



Clinical impact of transfusion transmitted arboviruses

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Disclosure of interests of Hans Zaaijer

No conflicts of interests:

Hans Zaaijer is or was paid for *unrestricted* lectures and teaching by:
ACTA, Abbott, Gilead, Griffols, ISBT, Janssen-Cilag, Roche, and
Virology Education.

No paid consultancy, no paid advisory boards, no shares, no other
interests in companies.

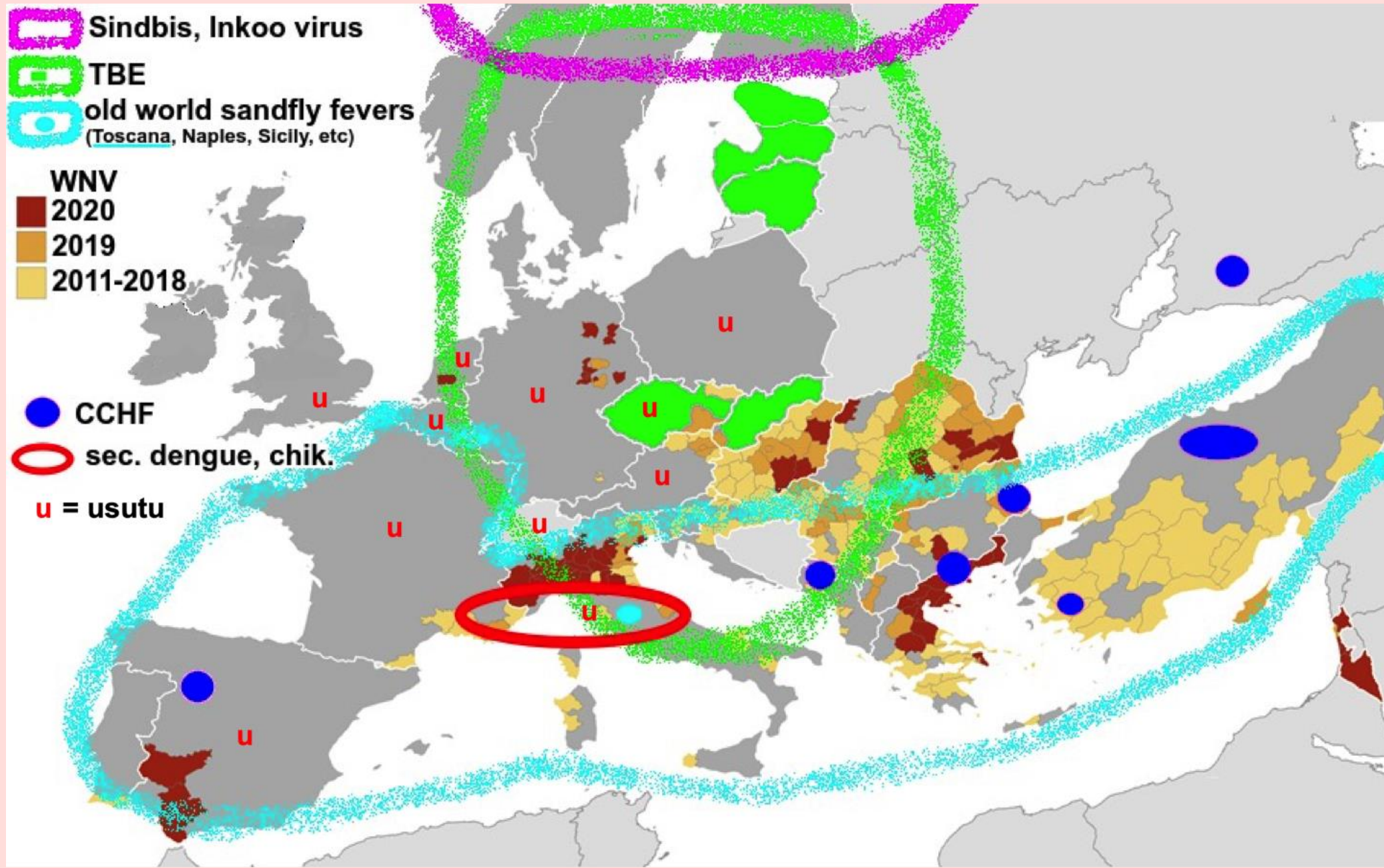
Impact of t.t. arboviruses: determinants

