel <sup>5</sup>, Jonathan H. Epstein <sup>6</sup>,  
Joel M. Montgomery <sup>7</sup>, Raina K. Plowright<sup>8</sup>, Henrik Salje <sup>9</sup>, Emily S. Gurley<sup>10</sup>,  
Syed M. Satter<sup>4</sup> & Arinjay Banerjee <sup>2,11,12,13,14</sup> 

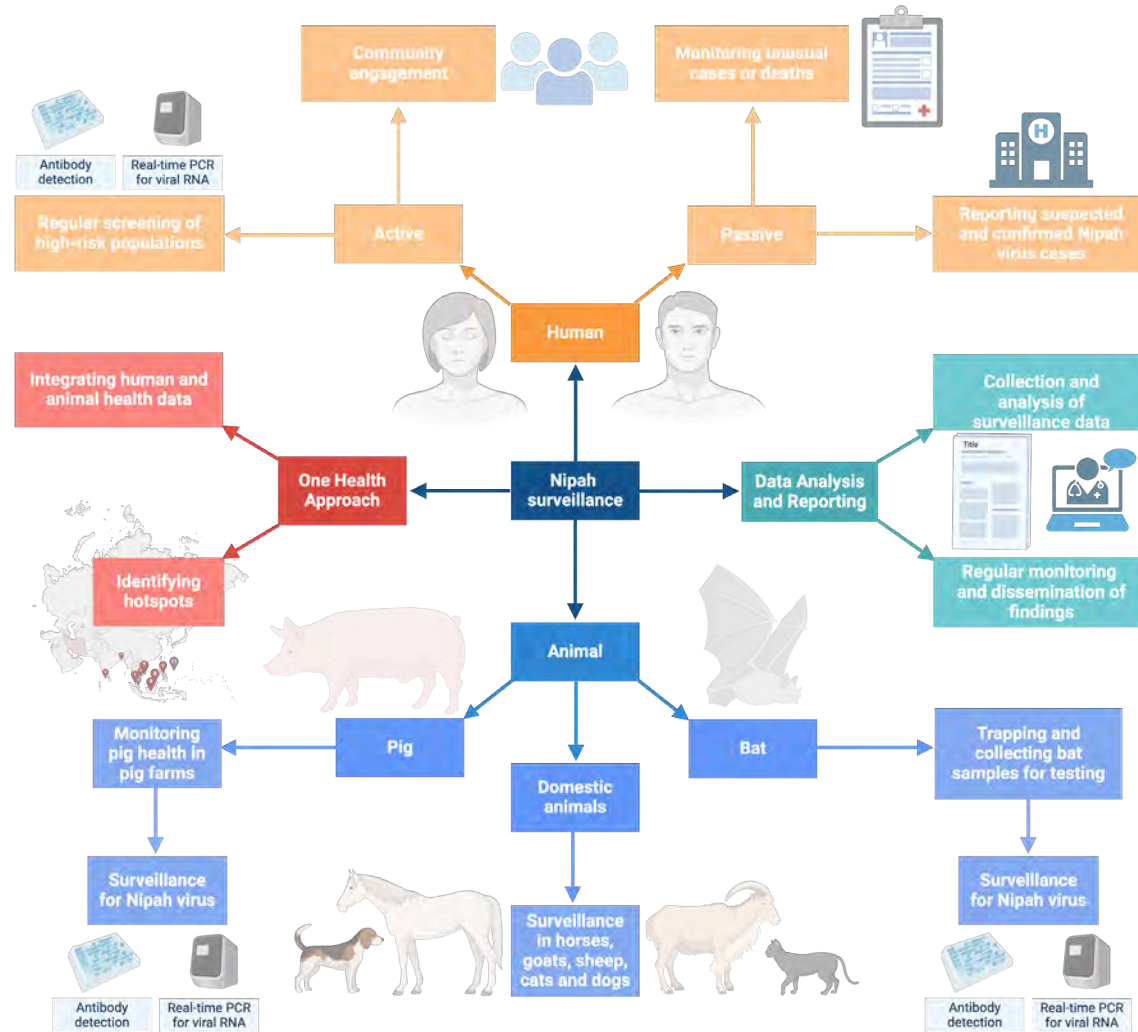
# Virus Nipah et « Une seule santé » VIDO



