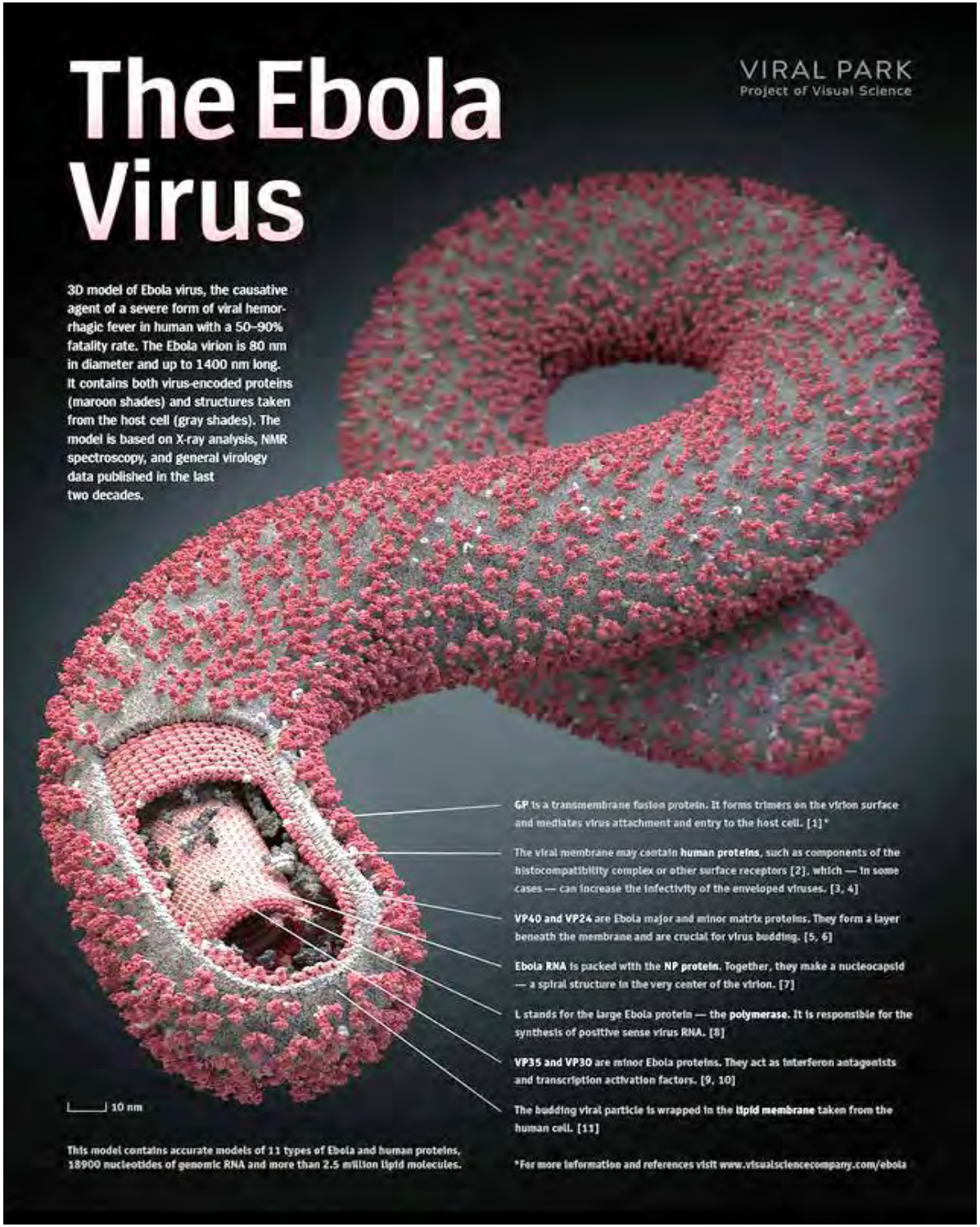
The Ebola Virus

VIRAL PARK
Project of Visual Science



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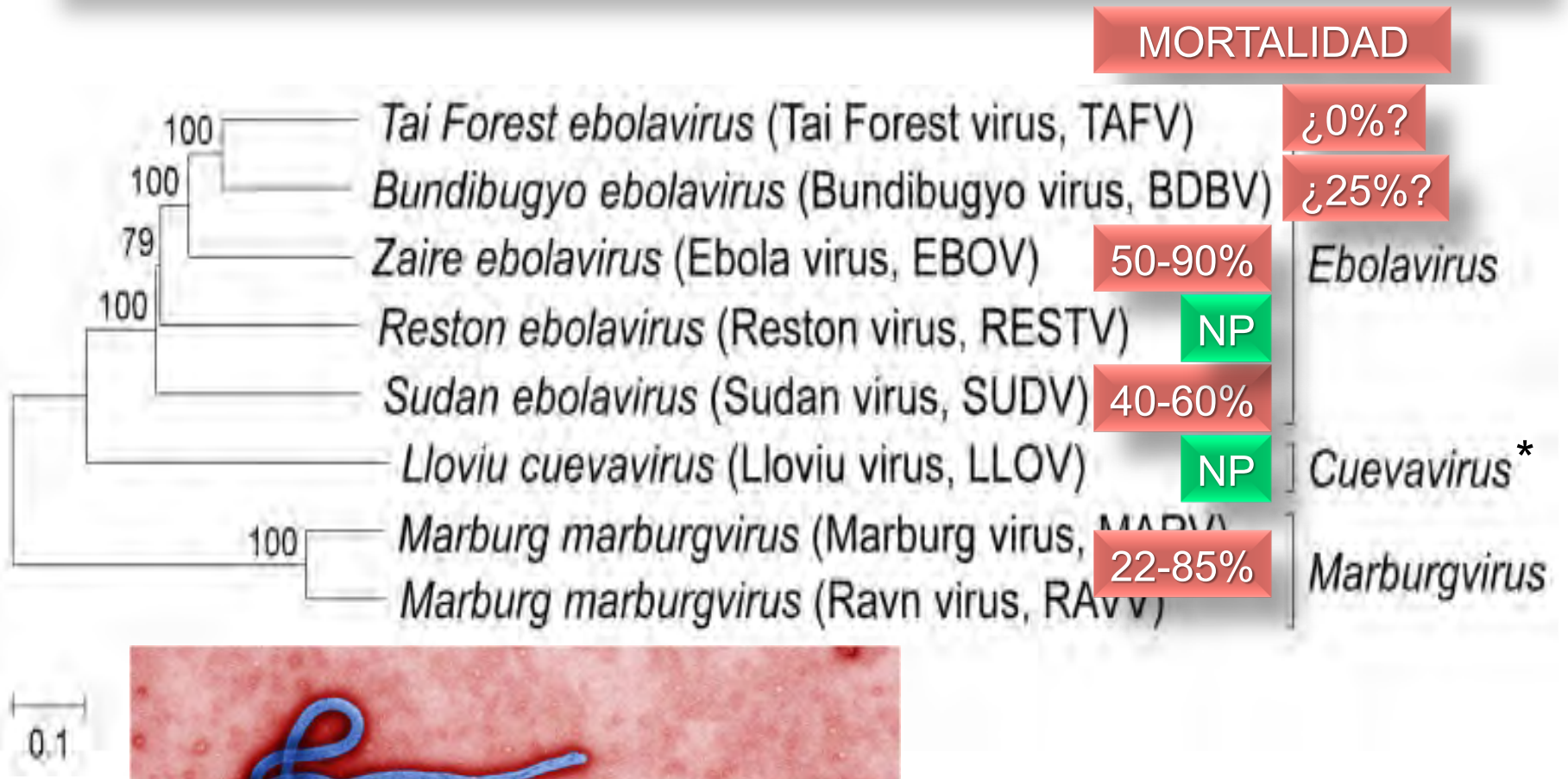
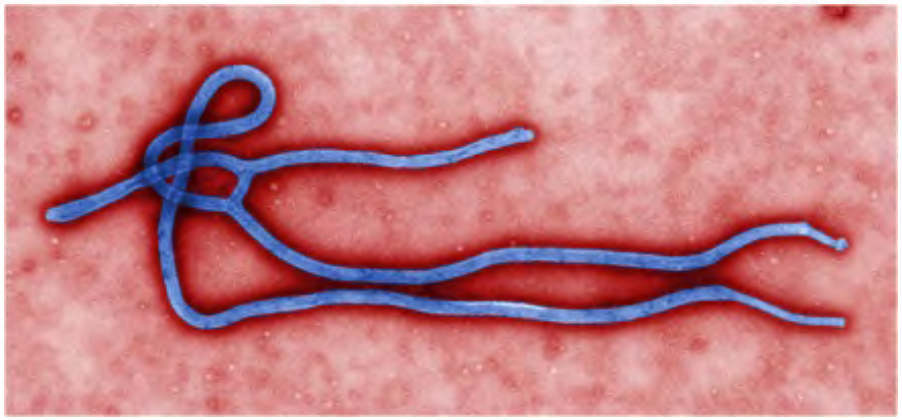
Clasificación de los Filovirus