- 1) Presence of arboviruses:
 - all over the world
 - >100 'human' species

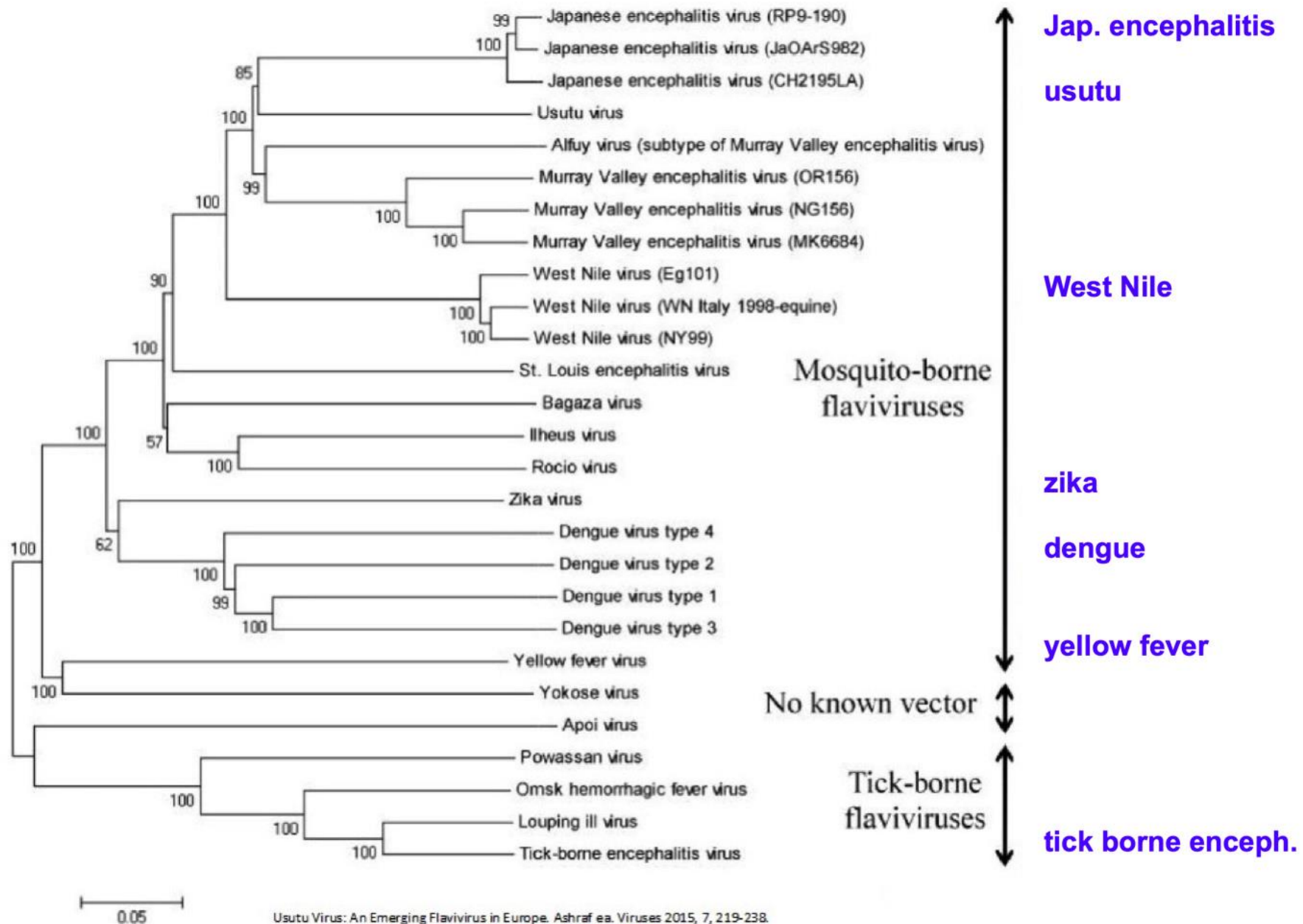
2)

3)

for example: human arboviruses in Europe



for example: human flaviviruses



Impact of t.t. arboviruses: determinants

1) Presence of arboviruses:

- all over the world
- >100 'human' species

2) Viremia in blood donors:

- no chronic infections
- short window period
- often asymptomatic



3)

virus

natural course of infection

Jap. encephalitis



usutu



West Nile



zika



dengue



yellow fever



TBE



chikungunya



proportion of cases:

asymptomatic infection

disease

fatal disease

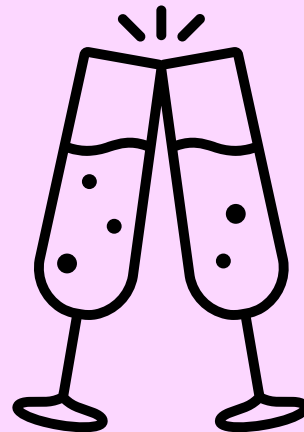
Impact of t.t. arboviruses: determinants

- 1) Presence of arboviruses:
 - all over the world
 - >100 'human' species
- 2) Viremia in blood donors:
 - no chronic infections
 - short window period
 - often asymptomatic
- 3) Transfusion into patient:
 - no infection?
 - infection, no disease
 - disease (WNV)

Transfusion-transmitted arboviruses: Update and systematic review

Ángel Giménez-Richarte  et al. Valencian Community Blood Transfusion Center, Valencia, Spain

20 years of transfusion transmitted arboviruses !



Transfusion-transmitted arboviruses: Update and systematic review

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How many transfusion-infected patients did our Spanish colleagues find in literature?

- 1) 1-10
- 2) 10-100
- 3) 100-1000
- 4) > 1000

Transfusion-transmitted arboviruses: Update and systematic review

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How many transfusion-infected patients did our Spanish colleagues find in literature?

