

# Molecular surveillance of mammalian orthoreovirus



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## in Midwest bats

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### Abstract

Mammalian orthoreovirus (MRV), or reovirus, is a zoonotic double-stranded RNA virus of the Reoviridae family and Spinareovirinae subfamily that is known to infect many mammalian and vertebrate species worldwide. This virus can be found in humans, pigs, bats, cattle, and many other species. Commonly, MRV infections cause upper respiratory and gastrointestinal illness, such as pneumonia and gastroenteritis, as well as neurologic symptoms such as encephalitis in severe infections. Bats, which are known reservoirs of a multitude of pathogens, have been found to be MRV positive in Asia, Australia, Europe, and Africa, but the status of MRVs in bats in the United States remains unclear. The objective of this study is to test bats sourced from the Midwest on their MRV status, as this virus has been found in swine and cattle within the United States. Necropsy and tissue homogenization are performed to prepare for RNA extraction and rt-PCR. If samples test positive, RNA isolation and sequencing are performed. This project will allow us to perform surveillance to understand the prevalence of MRVs in the Midwest bat population.

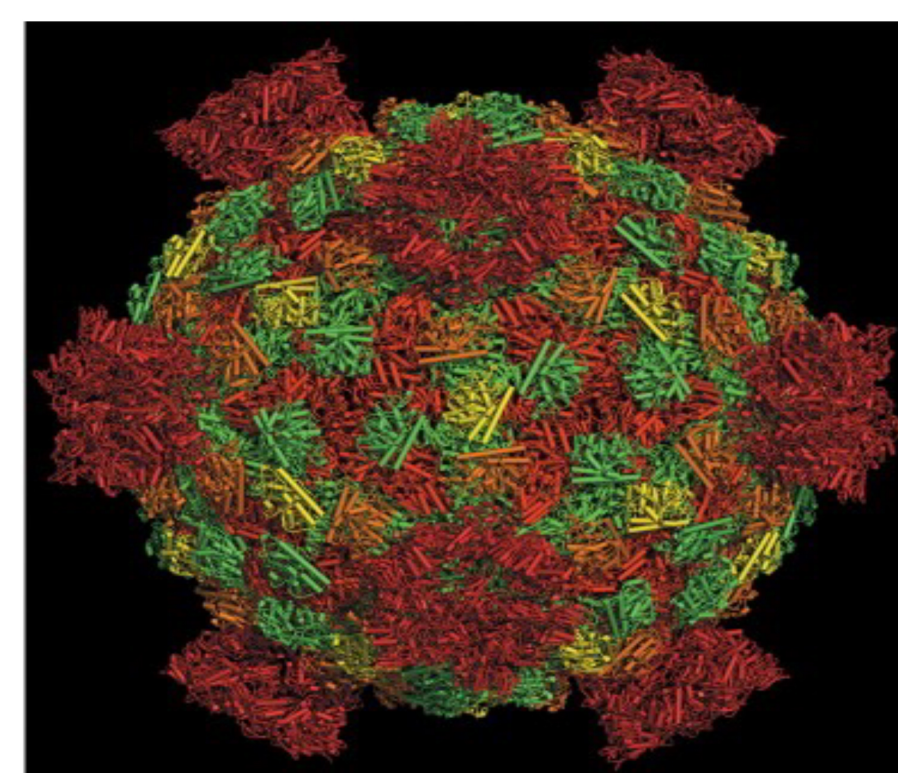


Figure 1. Obtained from "The Double Stranded RNA Viruses" in *Virus Taxonomy*, 2005 by N. Suzuki