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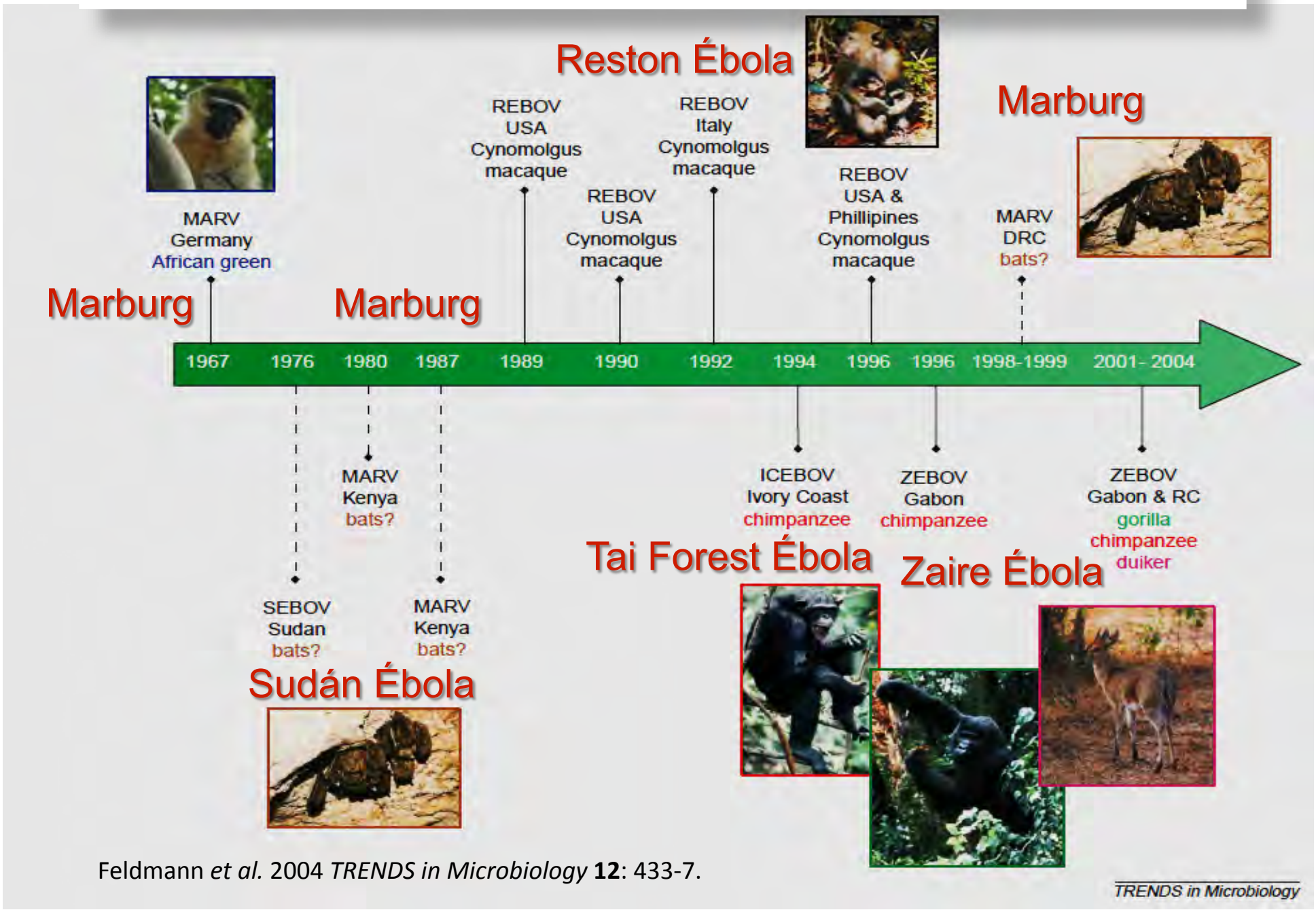
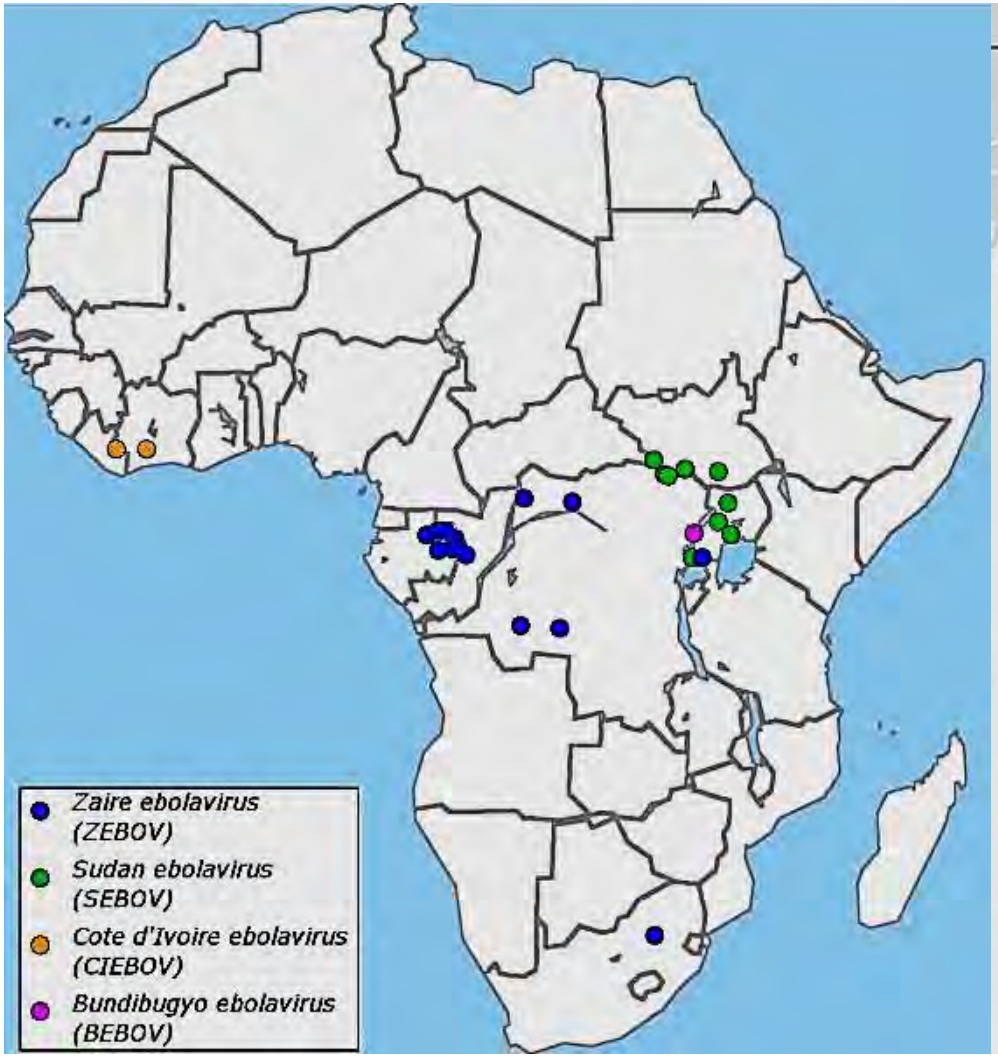
Nakayama and Saijo. 2013. *Front. Microbiol.* **4**:267. doi: 10.3389/fmicb.2013.00267
*Negredo *et al.*, 2011. *PLoS Pathog* **7**: e1002304.

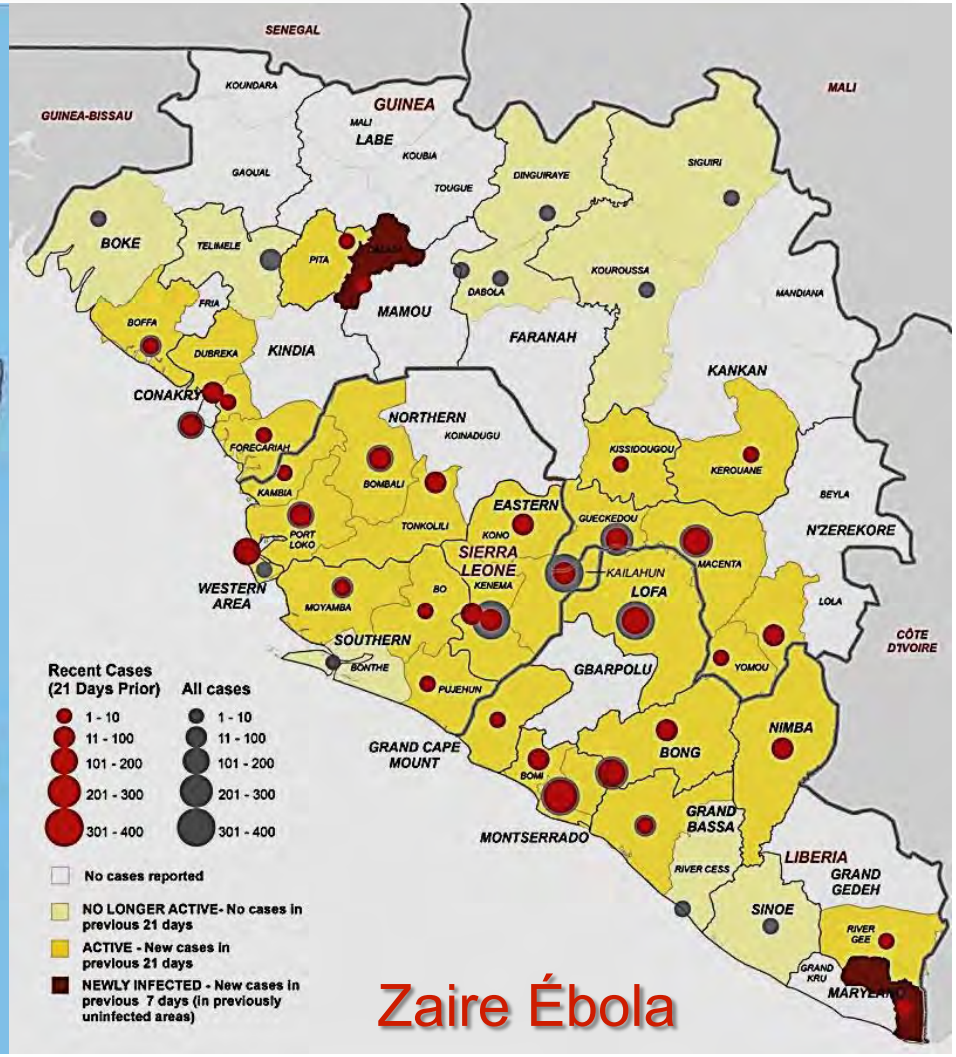
Descubrimiento de los Filovirus



Feldmann *et al.* 2004 *TRENDS in Microbiology* **12**: 433-7.

