

# St. Louis encephalitis Fact Sheet

## 1. Disease overview

St. Louis encephalitis virus (SLEV) causes St. Louis encephalitis, a mosquito-borne viral disease maintained in an enzootic cycle between *Culex* mosquitoes and wild birds, which serve as amplifying hosts. In birds, infection is typically asymptomatic, though seroconversion is common in endemic areas. While humans are dead-end hosts and most infections are asymptomatic or mild, the virus can rarely cause severe, potentially fatal neuroinvasive disease, especially in older adults.

St. Louis encephalitis is not a WOAH-notifiable disease, and it is not listed in the EU AHL.

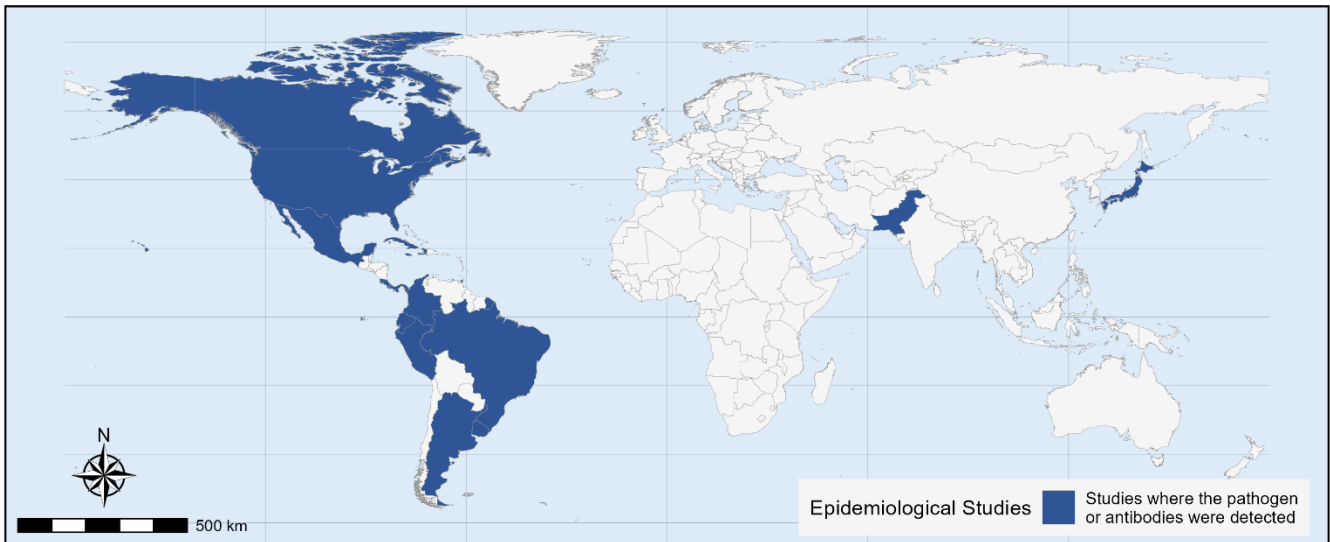
## 2. Agent

SLEV is an enveloped, single-stranded, positive-sense RNA virus that belongs to the Flavivirys genus of the Flaviviridae family. The virion is spherical, 40–60 nm in diameter and carries a single RNA strand that is translated into one large polyprotein. This is then cut into the virus's structural components: capsid (C), premembrane/membrane (prM/M), and envelope (E). The E protein plays a key role in attaching to host cells and is the main target of neutralizing antibodies.

The virus is moderately stable under ambient conditions but is readily inactivated by heat, lipid solvents, detergents, and standard disinfectants. (Fang et al., 2015).

## 3. Geographical Distribution

SLEV is distributed widely across the Americas, from southern Canada to Argentina. SLEV infection is not reportable to WOAH. Evidence from published studies describing natural infections with this agent, as well as field epidemiological studies, are collected in the EFSA's systematic literature review (updated until 31/12/2025) and summarized in Figure 1. For more detailed information, dynamic maps, and references visit the online disease profile (accessible via the button in the top right corner).



**Figure 1.** Geographical distribution of epidemiological studies addressing the occurrence of SLEV, as identified by the EFSA’s systematic literature review (covering years 1970-2025).

## 4. Animal hosts

### 4.1. Susceptible hosts

Based on epidemiological knowledge of host–pathogen–vector interactions and outbreak reports, the main hosts of SLEV are wild birds, whereas humans and horses are considered as dead-end hosts. However, other susceptible species have been identified in the SLR. The SLR summary is given in Table 1.