### Pathobiology

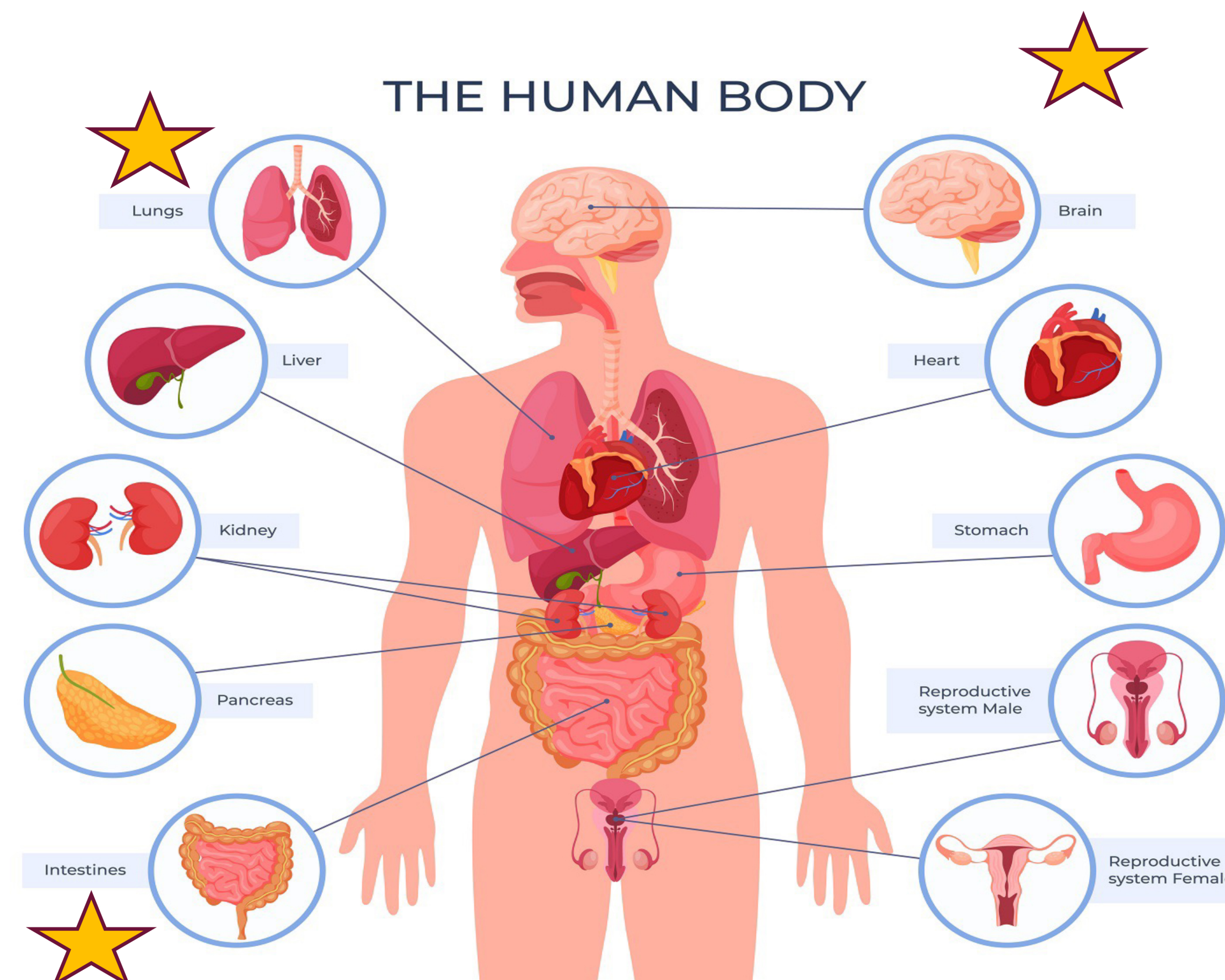


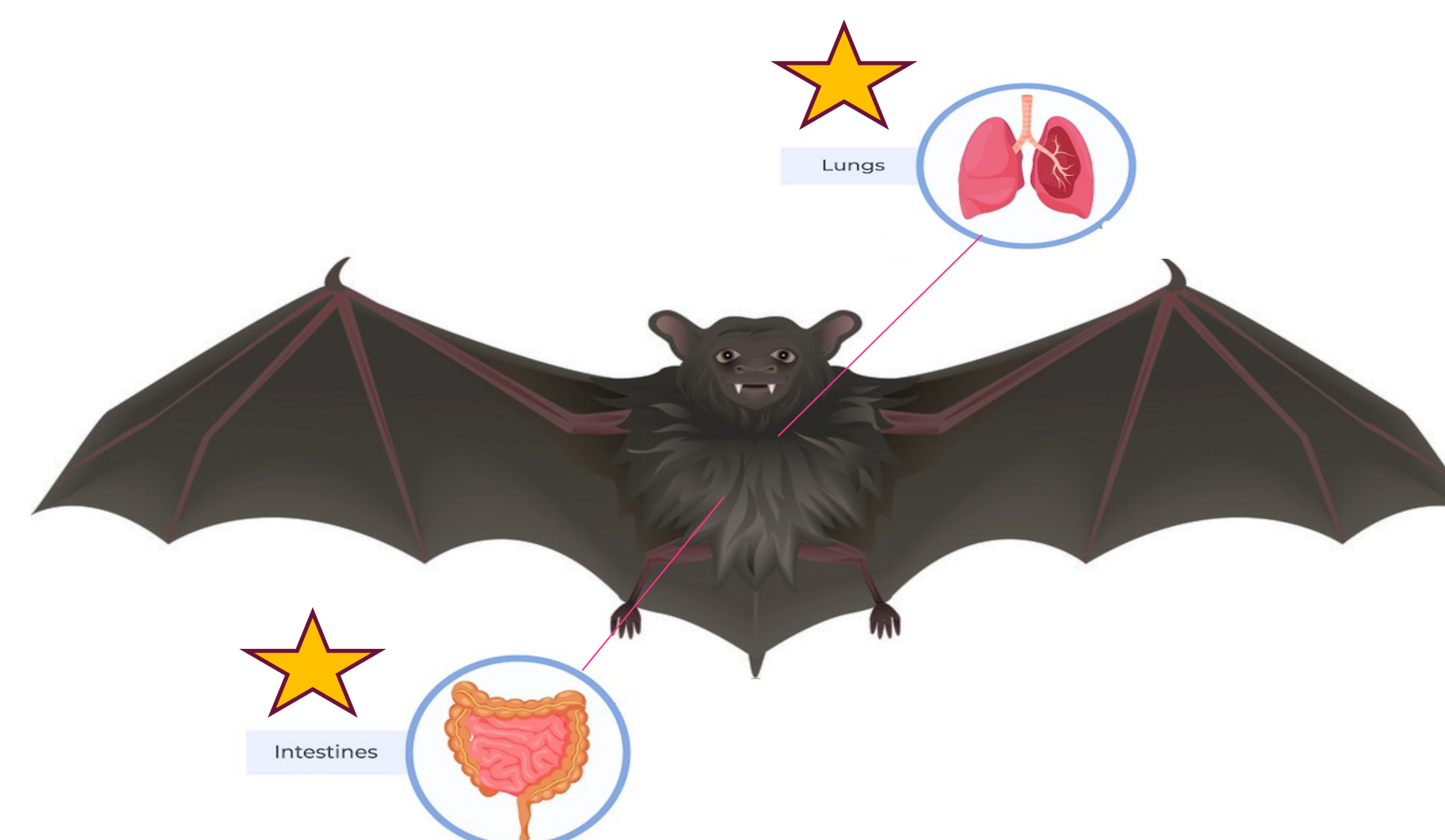
Figure 2. Obtained from Home Health UK

In mammals, transmission of MRV is through the fecal-oral route, where proteolytic enzymes in the gut are responsible for increasing infectivity of the virus and resulting in systemic infections. The virus also has the capability to replicate in the lungs, allowing for transmission via nasal secretions and aerosols.

Bats are a reservoir for many diseases, MRV being one that is transmissible to humans, making it zoonotic. The virus targets organs in a similar way to humans, prominently residing in the respiratory and intestinal tracts.

MRV in bats is not well-characterized in North America, but research shows systematic infections can present as:

- respiratory distress
- pneumonia, sometimes severe
- gastroenteritis
- tissue damage to lungs and intestine



Symptomatic cases are commonly found in young children, but are scarcely symptomatic in adults, resulting in subclinical infections. Due to antibodies to all 4 known serotypes from previous exposure of this ubiquitous virus, subclinical, self-limiting infections, rather than clinical infections, are common in humans.

Transmission of MRV from bat reservoirs has been isolated in humans from cases of:

- meningitis
- gastroenteritis
- pneumonia
- neurologic diseases (ex. encephalitis)
- severe diarrhea
- high fever
- vomiting

While human-human transmission is rare, it is possible. Epidemiological tracing has found that MRV from bat reservoirs has been linked to severe, acute respiratory infections. Additionally, neurologic disease is rare, as it is hypothesized that humans carry protective immunity due to non-neurovirulent strains.

### Methodology

#### Necropsy

Lung and intestine are collected

#### Tissue Homogenization

Tissue architecture is broken down and cells are lysed to release nucleic acids

#### RNA Extraction

RNA is extracted and purified from the homogenized solution

#### RT-qPCR

RNA is tested for the presence of MRV

### Results

Out of over 200 samples, RT-qPCR confirmed that the sampled Midwest bats were negative for MRV.



### Acknowledgements

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