

# LCMV Infection Models (WE, Clone 13, Docile, Armstrong)

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## Purpose

This protocol describes standardized mouse infection procedures using lymphocytic choriomeningitis virus (LCMV), with primary emphasis on **LCMV-WE** and **LCMV-Clone 13**, and additional reference to **LCMV-Docile** and **LCMV-Armstrong**.

The protocol defines virus handling, dilution, injection parameters, infection doses, and sampling windows, with specific annotation of **liver NLC (NK-like cell) dynamics** to guide optimal experimental design.

## Critical notes (read before starting)

- All LCMV work must be performed under **approved animal and biosafety protocols**.
- Virus stocks must be **titered, aliquoted, and freeze-thaw limited**.
- Infection dose and route strongly influence antigen load and immune kinetics.
- **NLC dynamics differ markedly between WE and Clone 13**, requiring strain-specific sampling strategies.
- Late timepoints (> day 7) in Clone 13 infection are **suboptimal for NLC-focused analyses**.

## Approximate timing

- Virus thawing and dilution: **5–10 min**
- Intravenous injection: **~1–2 min per mouse**
- Acute infection window: **days 0–15**
- Chronic infection window: **days 0–30+**

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## Procedure

### Virus stock handling and preparation

LCMV-WE, LCMV-Clone 13, LCMV-Docile, and LCMV-Armstrong virus stocks are propagated and titrated as previously described in the literature and internal Abdullah Lab SOPs.

- Virus stocks are stored at **−80 °C** in single-use aliquots.
- Repeated freeze–thaw cycles must be avoided.

### Thawing

- Virus aliquots are **rapidly thawed immediately before use**.
- Thawing is performed in a **37 °C water bath** until the aliquot is just thawed.
- Aliquots are removed promptly from the water bath and placed **immediately on ice**.
- Virus is kept on ice during dilution and injection.
- Repeated freeze–thaw cycles must be avoided.

### Dilution buffer

- Virus stocks are diluted in **sterile, endotoxin-free PBS**.
- No serum or supplements are added unless explicitly required by internal SOP.
- Dilutions are prepared **fresh on the day of infection**.

### Infection doses and routes

Mice are infected **intravenously (i.v.)** via the lateral tail vein using the following Abdullah Lab standard doses:

- **LCMV-Clone 13:  $2 \times 10^5$  plaque-forming units (PFU)**
- **LCMV-WE:  $2 \times 10^5$  plaque-forming units (PFU)**

Other strains (Docile, Armstrong) are included for reference and comparative studies as outlined below.

### Injection parameters

- **Injection volume: 200 µL per mouse**
- **Syringe:** insulin syringe
- **Needle gauge: 27G–30G**
- Injections are performed slowly to ensure proper intravenous delivery.
- Successful i.v. injection is confirmed by lack of resistance and absence of subcutaneous bleb formation.

## Post-infection monitoring

- Body weight and general health are monitored daily during the first week post infection.
- Monitoring frequency is adjusted according to infection severity and institutional guidelines.
- Humane endpoints are applied as defined in approved protocols.

## Infection dose ranges, rationale, and expected outcomes

Virus strain	Dose range (PFU, literature)	Rationale for low vs high dose	Expected outcome	Abdullah Lab standard
<b>Armstrong</b>	$\sim 1 \times 10^2 - 2 \times 10^3$	Low-moderate dose to induce acute infection with rapid immune control	Acute infection; strong effector CD8 response; viral clearance and memory formation	Not standard
<b>WE</b>	$\sim 1 \times 10^2 - 1 \times 10^3$	Minimal acute infection	Rapid clearance; limited systemic and hepatic involvement	–
	<b><math>2 \times 10^2</math></b>	Intermediate dose to ensure robust systemic infection without chronic persistence	Strong liver immune response; sustained NLC accumulation	<b>Yes</b>
	$\sim 1 \times 10^3$	High-dose systemic challenge used in comparative studies	Severe acute disease; heightened inflammation	No
<b>Clone 13</b>	<b><math>2 \times 10^2</math></b>	High antigen load to enforce chronic infection and exhaustion	Persistent infection; CD8 exhaustion program	<b>Yes</b>
<b>Docile</b>	$\sim 1 \times 10^2$	Moderate dose allowing partial control	Semi-chronic infection; intermediate exhaustion	–
	<b><math>2 \times 10^2</math></b>	High-dose infection to drive persistent antigen exposure	Chronic infection; exhaustion-prone immune response	<b>Yes</b>

## Expected NLC dynamics in the liver

### LCMV-WE ( $2 \times 10^6$ PFU i.v.)

- NLCs accumulate prominently in the liver.
- Peak frequency occurs at approximately **day 7 post infection**.
- Elevated NLC levels are **maintained through at least day 30 post infection**.
- This model supports **both early and long-term NLC analyses**.

### LCMV-Clone 13 ( $2 \times 10^6$ PFU i.v.)

- NLCs peak **early**, around **day 5 post infection**.
- A **sharp contraction occurs by ~day 7**, followed by gradual decline through day 30.
- The effective experimental window for NLC analysis is **day 4–7 post infection**.
- Sampling outside this window will substantially underestimate NLC abundance.

## Experimental design guidance

- For studies requiring **broad or late NLC sampling**, LCMV-WE is preferred.
- For studies focused on **early inflammatory or antigen-rich environments**, Clone 13 is appropriate but requires tight temporal control.
- Direct comparisons between WE and Clone 13 must account for **non-overlapping NLC kinetics**.

## Safety (brief)

- All animal procedures must comply with approved animal licences and institutional regulations.
- Wear appropriate PPE (lab coat, gloves, eye protection) when handling animals, tissues, and reagents.
- Handle sharps (needles, scalpels) with care and dispose of immediately in approved sharps containers.
- Perform virus handling, injections, and tissue processing in accordance with institutional biosafety guidelines.
- Dispose of viral waste and contaminated materials according to local biosafety regulations.

## Version history

Version	Date	Author	Change summary
v1.0	2026-01-09	Dillon Corvino	Initial LCMV infection protocol (WE, Clone 13, Docile, Armstrong)