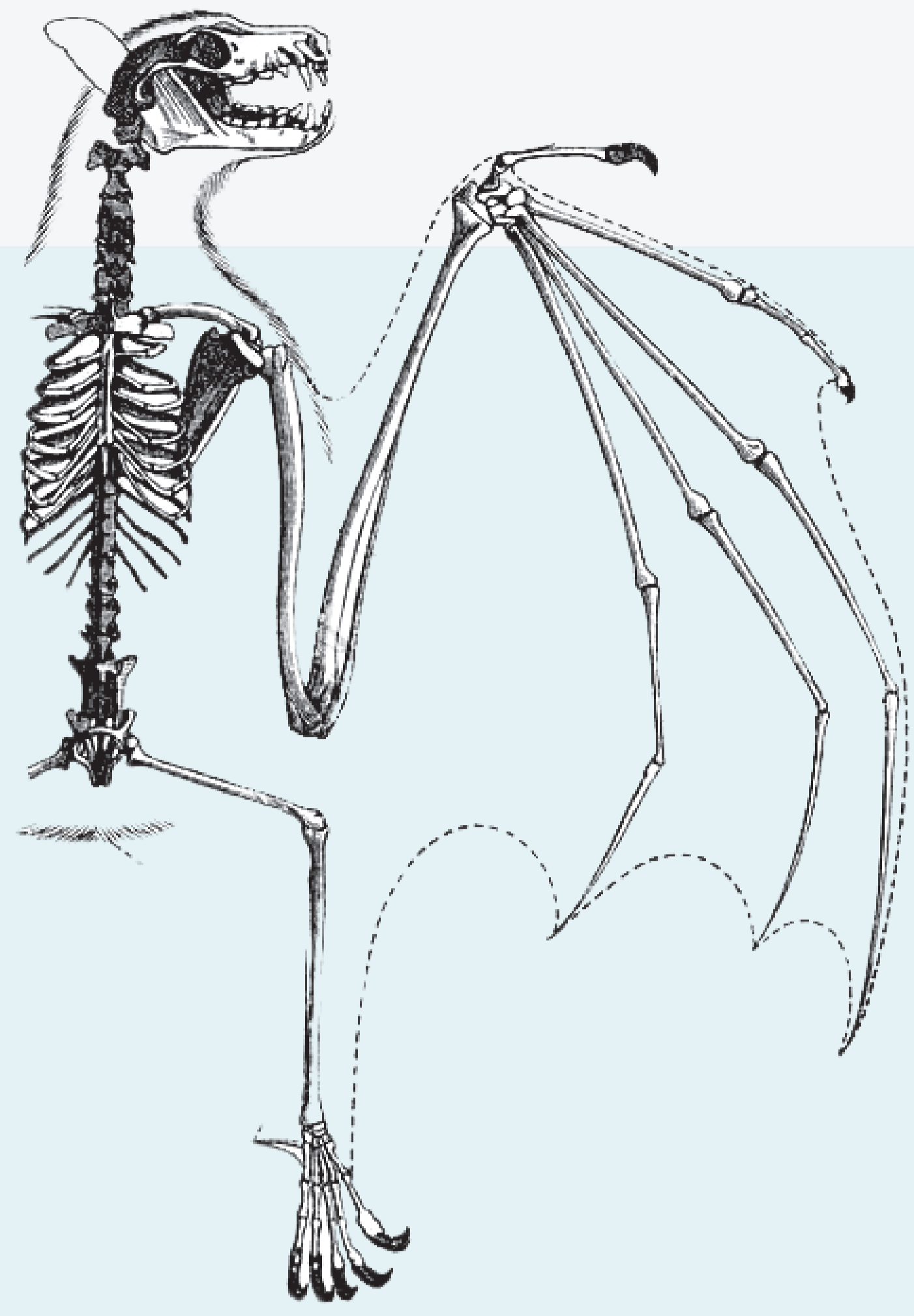


THE EUROPEAN BATS AS RESERVOIR OF POTENTIALLY ZOOONOTIC VIRICAL DISEASES



OBJECTIVES

The Chiroptera order is one of the largest of the class Mammalia, and it is distributed throughout the world, with the exception of Antarctica and some islands of the Oceanic continent. Although in recent years it has been noticed the importance of the bat as a reservoir for zoonotic diseases, the health status of European bats, and the diseases that can transmit, is still quite unknown. Because of this, this study has the objectives of: determine the reasons why bats are a reservoir of many diseases and collect which are the zoonotic diseases that are present or could potentially arise in European bats.