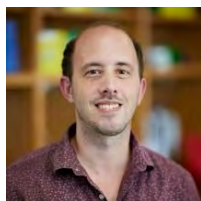
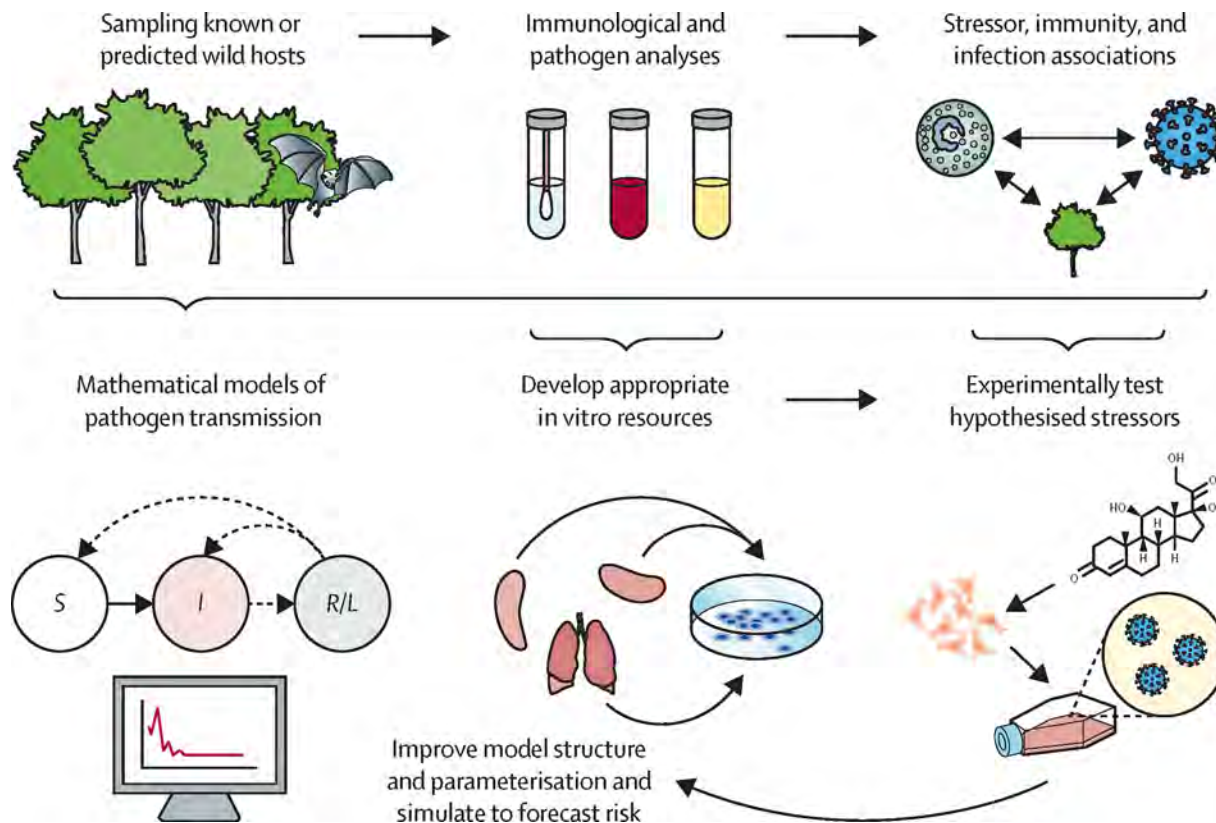
| Location and years                                            | Affected population and clinical presentation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Cases | Deaths |
|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------|
| <b>Bangladesh</b><br>2017–2024                                | <ul style="list-style-type: none"> <li>Seasonal outbreaks</li> <li>In 2023, 14 cases were recorded, making it the largest outbreak since 2015</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                          | 42    | 29     |
| <b>India (Kerala)</b><br>2018<br>2019<br>2021<br>2023<br>2024 | <ul style="list-style-type: none"> <li>Index patient in 2018 outbreak traced back to fruit bat exposure</li> <li>2019: survivor case of NiV encephalitis</li> <li>2021: fatal case of NiV encephalitis</li> <li>Nosocomial transmission</li> <li>Fever, myalgia, respiratory distress, headache, vomiting, cough, altered sensorium and encephalitis with seizures</li> <li>Public health lockdown used during 2023 NiV outbreak in Kerala</li> <li>2024: fatal case of NiV infection</li> <li>Consumption of contaminated wild hog plums hypothesized</li> </ul> | 27    | 20     |



# Virus Nipah et « Une seule santé »



# Associer études sur le terrain et études en laboratoire



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Rita Quintela  
Doctorante

Becker et Banerjee, 2023, *Lancet Microbe*  
 Das et coll., 2025, *mBio*  
 Becker et coll., 2025 (ANYAS)



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# Programme national de formation à « Une seule santé »



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Consider a bat that is infected with several deadly viruses, including ones that cause rabies, SARS, and Ebola. While this diagnosis would be lethal for other mammals, the winged wonder is totally unfazed, and may even spend the next 30 years living as if this were totally normal—because for bats, it is. So what's protecting bats from these dangerous infections? Arinjay Banerjee investigates.



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### Journal of Virology



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