1) 1-10

2) **74**

3) 100-1000

4) > 1000

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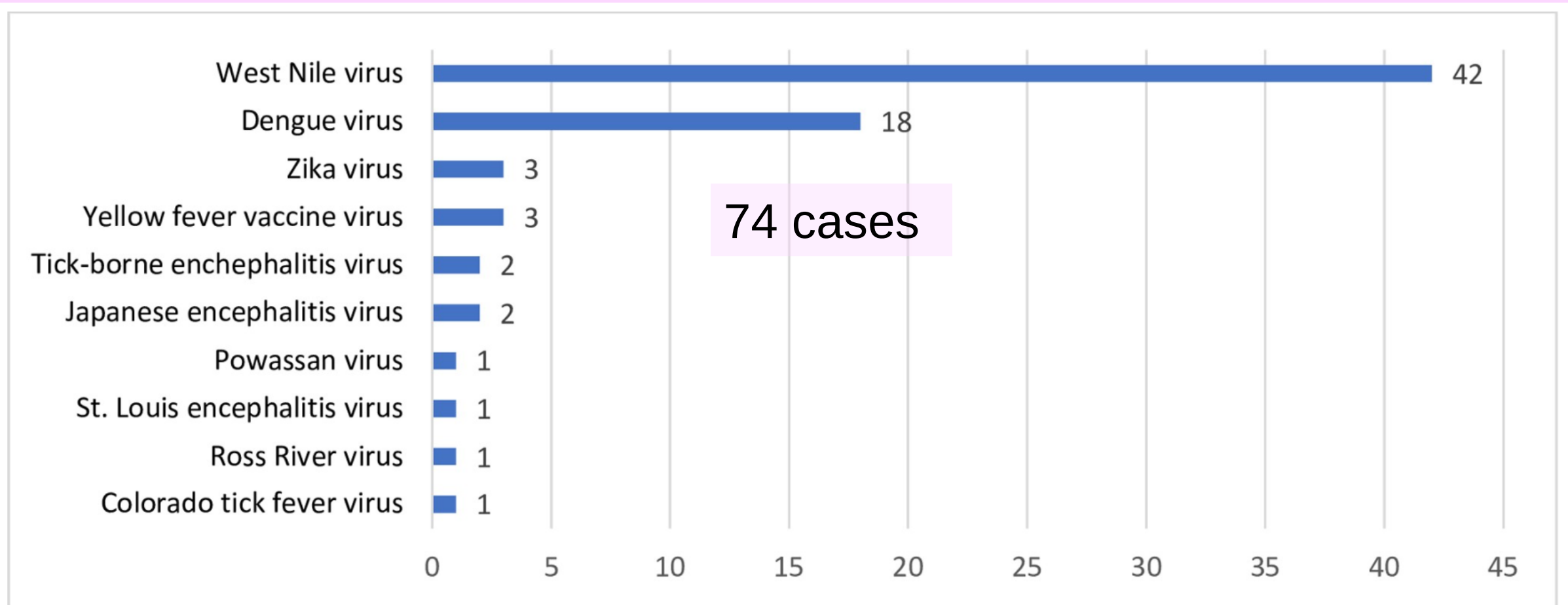


Fig 2. Reported transfusion-transmitted arbovirus cases.

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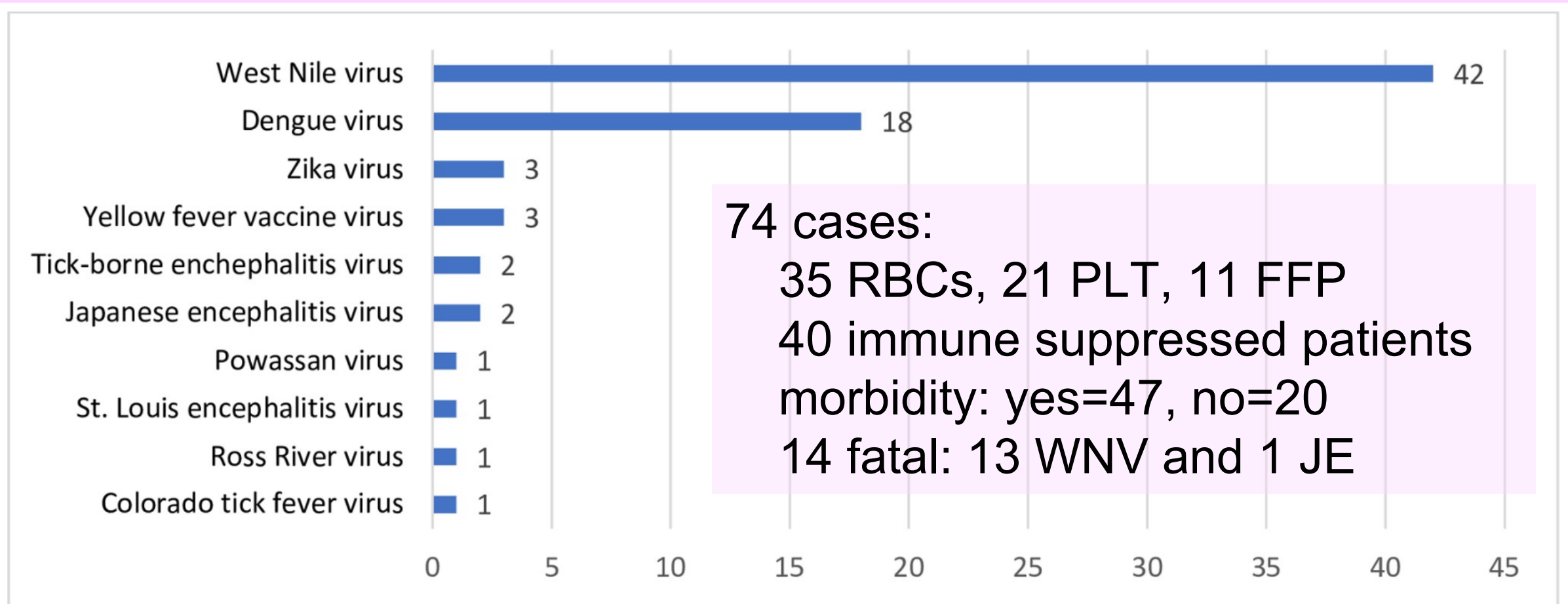