Diet and ecosystem

The Chiroptera order is distributed throughout the world covering virtually all types of ecosystems. Bats live in colonies. Their diet is very varied. Most of them are insectivorous and some are frugivorous.

Heterothermy

It is the ability to reduce their body temperature. It is due to a reduction in metabolic rate. Bats use this capability as a method of saving energy.

Migration

Bats have different refuge areas depending on the time of year. Migratory movements are due to displacement of Chiropters between shelters.

Flight

Is the only mammal with the ability to fly actively. High metabolism and temperature of the individual. Closely resembles a febrile response.

Immunology

Absence of "natural killer" cells and in a production of the regulatory factor 7 interferon (IFN7) in a greater amount of tissues.

RABIES

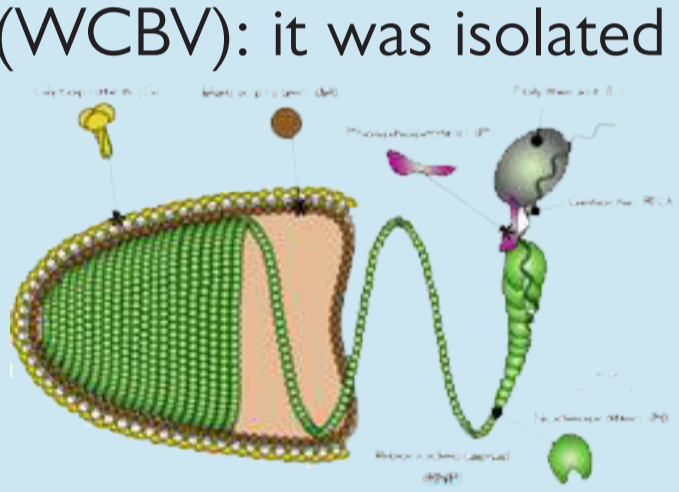
ETIOLOGY

Phylogroup 1

- Rabies Virus (RABV): natural hosts are terrestrial mammals. Responsible for most cases of rabies in the world.
- European Bat Lyssavirus type 1 (EBLV-1): Europe.
- European Bat Lyssavirus type 2 (EBLV-2): Europe.
- Bokeloh Bat Lyssavirus (BBLV): in Europe, it has only been isolated 3 times.

Phylogroup 3

- West Caucasian Bat Virus (WCBV): it was isolated only once in the Balkans.
- Lleida Bat Lyssavirus (LLBV): it is located in Spain. It has not yet been isolated.



EPIDEMIOLOGY

Mortality rate close to 100%.

- Transmission
- Bite or deep scratch
 - Predation
 - Contact between infectious material and mucous membranes

- Can affect any mammal

DIAGNOSIS

- Sample: salivary swabs
- Sample: samples of the central nervous system (CNS).
- Prove: RT-PCR
- Prove: fluorescent antibody test (FAT).