Virus Ébola en África





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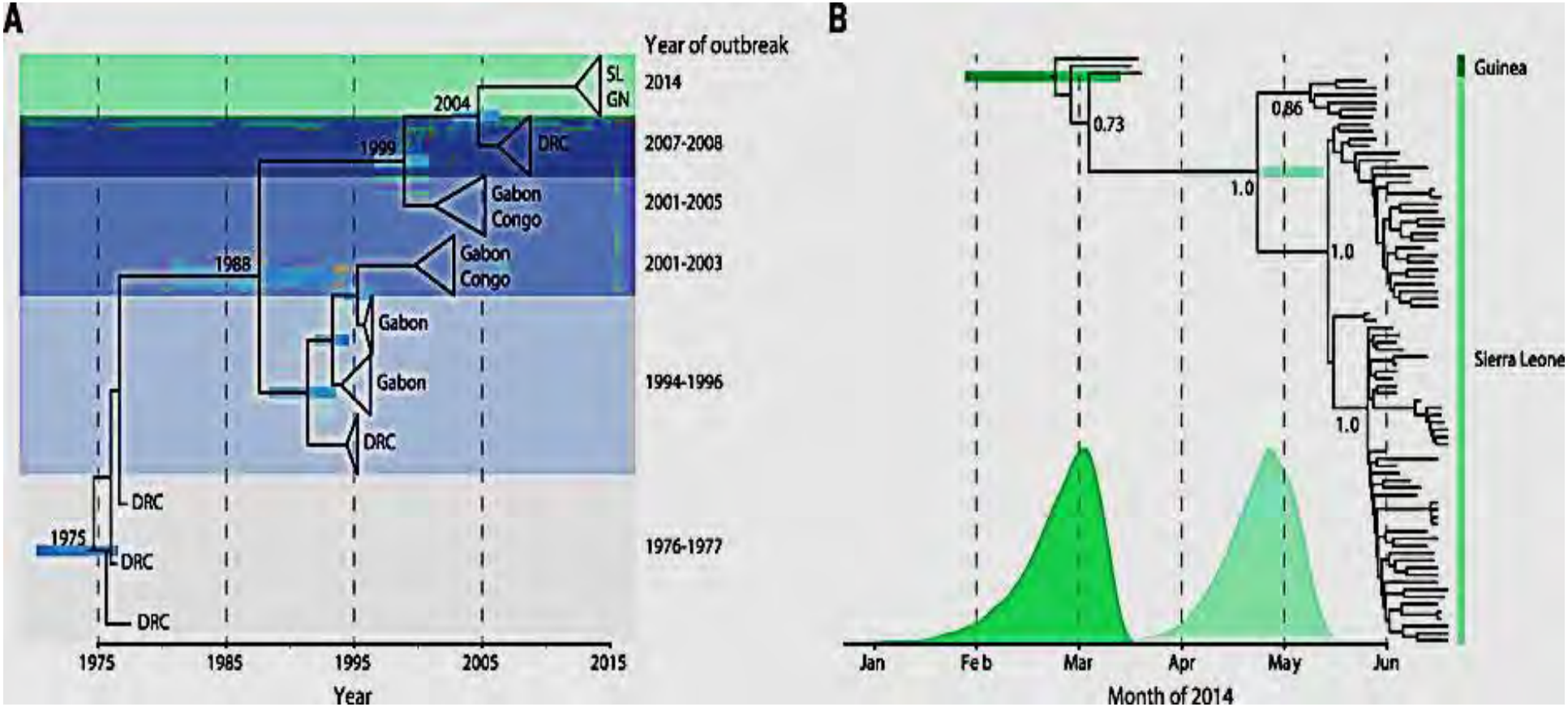
WHO Ebola Response Team. 2014. *N Engl J Med* **371**:1481-95.

Evolución del virus Ébola Zaire



Gire *et al.* 2014. *Science* **345**: 1369-72

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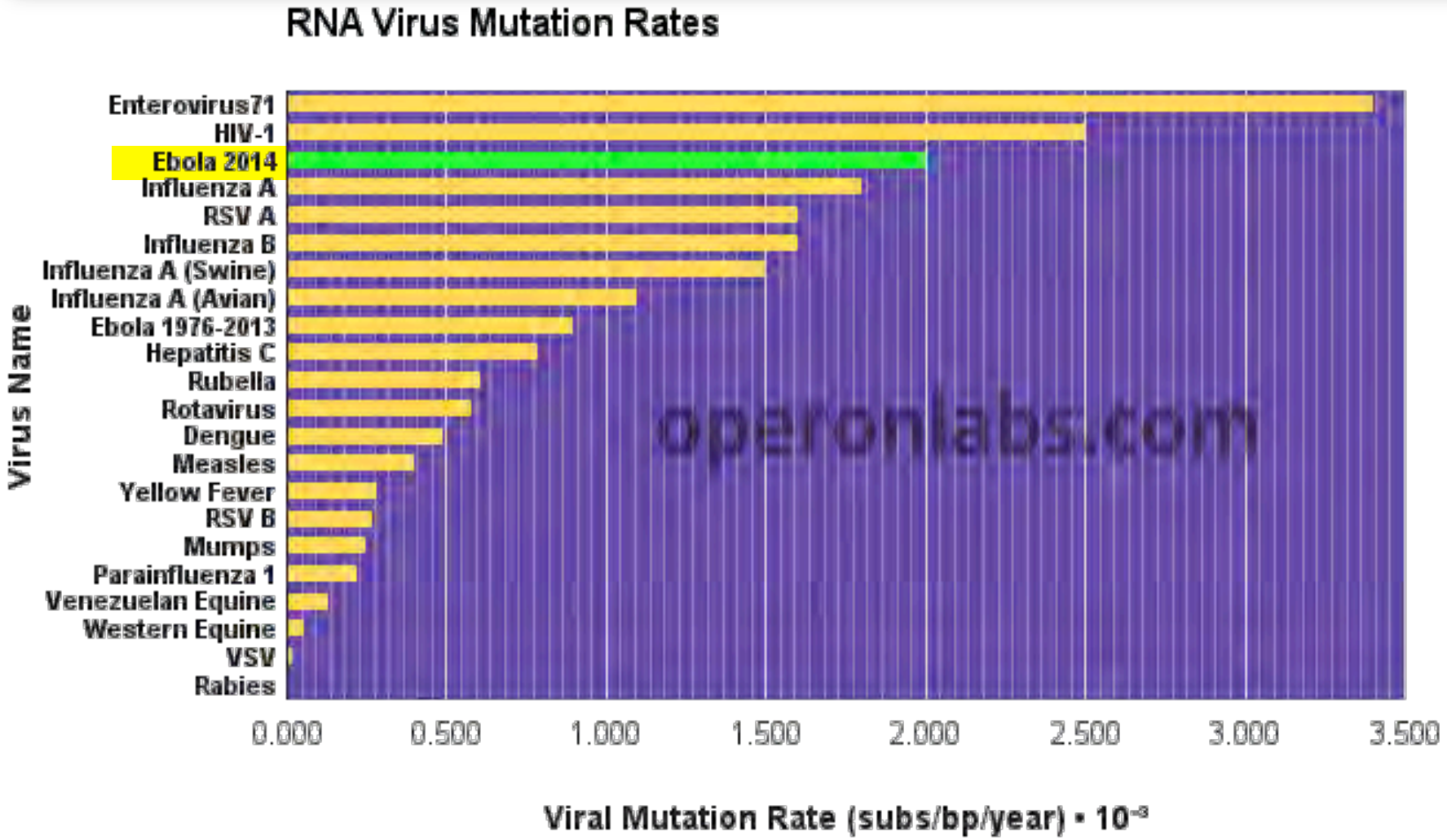
Evolución del virus Ébola Zaire



