# **Brain Metastasis Mouse Model**

A **brain metastasis mouse model** is a preclinical experimental system used to study how cancer cells from a primary tumor site (like breast, lung, or melanoma) spread to and grow within the brain. These models are essential for understanding the biology of brain metastases and for testing new therapies.

### **Types of Brain Metastasis Mouse Models**

#### **Intracardiac Injection Model**

- **Method**: Injection of tumor cells into the left ventricle of the heart.
- Purpose: Mimics hematogenous spread to the brain.
- Advantages: High reproducibility, relevant metastatic pattern.
- Disadvantages: Technically demanding.

#### **Intracarotid Injection Model**

- **Method**: Direct injection into the carotid artery.
- Purpose: Targets the brain more selectively than intracardiac.
- Advantages: Efficient brain colonization.
- **Disadvantages**: High surgical skill required.

#### **Tail Vein Injection**

- Method: Systemic injection via the tail vein.
- **Purpose**: Mimics general metastasis but often favors lungs over brain.
- **Disadvantages**: Poor brain specificity.

#### **Orthotopic Models**

- **Method**: Implantation of tumor cells into the original site (e.g., mammary fat pad for breast cancer).
- Purpose: Natural progression to brain metastasis.
- Advantages: Mimics real disease course.
- **Disadvantages**: Long time for brain metastasis formation; lower incidence.

### Intracerebral or Intracranial Injection

- **Method**: Direct injection of cancer cells into the brain.
- Purpose: Studies tumor growth in the brain microenvironment.
- Advantages: Fast tumor development.
- Disadvantages: Does not model metastatic spread.

### **Common Cell Lines Used**

- MDA-MB-231-BR: Breast cancer line selected for brain tropism.
- H2030-BrM3: Lung adenocarcinoma brain-seeking variant.
- A375Br: Melanoma with brain metastasis preference.

## **Imaging and Evaluation**

- Bioluminescence imaging (BLI) for tracking tumor growth.
- MRI or CT scans for anatomical visualization.
- Histology/IHC for pathological assessment.

### Applications

- Studying mechanisms of brain colonization.
- Testing blood-brain barrier (BBB) penetration of drugs.
- Evaluating **novel therapies**, including immunotherapies and nanomedicines.

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