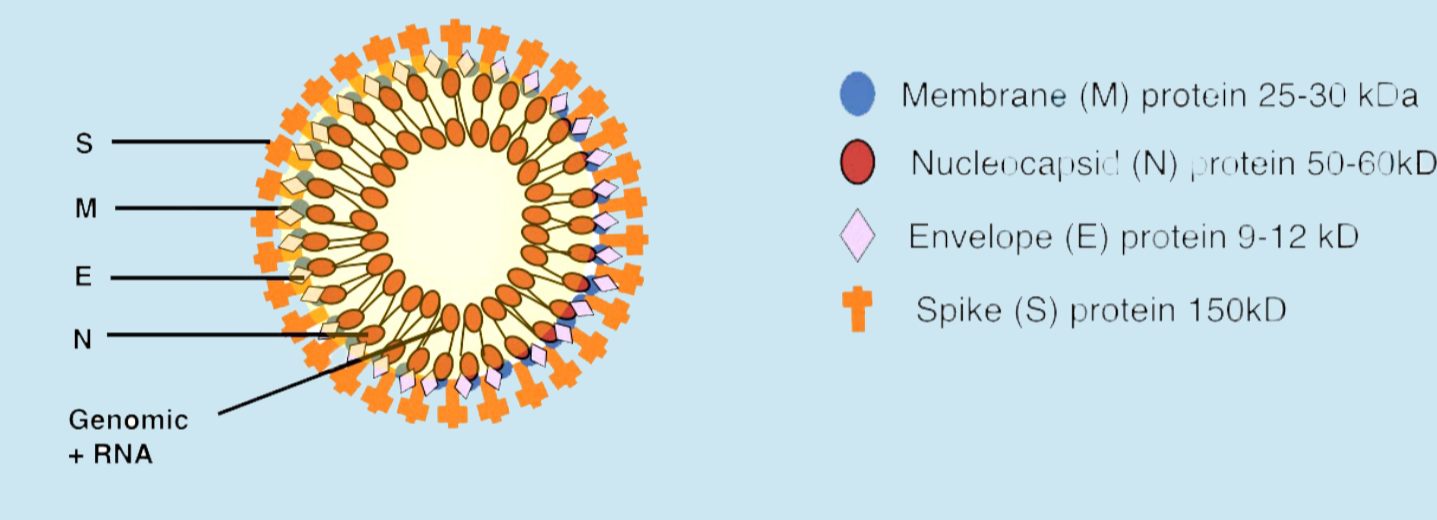
LYSSAVIRUS AND EUROPE

Rabies has been established in Europe since 1954. Passive surveillance. Eliminate the canine and human form of the disease 95% present the EBLV1 and the rest EBLV2. Lleida Bat Lyssavirus.

SEVERE ACUTE RESP. SYNDROME

ETIOLOGY

The etiologic agent of this disease is the human SARS coronavirus (SARS-CoV). The origin of this virus is another betacoronavirus found in bats, SARS-like CoV. The difference is simply that the SARS-like CoV fuses the ORF8a and the ORF8b in one ORF8. This genome fragment is very important because it is where it is pointed out that resides the interspecies transmission capacity.



EPIDEMIOLOGY

Mortality rate of 10%. The first epidemic of SARS occurred in China in 2003.

- Transmission
- Direct contact
 - Inhalation of infectious
 - Vectors
 - Predation

DIAGNOSIS

- Sample: blood serum.
- Sample: anal swab or nasopharyngeal
- Prove: Enzyme immunoassay (EIA).
- Prove: RT-PCR.