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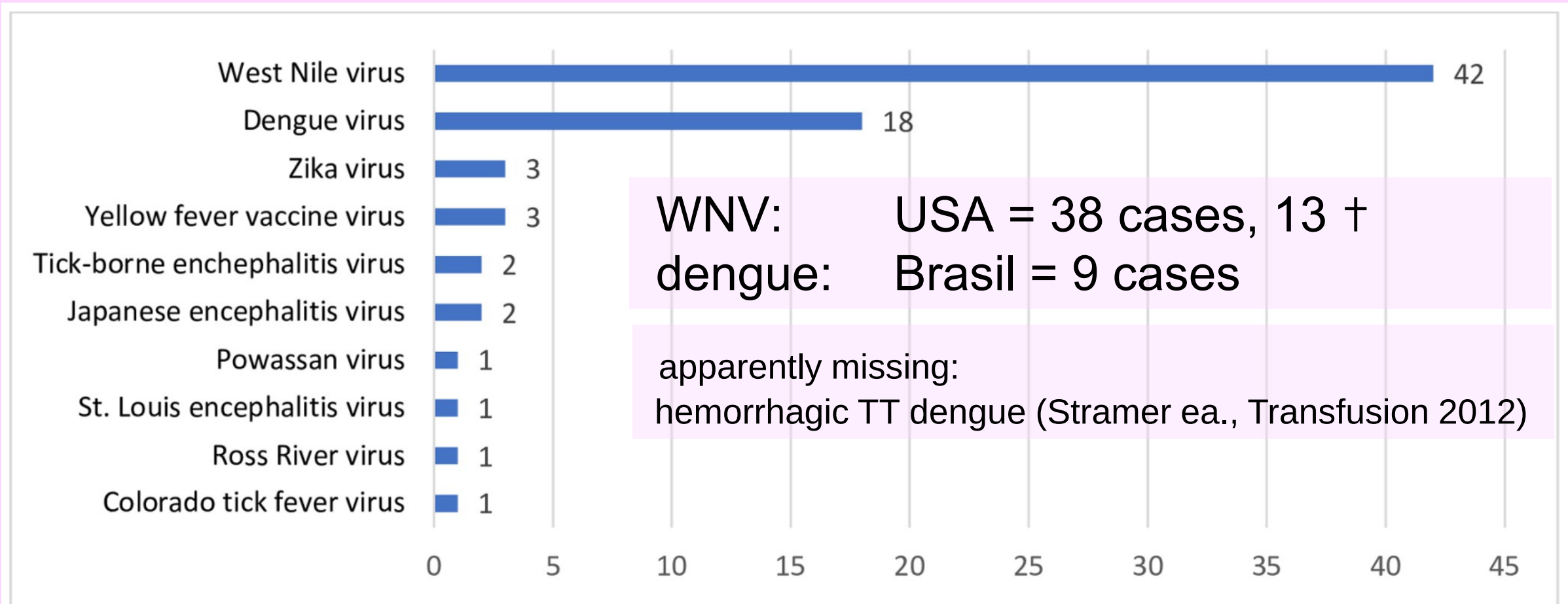


Fig 2. Reported transfusion-transmitted arbovirus cases.

The significance of mosquito saliva in arbovirus transmission and pathogenesis in the vertebrate host

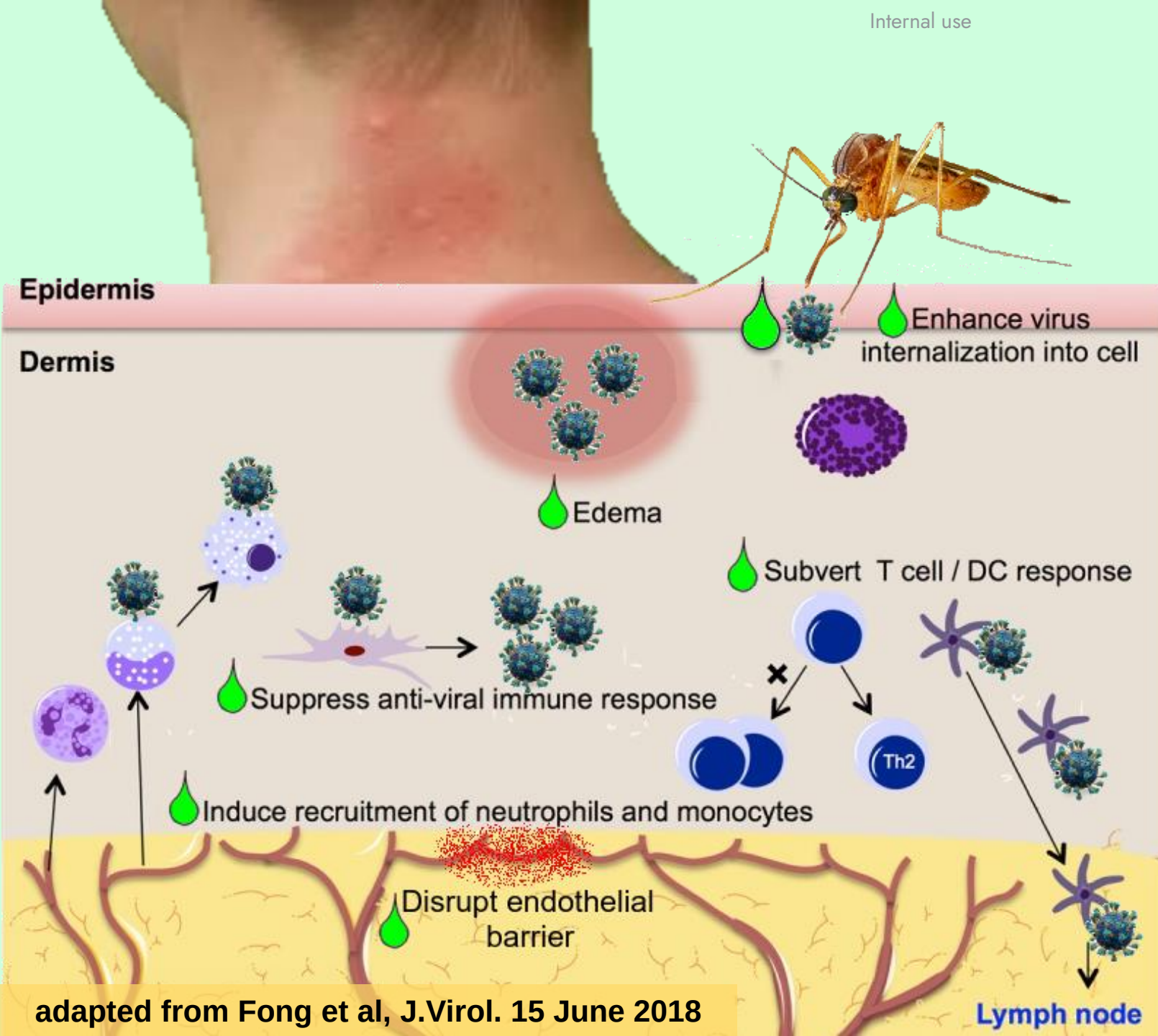
Imke Visser¹, Constantianus J.M. Koenraadt², Marion P.G. Koopmans¹, Barry Rockx^{1†}