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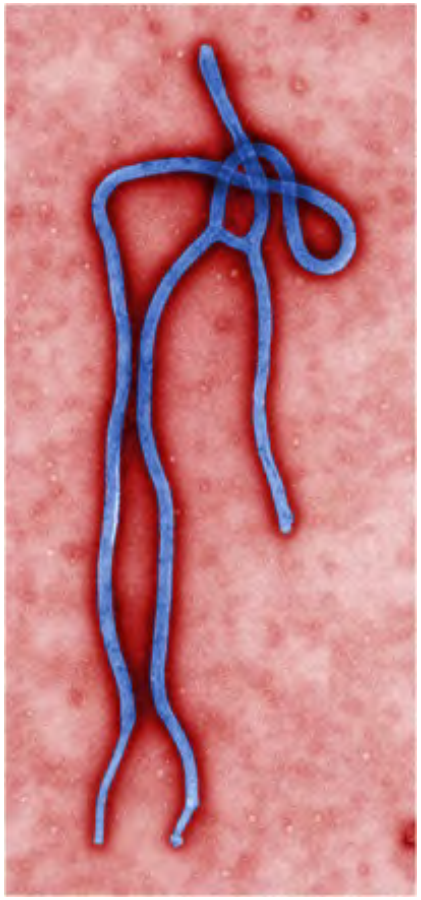
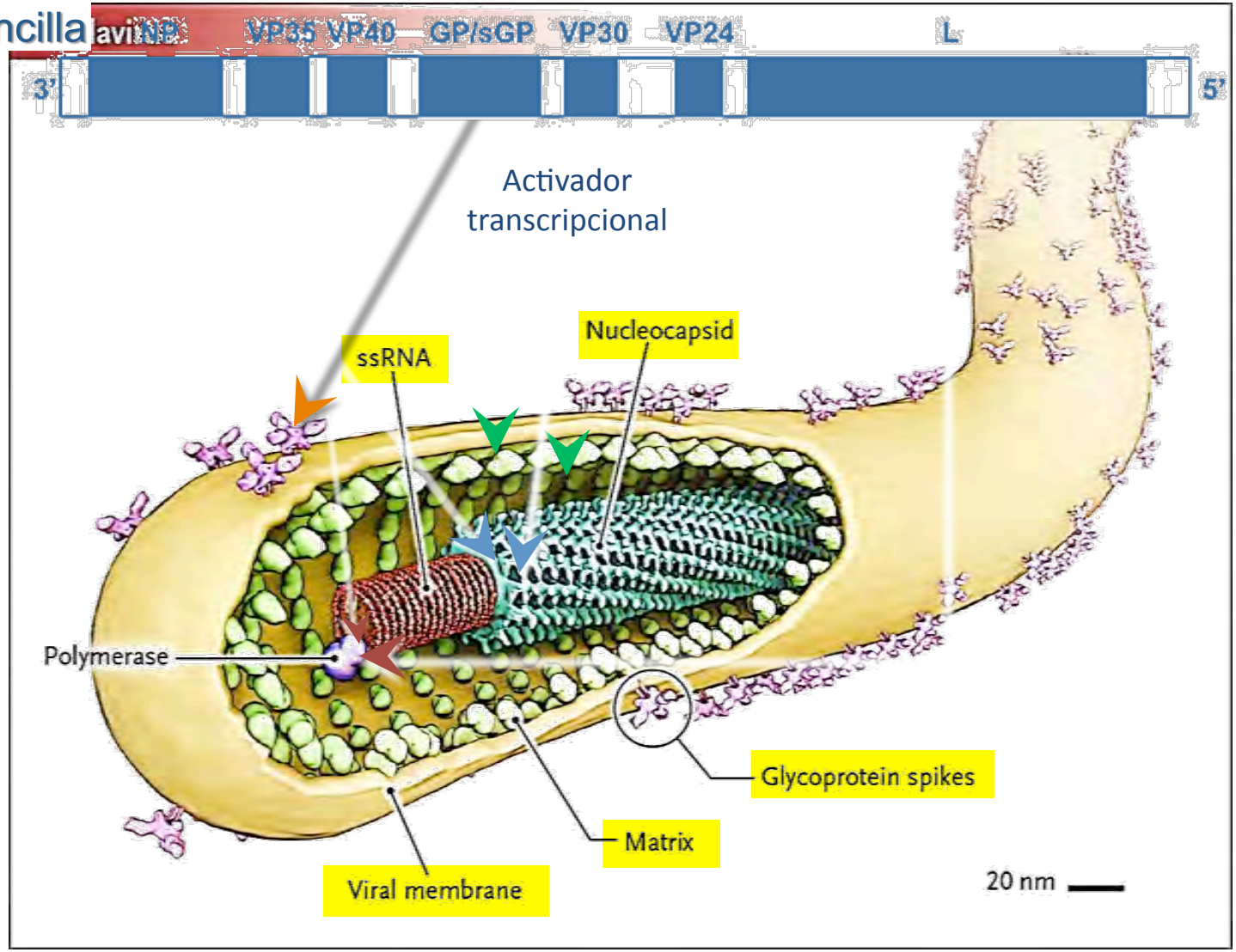
El virus Ébola: Filovirus

RNA cadena sencilla





Feldmann H. 2014. *N Engl J Med* **371**:1375-8.

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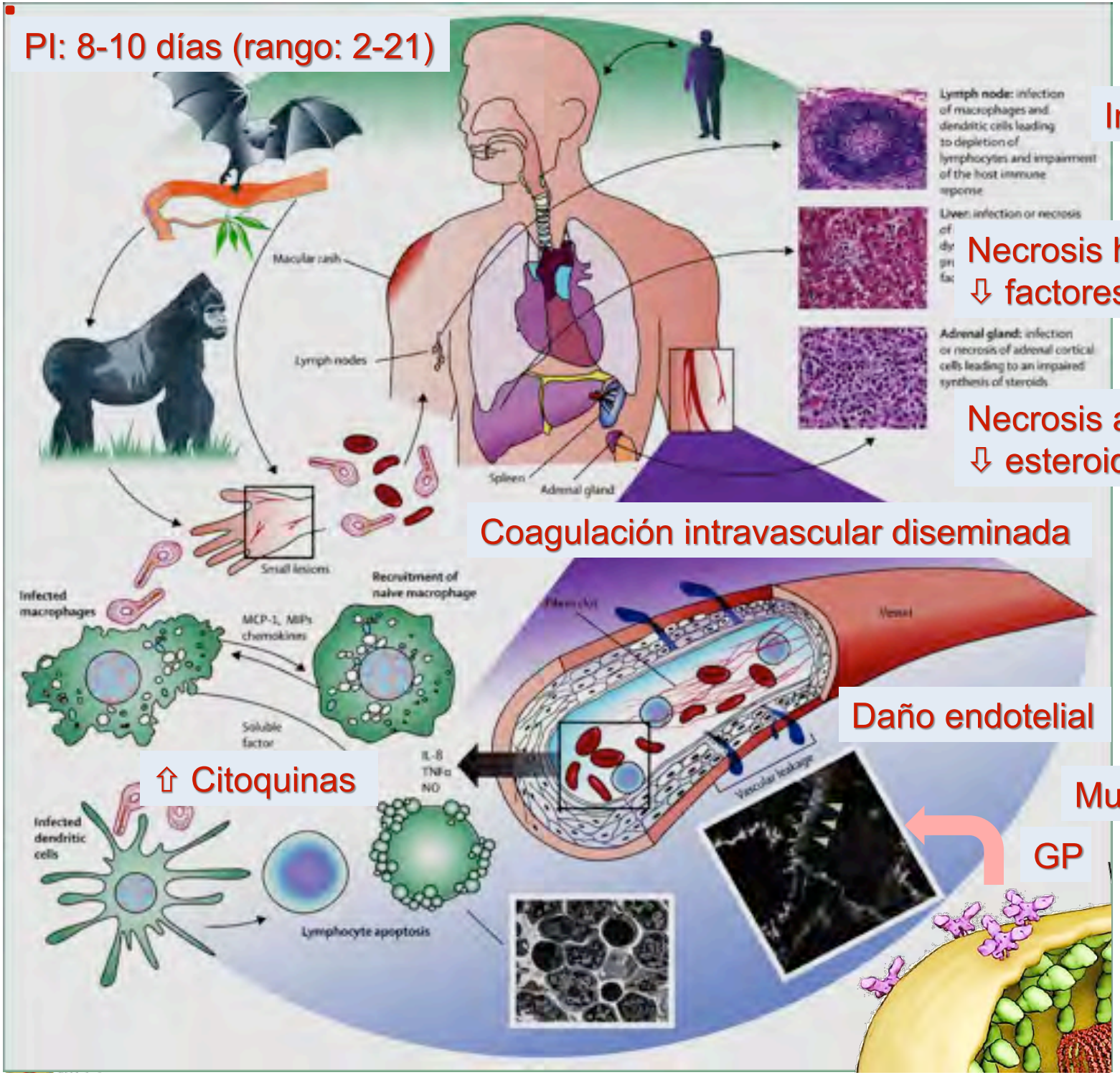
PI: 8-10 días (rango: 2-21)