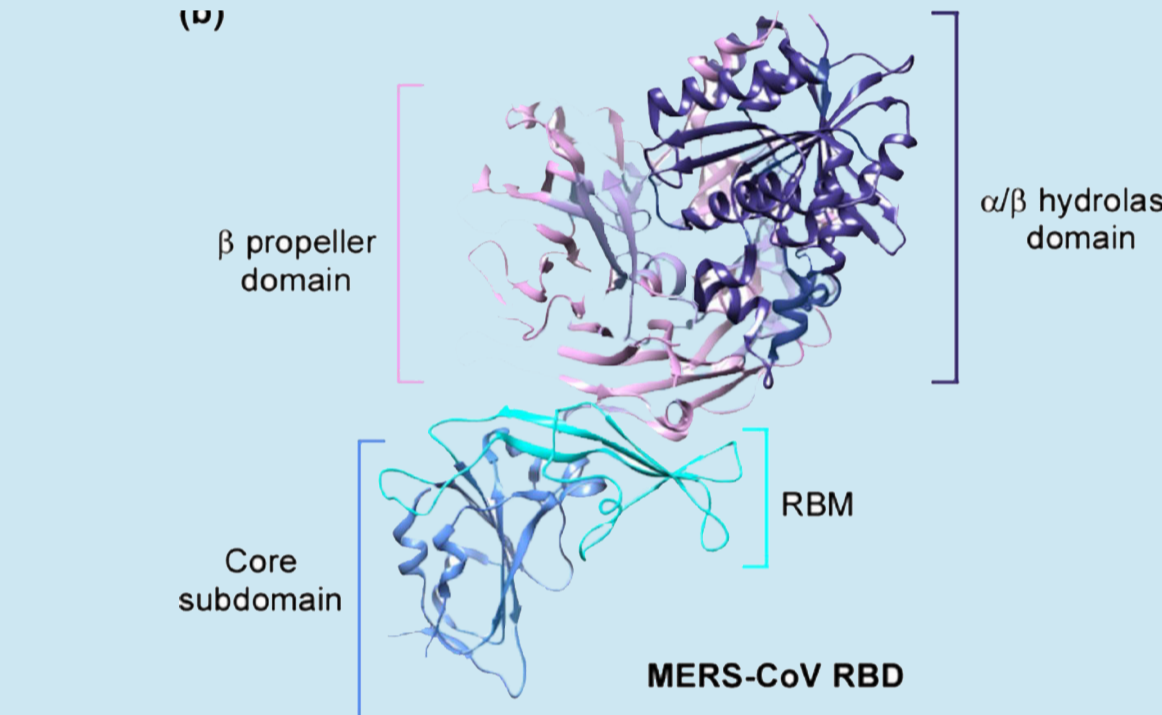
SARS IN EUROPE

We cannot establish a clear phylogenetic origin of the genome of European SARS-like CoVs. They, a priori, cannot infect humans.

MIDDLE EAST RESP. SYNDROME

ETIOLOGY

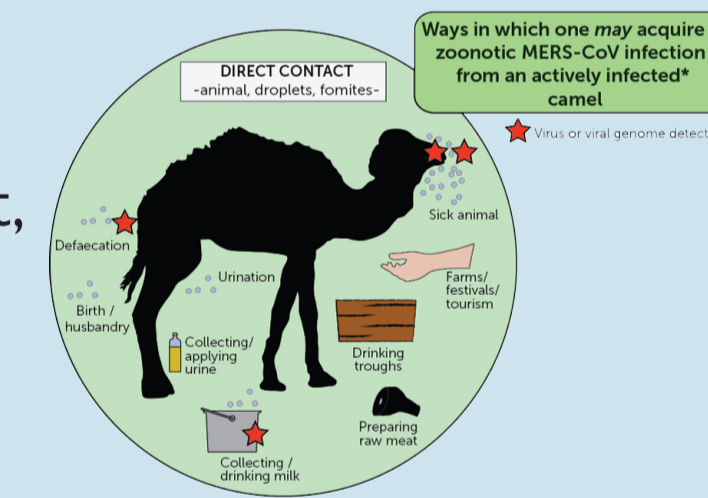
Agent: MERS-CoV. The union of their spicules (S) to specific cell receptors called dipeptidyl peptidase 4 (DPP4), which is highly expressed in endothelial and epithelial human cells. It is very similar to the HKU4 (bat betacoronavirus), and only differ in their spines.



EPIDEMIOLOGY

Mortality of this disease is >35%. In 2012 appeared the first case of MERS in Saudi Arabia. Bats: source and reservoir. Camels and dromedaries: reservoir and amplifiers.

- Transmission
- Consumption of meat, milk and urine
 - Direct contact



DIAGNOSIS

- Sample: respiratory tract samples.
- Test: RT-PCR. This test expands the genes encoding the E protein and the ORF1a. It is needed a positive result of the both of them.