Several in vitro studies demonstrate:

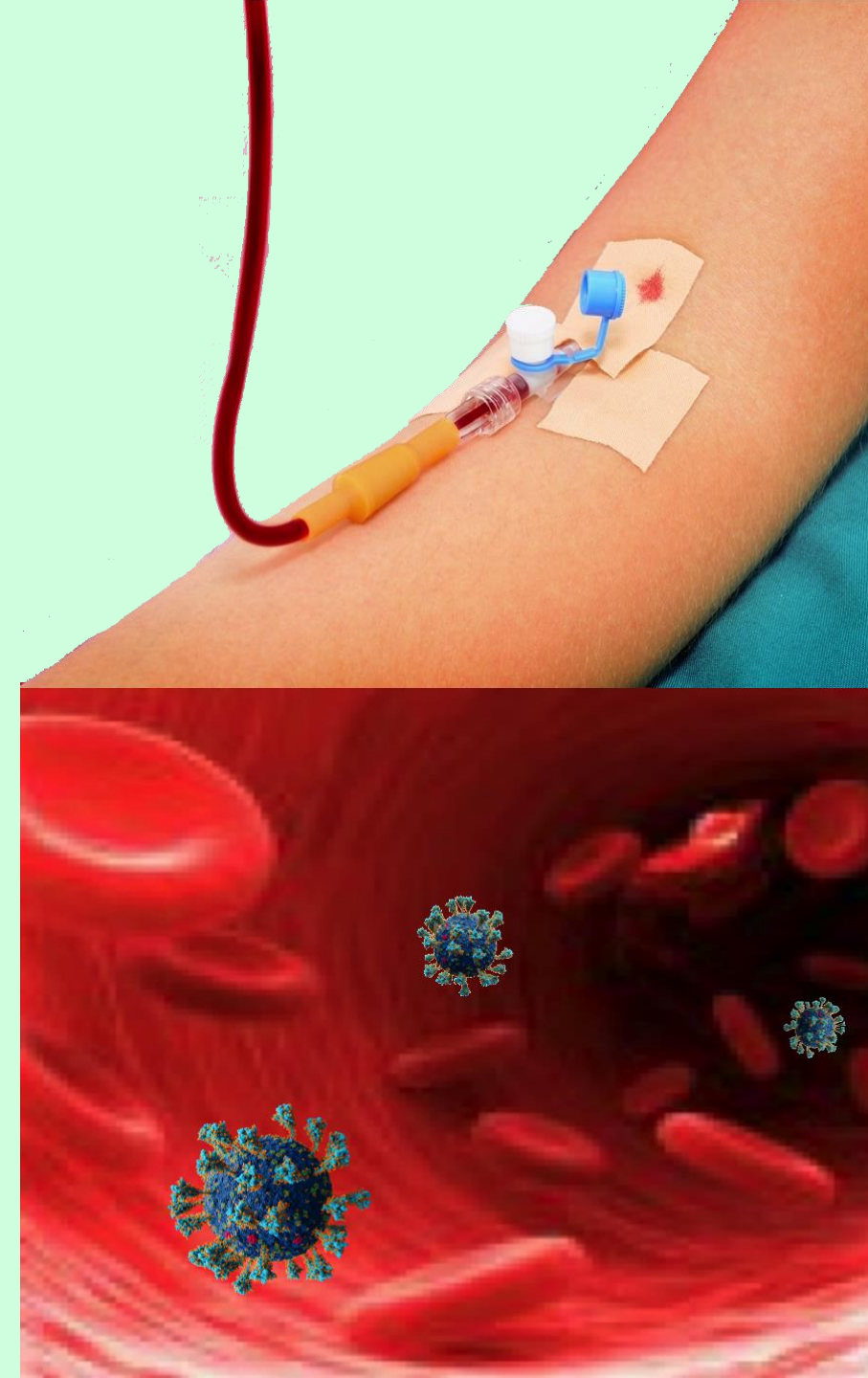
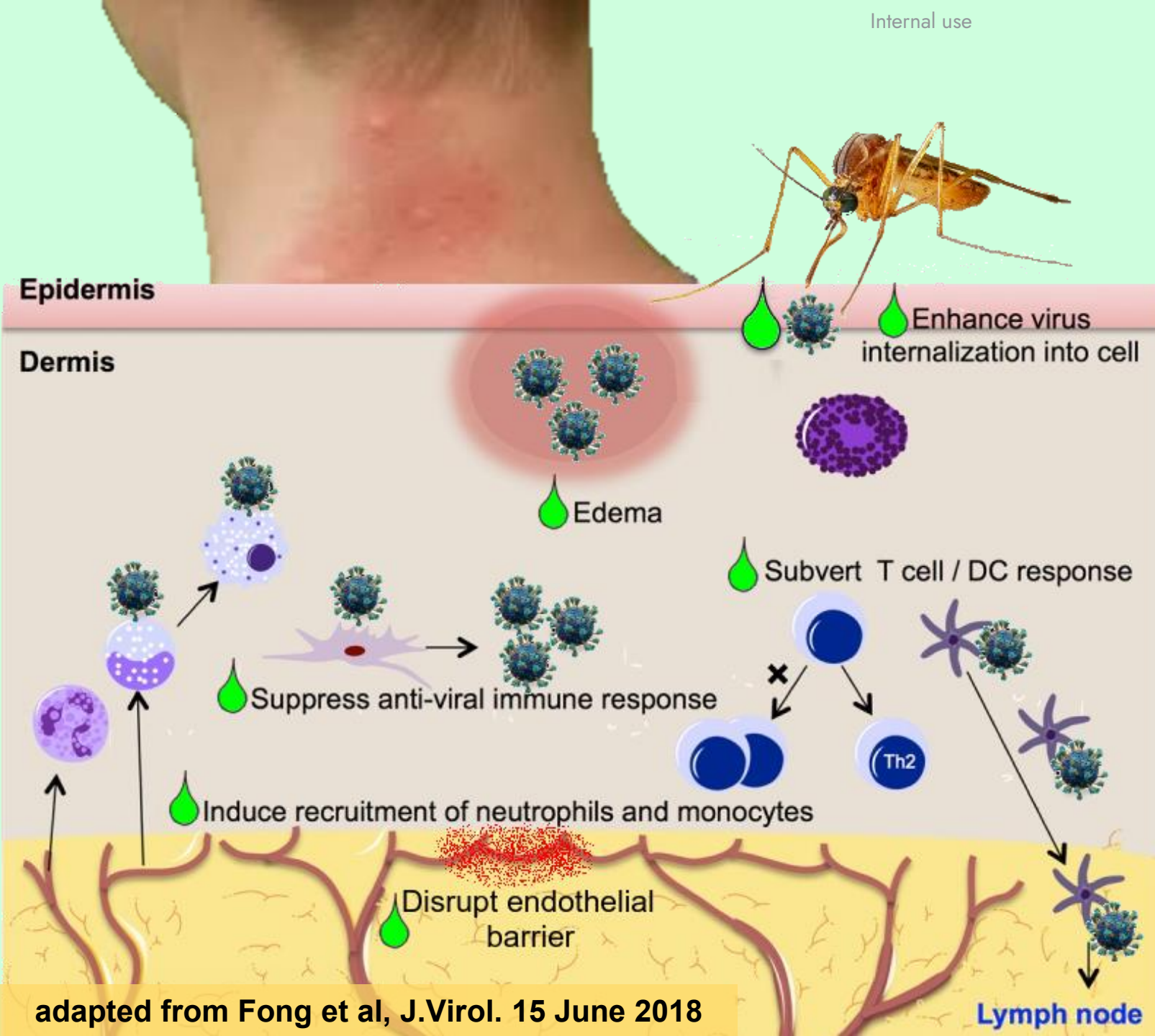
- mosquito saliva enhances or prolongs arbovirus viremia

Mechanisms:

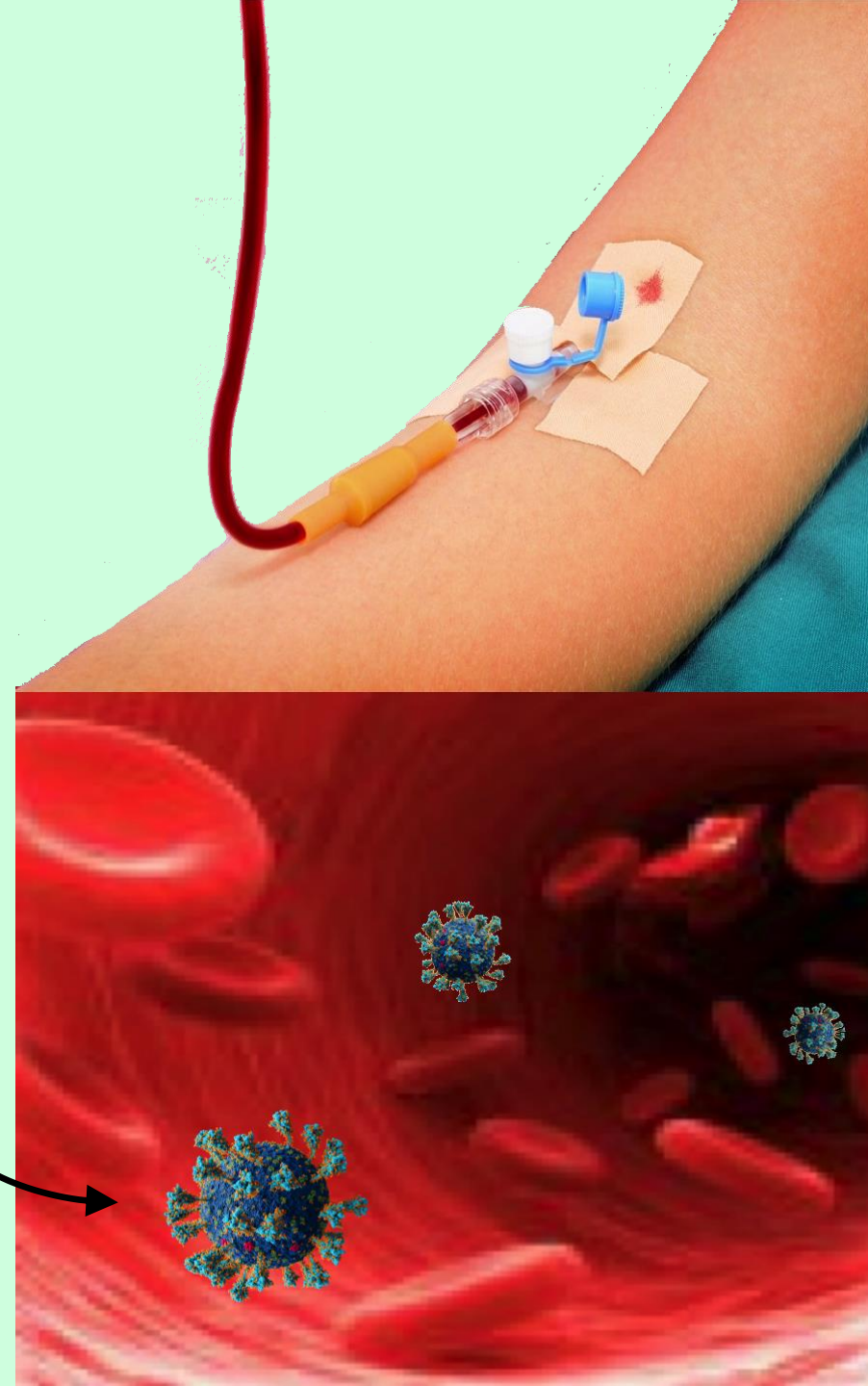
- local polarization towards Th2 immune response
- increased permeability of dermal endothelium
- influx of virus-susceptible immune cells