Inmunosupresión

Necrosis hepática,
⇩ factores de coagulación

Necrosis adrenocortical,
⇩ esteroides

Coagulación intravascular diseminada

Daño endotelial

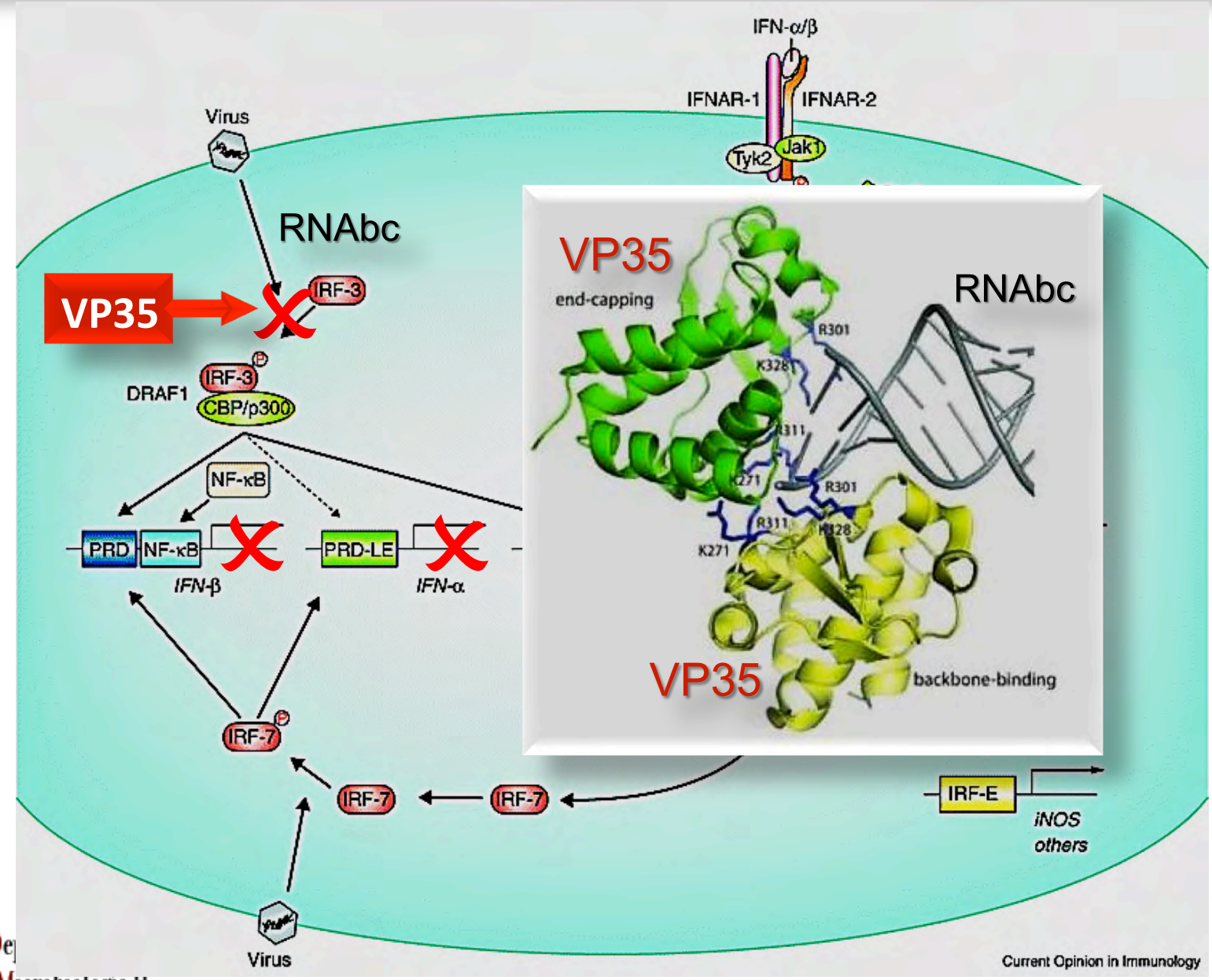
⇧ Citoquinas

Muerte: días 6-14

GP

Feldmann & Geisbert, 2011. *Lancet* **377**: 849–62.

El virus Ébola inhibe el sistema del interferón



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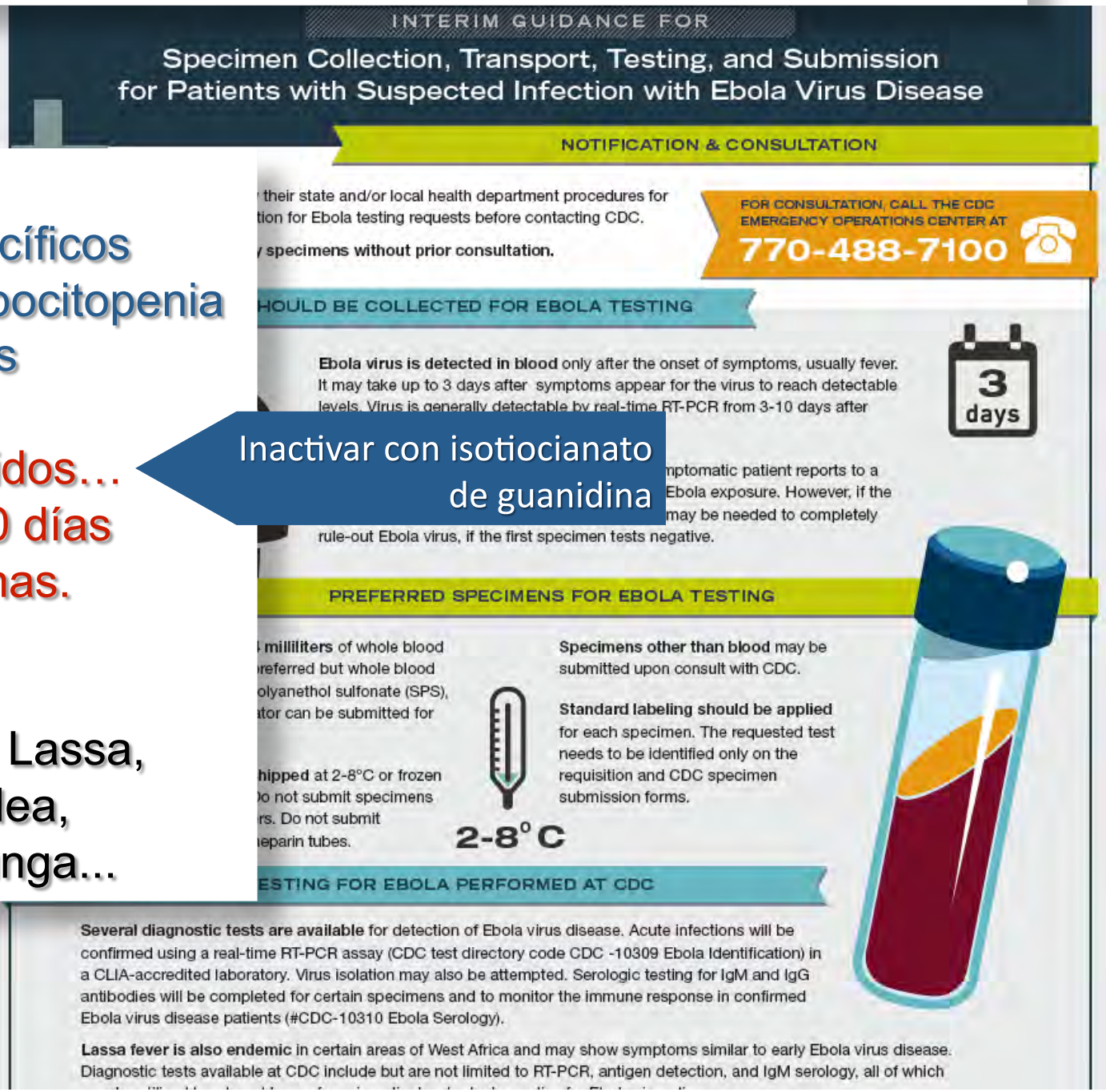
Hastie *et al*. 2012. *Curr Opin Virol* **2**:151–6; Reid *et al.* 2006. J Virol 80:5156–67.

Diagnóstico de la fiebre por Ébola

- Epidemiología
- Síntomas inespecíficos
- Linfopenia, trombocitopenia
- ⇧ Transaminasas
- RT-PCR
  - Sangre, fluidos…
  - + a los 3-10 días post-síntomas.
- IgM

Descartar fiebre de Lassa, malaria, fiebre tifoidea, dengue, Chikungyunga...



Inactivar con isotiocianato de guanidina

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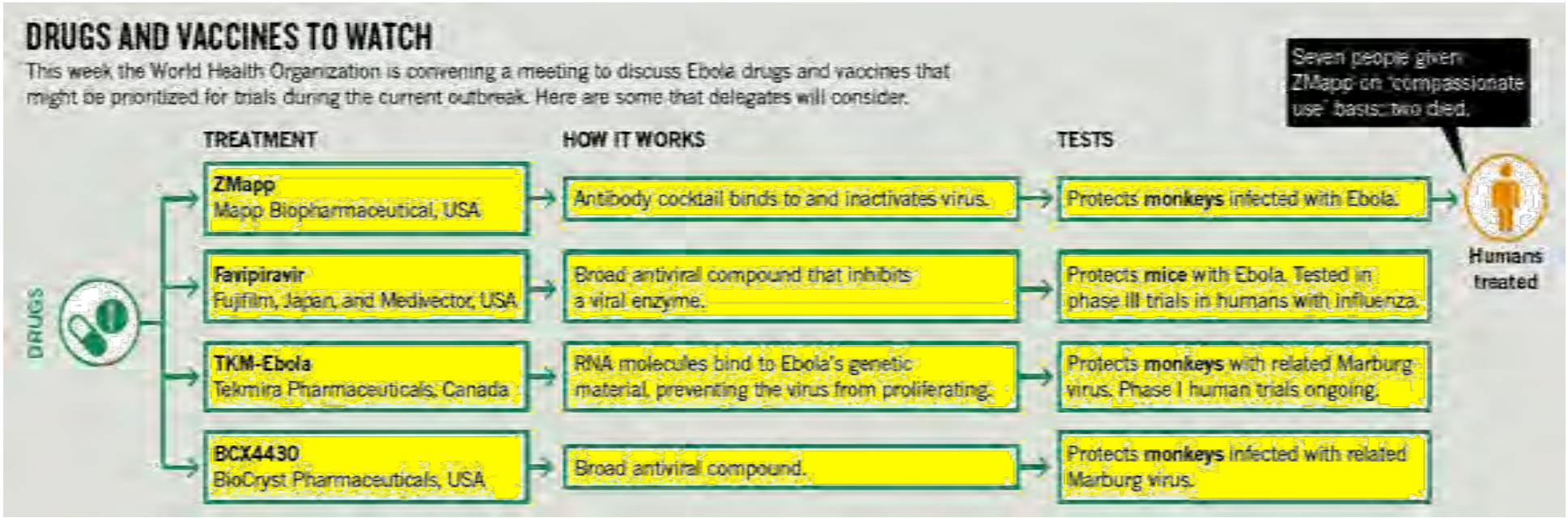
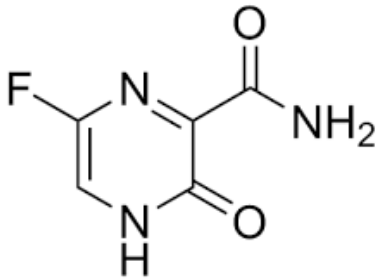
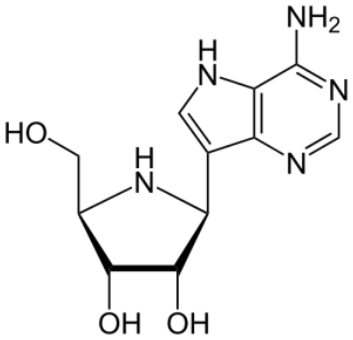
Tratamiento

Rehidratación, rNAPc2, proteína C-activada (PCA)…





Favipiravir (T-507)



BCX4430
(análogo de adenosina)