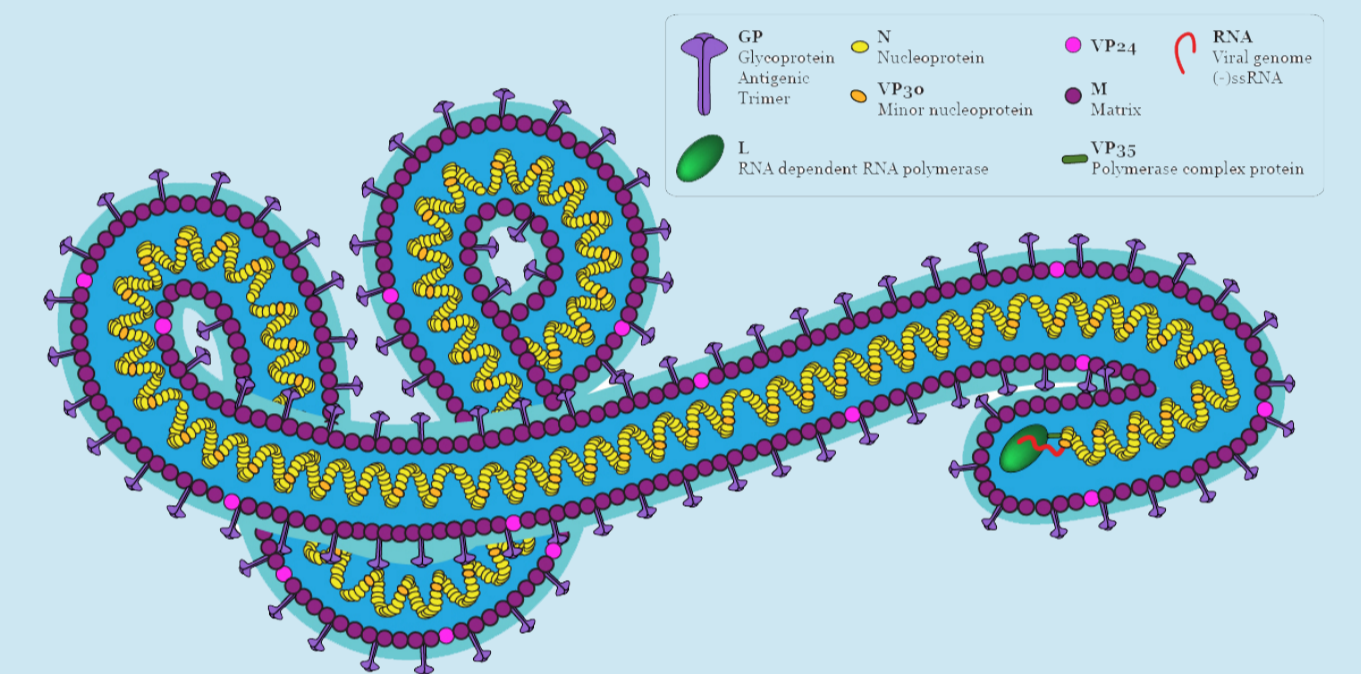
MERS AND EUROPE

Until recently MERS was only found in Saudi Arabia. However, over the years it has been spreading to Asia and Africa.

EBOLA

ETIOLOGY

It is produced by certain strains of the genus ebolavirus, part of the Filoviridae family. The ebolavirus consist of negative single-stranded RNA with envelop.



EPIDEMIOLOGY

Mortality rate ranging from 38% to 70%. In December 2013, it broke into Guinea with more severe symptoms and a more intense transmission. This ebola outbreak was produced by the variant Zaire ebolavirus.

- Transmission
- Direct contact
 - Indirect contact
 - Nosocomial infection
 - Aerosol

DIAGNOSIS

- Sample: blood.
- Test: RT-PCR.

FILOVIRUS AND EUROPE

Recently it was discovered a new endemic filovirus of Europe in the Lloviu Cave (Cantabria) which is called lloviuvirus. This new virus has not yet been isolated, so many things are still unknown. It has been observed that it affects bats, and it is hypothesized that can also affect humans.

CONCLUSIONS

Factors favoring entry into Europe of zoonotic diseases, which have bats as a reservoir:

- Environmental factors:
- Climate change
 - Deforestation-> bat-human interactions
 - Migration and globalization

- Factors intrinsic to the bat:
- Ability to alter the metabolism:
 - Flight: febrile response.
 - Torpor state: slower growth
 - Large colonies: grooming
 - Immune system: prevent the symptomatic phase

- European factors:
- The largest biodiversity concentrated in the Mediterranean zone.
 - Lack of data about the health condition of the colonies of european bats
 - Rabies is the only endemic zoonotic disease.

Europe is currently only affected by rabies, it is highly likely that in the future this situation will change, and the presence of zoonotic diseases with a high pathogenicity increases. Therefore it is vital to know the health status of our chiropters and deepen further in the unknowns of their biology.