**Table 1.** Susceptible host species of Saint Louis encephalitis virus.

The systematic literature review reported in the SLEV disease profile, identified the following susceptible species (updated until 31/12/2025, for references see online disease profile)
FIELD
Epidemiological studies carried out in the field
<b>Pathogen was detected in the following animal species:</b>
<ul style="list-style-type: none"> <li>• Canidae: <i>Canis latrans</i>, <i>Vulpes vulpes</i></li> <li>• Cervidae: <i>Odocoileus hemionus</i>, <i>Odocoileus virginianus</i></li> <li>• Equidae: <i>Equus caballus</i></li> <li>• Hominidae: <i>Homo sapiens</i></li> <li>• Mephitidae: <i>Mephitis mephitis</i></li> <li>• Phasianidae: <i>Gallus gallus domesticus</i></li> <li>• Procyonidae: <i>Procyon lotor</i></li> </ul>
<b>Antibodies were detected in the following animal species:</b>
<ul style="list-style-type: none"> <li>• Accipitridae: No species specified</li> <li>• Anatidae: No species specified</li> <li>• Bovidae: <i>Bos taurus</i>, <i>Capra hircus</i>, <i>Bubalus bubalis</i></li> <li>• Canidae: <i>Canis lupus familiaris</i></li> <li>• Cervidae: <i>Odocoileus virginianus</i></li> <li>• Columbidae: <i>Columba livia domestica</i></li> <li>• Equidae: <i>Equus caballus</i></li> </ul>

- Falconidae: No species specified
- Hominidae: *Homo sapiens*
- Phasianidae: *Gallus gallus domesticus*, *Meleagris gallopavo*
- Strigidae: No species specified

**Outbreaks reported to WOAAH included the following species:**

- No species specified

EXPERIMENTS

**Experimental studies demonstrated infection in:**

- Phasianidae: *Gallus gallus domesticus*
- Anatidae: No species specified
- Columbidae: *Columba livia domestica*
- Canidae: *Canis lupus familiaris*
- Suidae: *Sus scrofa domesticus*

## 4.2. Clinical Signs

SLEV primarily affects birds, which usually do not show clinical signs. Clinical illness in mammals is less common and asymptomatic. The only potential exception noted in research is the isolation of SLEV from a grey fox with encephalitis, suggesting that in rare cases, other mammals may develop clinical signs (Swanepoel and Burt, 2008).

### 4.2.1. Incubation Period

The incubation period in vertebrate hosts is poorly known, as most infected animals remain subclinical. Serological surveys in horses frequently detect neutralizing antibodies, yet molecular studies rarely identify active SLEV infection or virus in blood or tissue, consistent with low-level or transient viremia and negligible outward signs of disease (Chalhoub et al, 2022; Silva et al, 2014).

In experimentally infected birds, viremia typically develops within 1 to 4 days post-infection and lasts less than 5 days, providing a window for mosquito-mediated transmission (Reisen et al, 2003; Monath et al, 1978).

### 4.2.2. Morbidity and case fatality

Experimental infection studies in birds show that although many species become infected (i.e., seroconvert), clinical disease and mortality are rare or absent (Reisen et al, 2003).

### 4.2.3. Zoonotic Potential

St. Louis encephalitis is a zoonotic disease (CDC, 2024).

## 5. Transmission

SLEV is transmitted by mosquitoes (Diptera; Culicidae). For more information on vector distribution, visit the Vector section in the online disease profile.

The virus is maintained in an enzootic cycle between mosquitoes and birds, which serve as the reservoir and amplifying hosts, while humans, horses, and other mammals are considered dead-end hosts (Danforth et al, 2022). Transmission does not occur via direct contact between animals or through fomites. Seasonal patterns of human and animal infection generally correspond to peaks in mosquito activity, often during warm, wet months.

## 6. Diagnostic tests

There are no WOA-recommended tests specifically for SLEV, but a range of assays are used for the detection of flaviviruses in animals. Tests for detection of the agent include reverse transcription PCR (RT-PCR) targeting conserved regions of the SLEV genome, virus isolation in cell culture, and inoculation of susceptible laboratory animals followed by confirmation of infection using PCR or immunohistochemistry (Howe et al, 1992). SLEV can be isolated most reliably from blood or tissues during the short period of viremia in birds (Kramer et al, 2002); isolation from mammals is more difficult due to low-level and transient viremia.

Tests for detection of the immune response include hemagglutination inhibition (HIA) assays, complement fixation (CF) tests, and enzyme-linked immunosorbent assays (ELISAs). Most serological tests detect antibodies against flaviviruses broadly, and cross-reactivity is common, especially among closely related viruses such as West Nile virus (Chan et al, 2022). Serum neutralisation tests are more specific for SLEV albeit are labour-intensive.

The SLR has not found diagnostic tests evaluation studies meeting the eligibility criteria for inclusion.