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Prevención

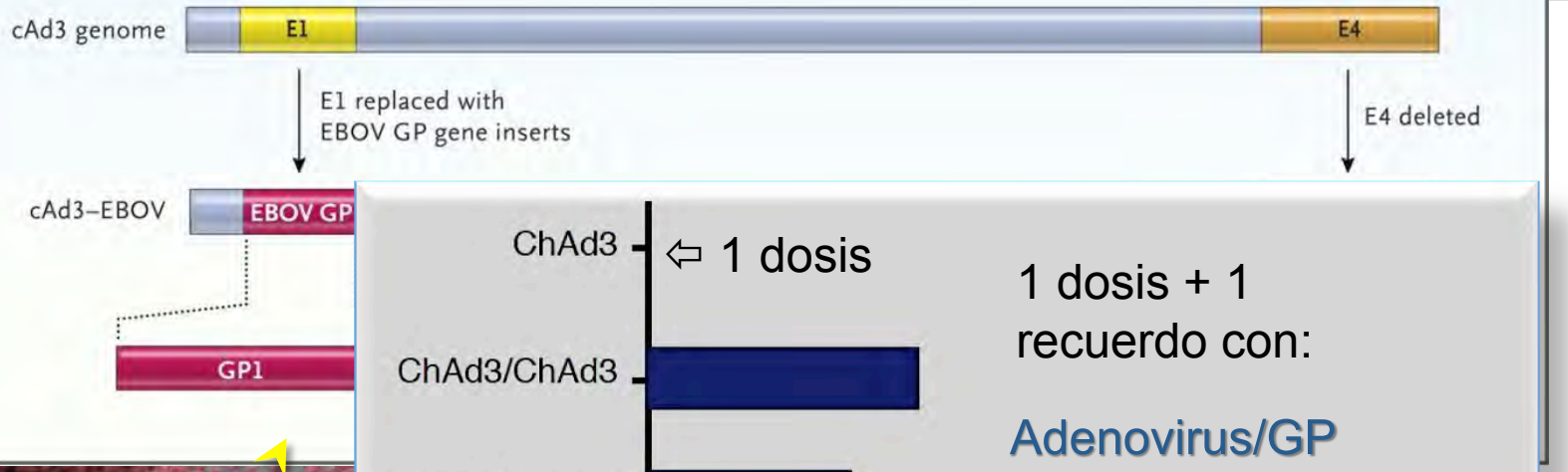
VACCINES

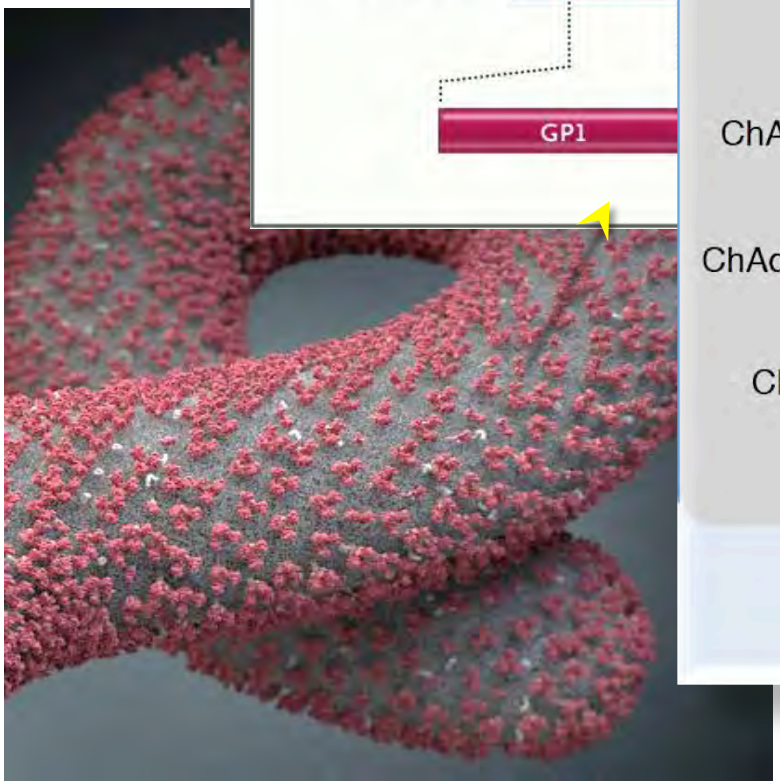
NIAID/GSK Ebola vaccine
US National Institute of Allergy and Infectious Diseases and GlaxoSmithKline, UK

Chimpanzee virus delivers segments of genetic material from two Ebola virus species.

Phase I clinical trials imminent.

B NIAID/GSK cAd3 Ebola vaccine





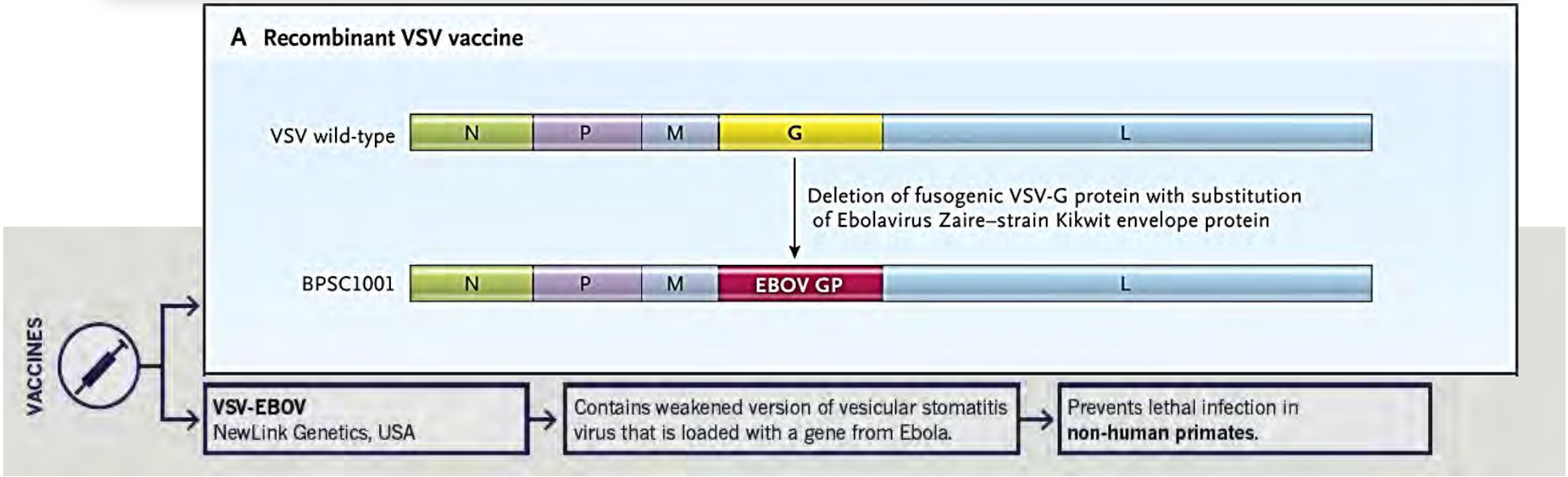
1 dosis + 1 recuerdo con:

Adenovirus/GP

% supervivencia a los 10 meses de macacos (4/grupo), tras inoculación de 1000 UFP de Ébola Zaire

Stanley *et al*. 2014. *Nature Med*. **20**:1126-9

Prevención



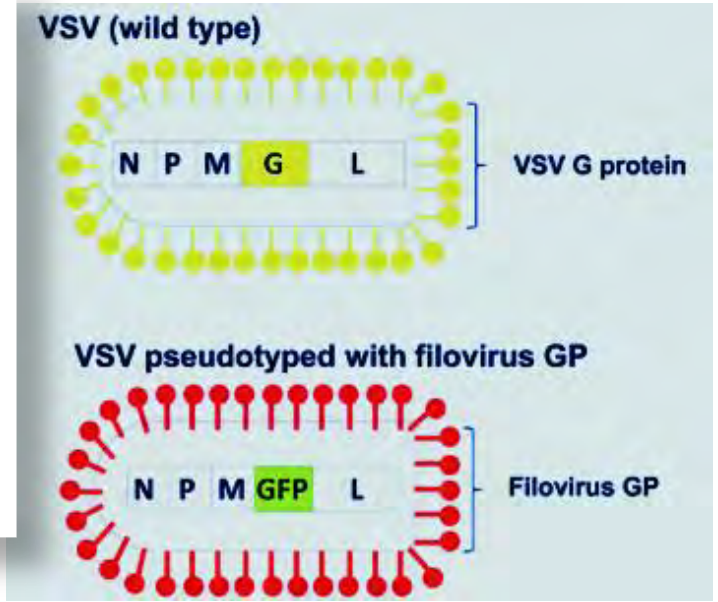
1 dosis:

- 100% protección al año (6 macacos inoculados con Marburg)
- Posible uso IM o intranasal

1 dosis post-exposición:

- 24h ~ 80%
- 48h ~ 30%

Mire *et al.* 2014. *PLoS ONE* **9**(4): e94355



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Modelos animales

- Ratón:
  - Cepa Zaire adaptada
  - Zaire silvestre, sólo en ratones SCID
  - No afecta coagulación
- Cobaya:
  - Cepa Zaire adaptada
  - Algunas alteraciones coagulación
  - Mal modelo para estudios inmunitarios
- Hamster sirio
  - Buen modelo de patogénesis
  - Cepa adaptada a ratones
  - Mal modelo para estudios inmunitarios
- Primates (Macacos, Monos verdes, Babones)
  - Buen modelo de patogénesis
  - 100% letalidad con cepas humanas
  - Dosis letal: ≥10 ufp/IM-SC; 400 ufp/aerosol

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Nakayama and Saijo. 2013. *Front. Microbiol.* **4**:267. doi: 10.3389/fmicb.2013.00267

Enfermedad del Ébola (Enfermedad del virus del Ébola)

Idioma: Español

SIGNOS Y SÍNTOMAS

Los síntomas pueden aparecer entre 2 y 21 días de la exposición al virus del Ébola...