Internal use



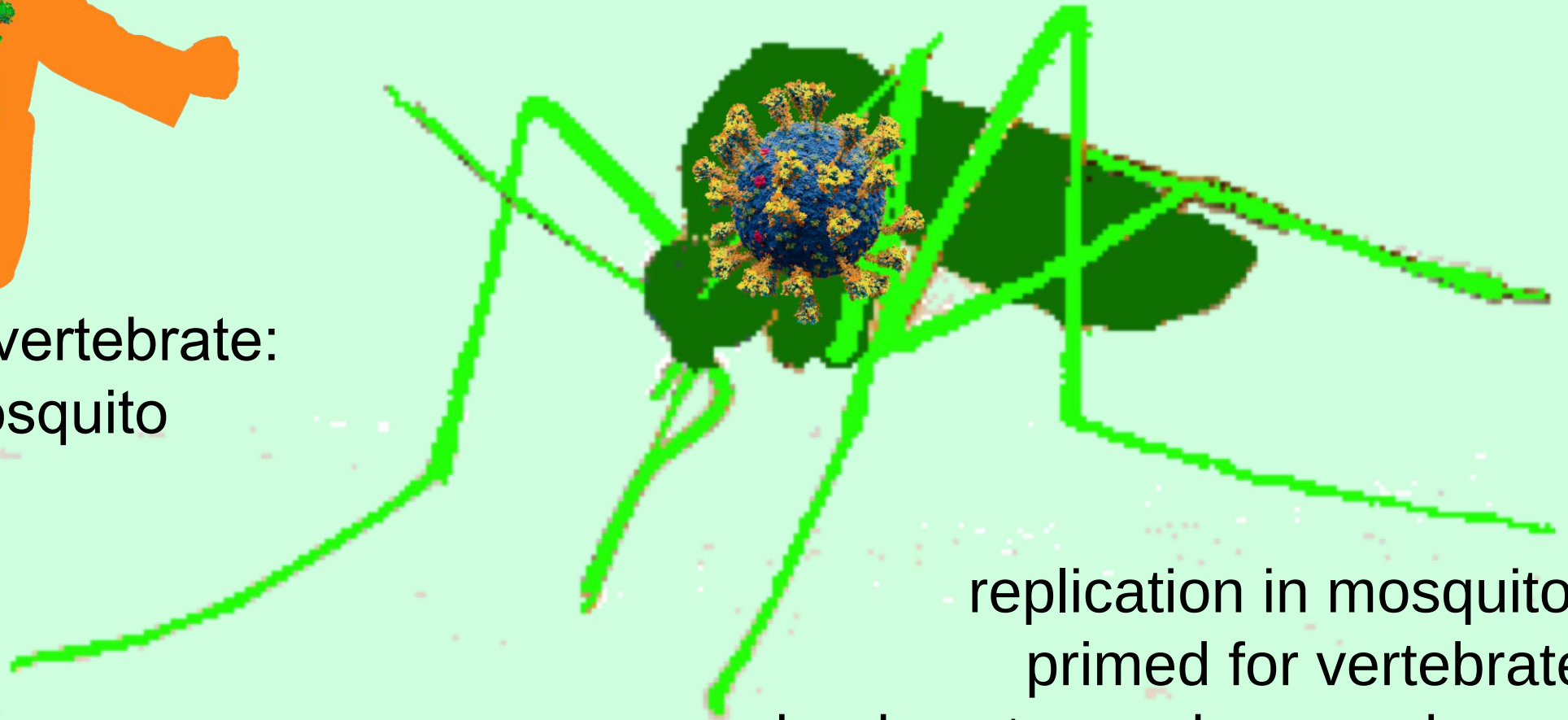
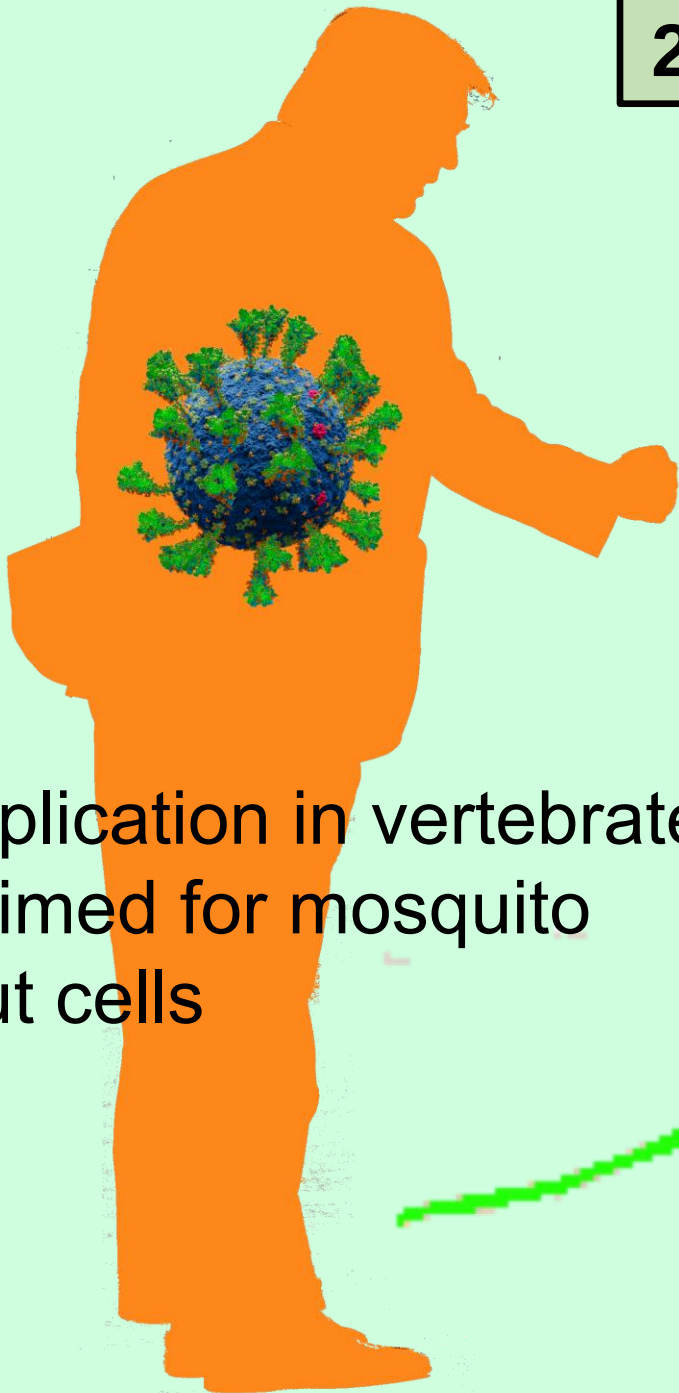
**hoping to be sucked up,
looking for epithelial cell
in gut of a mosquito**



2 phenotypes of an arbovirus ?

wild
hypothesis

replication in vertebrate:
primed for mosquito
gut cells



replication in mosquito:
primed for vertebrate
dendrocytes and macrophages

virus	natural course of infection	impact of transfusion
Jap. encephalitis		⊕
usutu		●
West Nile		⊙
zika		●
dengue		⊙
yellow fever		⊕
TBE		●
chikungunya		●

impact of transfused
arbovirus:

negligible
(severe) disease
fatal disease

Conclusion

Transfusion transmitted **WNV** is a significant threat to patients.

Transfusion transmitted **dengue** seems a significant threat,
but only against background of a large outbreak?

Other TT arbovirus accidents are sporadic.
(absence of evidence $\neq$ evidence of absence).
Risk of mosquito bites overshadows risk of transfusion.

Final remark

soon:

2 solutions for transfusion transmitted arboviruses ?

pan-arbovirus NAT

pathogen reduction for all blood components



Thank you

Blood-borne infections team at Sanquin:

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Thijs van de Laar

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Ed Slot

Ryanne Lieshout-Krikke

Marco Koppelman

Hans Zaaier