## 7. Prevention and control

### 7.1. Vaccination

No, there is no vaccine available for St. Louis encephalitis. The infection in animals is usually asymptomatic or very mild, and they recover on their own.

### 7.2. Treatment

There is currently no specific antiviral treatment for St. Louis encephalitis.

## 8. References

- Ardakani R, Chauhan L, Piquet AL, Tyler KL, Pastula DM (2024). An Overview of Saint Louis Encephalitis. *The Neurohospitalist*. 2024 Jan 16;14(2):230.
- CDC (Centers for Disease Control and Prevention), 2024. About St. Louis encephalitis, CDC, 14 May. Available at: <https://www.cdc.gov/sle/about/index.html> (Accessed: 26 December 2025).
- Chalhoub FL, Horta MA, Alcantara LC, Morales A, Dos Santos LM, Guerra-Campos V, Rodrigues CD, Santos CC, Mares-Guia MA, Pauvolid-Corrêa A, de Filippis AM (2022). Serological Evidence of Exposure to Saint Louis Encephalitis and West Nile Viruses in Horses of Rio de Janeiro, Brazil. *Viruses*. 2022 Nov 6;14(11):2459. DOI: [10.3390/v14112459](https://doi.org/10.3390/v14112459)
- Chan KR, Ismail AA, Thergarajan G, Raju CS, Yam HC, Rishya M, Sekaran SD (2022). Serological cross-reactivity among common flaviviruses. *Frontiers in Cellular and Infection Microbiology*. 2022 Sep 15;12:975398. <https://doi.org/10.3389/fcimb.2022.975398>
- Danforth ME, Snyder RE, Feiszli T, Bullick T, Messenger S, Hanson C, et al. (2022) Epidemiologic and environmental characterization of the Re-emergence of St. Louis Encephalitis Virus in California, 2015–2020. *PLoS Negl Trop Dis* 16(8): e0010664. <https://doi.org/10.1371/journal.pntd.0010664>
- Fang Y, Brault AC, Reisen WK (2009). Comparative thermostability of West Nile, St. Louis encephalitis, and western equine encephalomyelitis viruses during heat inactivation for serologic diagnostics. *The American journal of tropical medicine and hygiene*. 2009 May 1;80(5):862-3. DOI: [10.4269/ajtmh.2009.80.862](https://doi.org/10.4269/ajtmh.2009.80.862)
- Howe DK, Vodkin MH, Novak RJ, Shope RE, McLaughlin GL (1992). Use of the polymerase chain reaction for the sensitive detection of St. Louis encephalitis viral RNA. *J Virol Methods*. 1992 Jan;36(1):101-10. doi: [10.1016/0166-0934\(92\)90161-6](https://doi.org/10.1016/0166-0934(92)90161-6). PMID: 1348060.
- Kramer LD, Wolfe TM, Green EN, Chiles RE, Fallah H, Fang Y, Reisen WK (2002). Detection of encephalitis viruses in mosquitoes (Diptera: Culicidae) and avian tissues. *Journal of Medical Entomology*. 2002 Mar 1;39(2):312-23. <https://doi.org/10.1603/0022-2585-39.2.312>

- Monath TP, Kemp GE, Cropp CB, Bowen GS (1978). Experimental infection of house sparrows (*Passer domesticus*) with Rocio virus. *The American Journal of Tropical Medicine and Hygiene*. 1978 Nov 1;27(6):1251-4. DOI: [10.4269/ajtmh.1978.27.1251](https://doi.org/10.4269/ajtmh.1978.27.1251)
- Reisen WK, Chiles RE, Martinez VM, Fang Y, Green EN (2003). Experimental infection of California birds with western equine encephalomyelitis and St. Louis encephalitis viruses. *Journal of Medical Entomology*. 2003 Nov 1;40(6):968-82. <https://doi.org/10.1603/0022-2585-40.6.968>
- Silva JR, Romeiro MF, De Souza WM, Munhoz TD, Borges GP, Soares OA, De Campos CH, Machado RZ, Silva ML, Faria JL, Chávez JH (2014). A Saint Louis encephalitis and Rocio virus serosurvey in Brazilian horses. *Revista da Sociedade Brasileira de Medicina Tropical*. 2014 Jul;47:414-7. DOI: [10.1590/0037-8682-0117-2014](https://doi.org/10.1590/0037-8682-0117-2014)
- Simon LV, Kong EL, Graham C (2023). St Louis Encephalitis. <https://www.ncbi.nlm.nih.gov/books/NBK470426/>
- Swanepoel R, Burt FJ (2008). Flaviviruses of Veterinary Importance in *Encyclopedia of Virology (Third Edition)*, pages 234 – 241. <https://doi.org/10.1016/B978-012374410-4.00622-1>