

Murine Model of Intracerebral Hemorrhage

A **murine model of intracerebral hemorrhage (ICH)** refers to experimental ICH induction in mice or rats, enabling study of the disease's pathophysiology and treatment options in a controlled environment.

□ Types of Murine ICH Models

- **Collagenase-induced model**

- ***Mechanism:** Injection of bacterial collagenase into the striatum or cortex, degrading vascular matrix.
- ***Advantages:** Simulates vessel rupture; progressive bleeding.
- ***Disadvantages:** Strong inflammatory response; variable hematoma.

- **Autologous blood injection model**

- ***Mechanism:** Injection of the animal's own blood directly into the brain.
- ***Advantages:** Controlled hematoma size; reproducible.
- ***Disadvantages:** Does not replicate active bleeding or vessel rupture.

- **Balloon inflation model**

- ***Mechanism:** Mechanical mass effect via balloon or gel.
- ***Advantages:** Mimics mass effect.
- ***Disadvantages:** Lacks actual bleeding; limited biological relevance.

- **Genetically modified models**

- ***Mechanism:** Knockout/transgenic animals targeting vascular or coagulation pathways.
- ***Advantages:** Useful for studying gene-specific effects.
- ***Disadvantages:** Time-consuming; expensive; variable phenotypes.

□ Parameters Measured

- Neurological deficits (e.g. rotarod, cylinder test)
- Hematoma volume (MRI, histology)
- Neuronal death (TUNEL, caspase activation)
- Inflammation (e.g. IL-6, TNF- α , microglia markers)
- Autophagy/apoptosis markers (LC3, Beclin-1, cleaved caspase-3)
- Signaling pathways (e.g. AMPK/mTOR, NF- κ B)

□ Relevance to Human ICH

Murine models effectively reproduce:

- Early events: edema, inflammation, oxidative stress.
- Limitations: chronic evolution, large hematomas, comorbidities (e.g. hypertension, aging).

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