TRANSMISIÓN

Se propaga a través de los líquidos corporales de una persona con la enfermedad del Ébola o que ha muerto a causa de ella...

RIESGO DE EXPOSICIÓN

Durante los brotes de la enfermedad del Ébola, quienes corren mayor riesgo son los trabajadores del sector de la salud y los familiares...

BROTES

PARA TRABAJADORES DEL SECTOR DE LA SALUD

Guía actualizada para controlar o prepararse para la enfermedad del Ébola en los EE. UU. y el exterior...

PREVENCIÓN

El personal de atención médica debe estar listo para tomar las precauciones de aislamiento...

DIAGNÓSTICO

Diagnosticar la enfermedad del Ébola en una persona que la ha contraído hace pocos días es difícil...

TRATAMIENTO

El tratamiento de la enfermedad del Ébola presenta

Brote en África Occidental en 2014

La epidemia 2014 de la enfermedad del Ébola es la más grande que se haya registrado y afecta a varios países de África Occidental. Dos casos importados, incluida una muerte, y dos casos de contagio a nivel local en trabajadores del sector de la salud se han reportado en los Estados Unidos. Los CDC y organizaciones asociadas están tomando medidas para evitar la propagación de la enfermedad del Ébola dentro de los Estados Unidos.

Última información de los CDC sobre el brote
Actualizado el 29 de octubre de 2014

Lo nuevo

29 de octubre de 2014: Cantidad de casos actualizada

28 de octubre de 2014: Infographic: Is it Flu or Ebola? [PDF - 1 page]

27 de octubre de 2014: Hoja informativa: Vigilancia de síntomas y control del movimiento para detener la propagación de la enfermedad del Ébola

Actualizado el 27 de octubre de 2014: Guía provisional para los EE. UU. sobre la vigilancia y el traslado de personas potencialmente expuestas al virus del Ébola

Actualizado el 27 de octubre de 2014: Definición de casos de la enfermedad del virus del Ébola (EVE)

27 de octubre de 2014: Factores de riesgo epidemiológico a considerar al evaluar a una persona con exposición al virus del Ébola.

25 de octubre de 2014: Identificar, aislar, informar: evaluación y control del departamento de emergencias para pacientes que se presentan con posibilidades de enfermedad del virus del Ébola

Lo nuevo (continuación) >

Cuando saltaron las primeras alarmas por el brote de Ébola el pasado marzo, nuestros equipos acudieron de inmediato a los países afectados en África occidental.

En Médicos Sin Fronteras, contamos con una larga experiencia en la lucha contra el Ébola y otras fiebres hemorrágicas, ya que hemos intervenido en prácticamente todos los brotes de los últimos 20 años.

Actualmente, más de 3.000 profesionales de MSF trabajan en primera línea para contener esta epidemia sin precedentes. Desde el principio del brote, hemos ingresado a cerca de 5.000 pacientes, de los cuales 3.200 han dado positivo en las pruebas de Ébola: más de 1.000 se han curado tras recibir tratamiento en nuestros centros.

Pero no es suficiente. Millones de personas están amenazadas por el Ébola y la crisis médica y humanitaria que ha generado en África occidental. **Las necesidades son enormes y nuestros equipos están al límite de sus capacidades.** Pero no vamos a descansar. Vamos a seguir luchando, y **por eso hoy te pedimos que te movilices para ayudarnos a detener la epidemia. Te pedimos que apoyes nuestra campaña** #StopEbola.

Si puedes, haz un donativo.

Con 30 €
conseguiremos 30 litros de suero para la rehidratación intravenosa.

Con 89€
adquiriremos un traje completo de protección biológica.

Con 160€
tendremos un kit con todo lo necesario para tratar a un enfermo de Ébola durante cinco días.

Haz un donativo

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http://www.medscape.com/viewarticle/833907

Doffing PPE, PAPR Option – PPE doffing should be performed in the designated PPE removal area.
Engage Trained Observer: The doffing process is conducted under the supervision of a trained observer, who reads aloud each step of the procedure and confirms visually that the PPE is removed properly. Prior to doffing PPE, the trained observer must remind the healthcare worker to avoid reflexive actions that may put them at risk, such as touching their face. Post this instruction and repeat it verbally during doffing. Although the trained observer should minimize touching the healthcare worker or the healthcare worker's PPE during the doffing process, the trained observer may assist with removal of specific components of PPE, as outlined below. The trained observer disinfects the outer-gloved hands immediately after handling any healthcare worker PPE.
Inspect: Inspect the PPE to assess for visible contamination, cuts, or tears before starting to remove. If any PPE is potentially contaminated, then disinfect using an EPA-registered disinfectant wipe.
Disinfect Outer Gloves: Disinfect outer-gloved hands with either an *EPA-registered disinfectant wipe or ABHR, and allow to dry.
Remove Apron (if used): Remove and discard apron taking care to avoid contaminating gloves by rolling the apron from inside to outside.
Inspect: Following apron removal, inspect the PPE ensemble to assess for visible contamination or cuts or tears. If visibly contaminated, then disinfect affected PPE using an *EPA-registered disinfectant wipe.
Disinfect Outer Gloves: Disinfect outer-gloved hands with either an *EPA-registered disinfectant wipe or ABHR.
Remove Boot *or* Shoe Covers: While sitting down, remove and discard boot *or* shoe covers.
Disinfect and Remove Outer Gloves: Disinfect outer-gloved hands with either an *EPA-registered disinfectant wipe or ABHR. Remove and discard outer gloves, taking care not to contaminate inner glove during removal process.
Inspect and Disinfect Inner Gloves: Inspect the inner gloves' outer surfaces for visible contamination, cuts, or tears. If an inner glove is visibly soiled, cut, or torn, then disinfect the glove with either an *EPA-registered disinfectant wipe or ABHR. Then remove the inner gloves, perform hand hygiene with ABHR on bare hands, and don a clean pair of gloves. If no visible contamination, cuts, or tears are identified on the inner gloves, then disinfect the inner-gloved hands with either an *EPA-registered disinfectant wipe or ABHR.
Remove Respirator (PAPR)***:
If a PAPR with an external belt-mounted blower unit is used, then all components must be removed at this step.
Remove and discard disposable hood.
Disinfect inner gloves with either an *EPA-registered disinfectant wipe or ABHR.
Remove headpiece, blower, tubing, and the belt and battery unit. This step might require assistance from the trained observer.

Ebola Virus Disease (Ebola)

Algorithm for Evaluation of the Returned Traveler

FEVER (subjective or ≥100.4°F or 38.0°C) or compatible Ebola symptoms* in a patient who has resided in or traveled to a country with wide-spread Ebola transmission** in the 21 days before illness onset

* headache, weakness, muscle pain, vomiting, diarrhea, abdominal pain, or hemorrhage

NO

Report asymptomatic patients with high- or low-risk exposures (see below) in the past 21 days to the health department

YES

1. Isolate patient in single room with a private bathroom and with the door to hallway closed
2. Implement standard, contact, and droplet precautions
3. Notify the hospital Infection Control Program and other appropriate staff
4. Evaluate for any risk exposures for Ebola
5. IMMEDIATELY report to the health department

HIGH-RISK EXPOSURE

Percutaneous (e.g., needle stick) or mucous membrane contact with blood or body fluids from an Ebola patient

OR

Direct skin contact with, or exposure to blood or body fluids of, an Ebola patient

OR

Processing blood or body fluids from an Ebola patient without appropriate personal protective equipment (PPE) or biosafety precautions

OR

Direct contact with a dead body (including during funeral rites) in a country with wide-spread Ebola transmission** without appropriate PPE

LOW-RISK EXPOSURE

Household members of an Ebola patient and others who had brief direct contact (e.g., shaking hands) with an Ebola patient without appropriate PPE

OR

Healthcare personnel in facilities with confirmed or probable Ebola patients who have been in the care area for a prolonged period of time while not wearing recommended PPE

NO KNOWN EXPOSURE

Residence in or travel to a country with wide-spread Ebola transmission** without HIGH- or LOW-risk exposure

Review Case with Health Department Including:

- Severity of illness
- Laboratory findings (e.g., platelet counts)
- Alternative diagnoses

Ebola suspected — **Ebola not suspected**

TESTING IS INDICATED

The health department will arrange specimen transport and testing at a Public Health Laboratory and CDC

The health department, in consultation with CDC, will provide guidance to the hospital on all aspects of patient care and management

TESTING IS NOT INDICATED

If patient requires in-hospital management:

- Decisions regarding infection control precautions should be based on the patient's clinical situation and in consultation with hospital infection control and the health department
- If patient's symptoms progress or change, re-assess need for testing with the health department

If patient does not require in-hospital management:

- Alert the health department before discharge to arrange appropriate discharge instructions and to determine if the patient should self-monitor for illness
- Self-monitoring includes taking their temperature twice a day for 21 days after their last exposure to an Ebola patient

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

** CDC Website to check current countries with wide-spread transmission: http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/case-counts.html

This algorithm is a tool to assist healthcare providers identify and triage patients who may have Ebola. The clinical criteria used in this algorithm (a single symptom consistent with Ebola) differ from the CDC case definition of a Person Under Investigation (PUI) for Ebola, which is more specific. Public health consultation alone does not imply that Ebola testing is necessary. More information on the PUI case definition: http://www.cdc.gov/vhf/ebola/hcp/case-definition.html

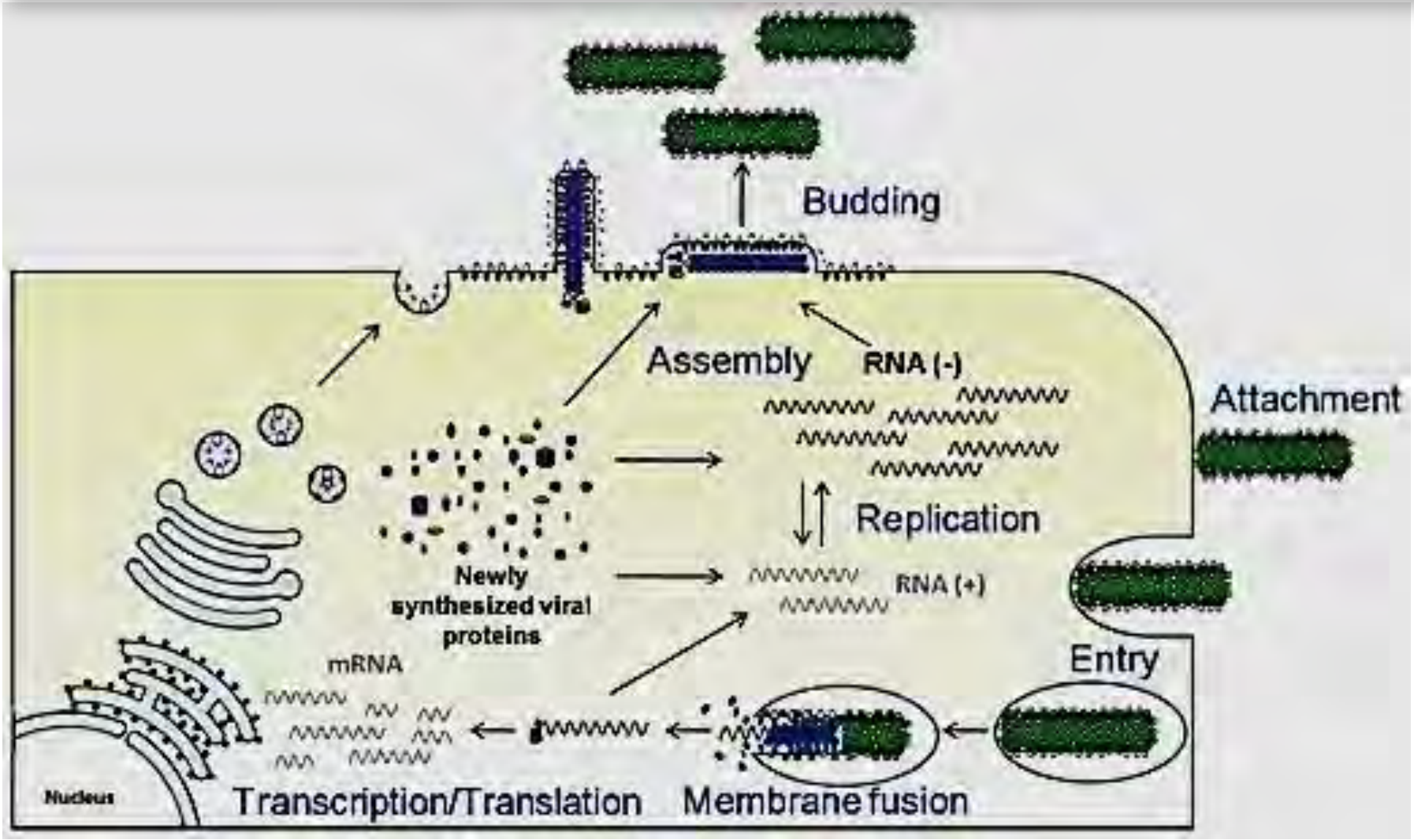
Table 2 Case definition of Ebola Virus Disease (EVD) [23,34]

Name	Definition
Index case	Very first case (probable or confirmed, see below) found to be the origin of the outbreak
Alert case	Any person with sudden onset of high fever or sudden death or bleeding or bloody diarrhea or blood in urine
Suspect case (person under investigation)	Any person, dead or alive, who present (or presented before the death):
	(i) fever (>38.5°C or 101.5 °F) with additional symptoms (severe headache, muscle pain, vomiting, diarrhea, abdominal pain, or unexplained hemorrhage) and (ii) epidemiologic risk factors within the past 21 days before the onset of symptoms (close contact with body fluids of a suspect or probable case of EVD, or direct handling of bush animals from disease-endemic areas)
Probable case	Person with symptoms compatible with EVD, as evaluated by a clinician, or a dead person with an epidemiological link with a confirmed case
Contacts	Person without suggestive symptom of the disease, but who has been in contact with a suspect or probable case of EVD (living in the same house, provided care during the illness, participated in the burial rites etc.). It should be important to assess the risk level (see Table 3).
	If laboratory samples are obtained at an appropriate time during the illness, the previous notification categories should be reclassified as "laboratory-confirmed" cases and "not a case"
Confirmed case	Case with positive laboratory response for either Ebola virus antigen or Ebola IgG antibody
"Not a case"	Person with no Ebola-specific detectable antibody or antigen

Table 3 Definition and assessment of risk exposure [23,34-36]

Risk level	Definition
High-risk exposure	• Percutaneous injury, e.g. needlestick, or mucous membrane exposure to body fluids of an EVD patient
	• Direct care or exposure to body fluids of an EVD patient without appropriate personal protective equipment (PPE)
	• Laboratory worker processing body fluids of confirmed EVD patients without appropriate PPE or standard biosafety precautions
	• Participation in funeral rites that include direct contact with human remains in the geographic area where an outbreak is occurring without appropriate PPE
Low-risk exposure	• Household member or other casual contact[1] with an EVD patient
	• Providing patient care or casual contact[1] without high-risk exposure with EVD patients in health care facilities in EVD outbreak affected countries
No known exposure	Persons with no known exposure were present in an EVD outbreak affected country in the past 21 days with no low-risk or high-risk exposures
	[1]Casual contact is defined as (i) being within approximately 3 feet (1 meter) or within the room or care area for a prolonged period of time (e.g. healthcare personnel, household members) while not wearing recommended personal protective equipment; or (ii) having direct brief contact (e.g., shaking hands) with an EVD case while not wearing recommended personal protective equipment

Ciclo de replicación del virus Ébola



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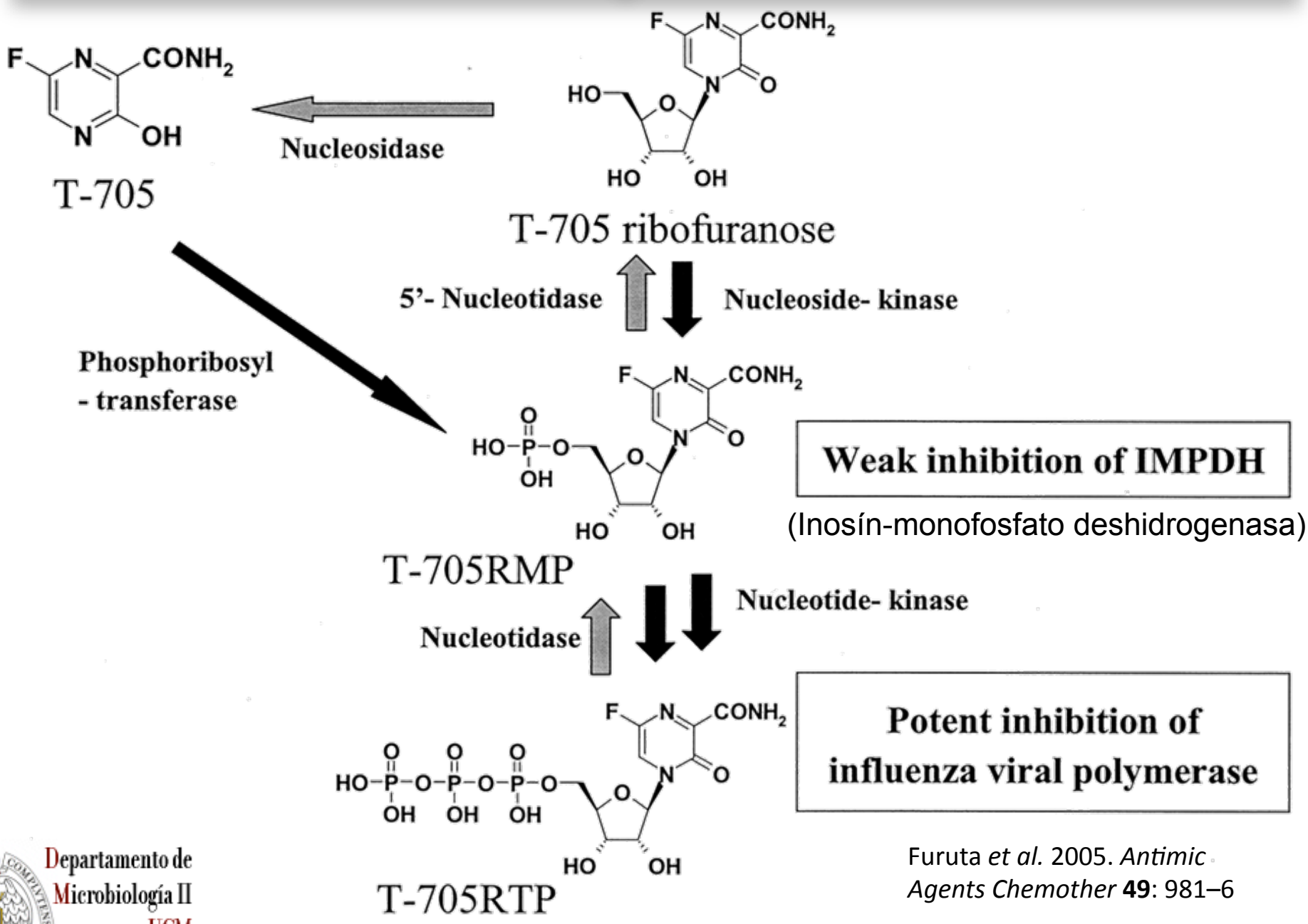
Favipiravir



Furuta *et al.* 2005. *Antimic Agents Chemother* **49**: 981–6