

Leveraging Lentiviral Systems to Uncover Osteosarcoma Metastasis Mechanisms

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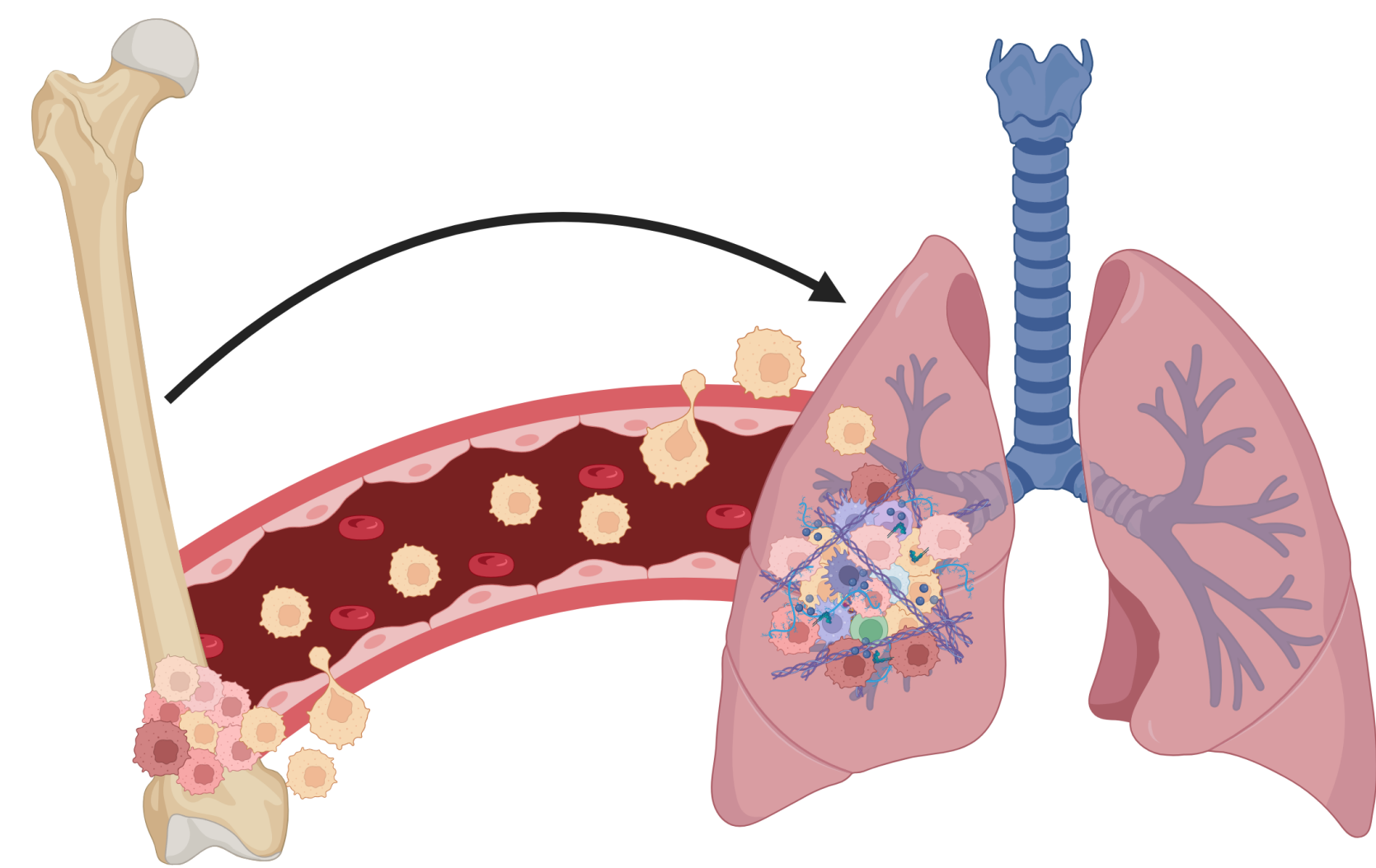
Background

For osteosarcoma patients, the leading cause of mortality is the metastatic dissemination to the lungs, a process that remains understudied due to various challenges. A few include:

- ❑ The Metastatic Bottleneck
- ❑ Heterogenous Subpopulations
- ❑ Tumor-microenvironment Deconvolution

Our lab has leveraged Lentiviral systems to perform *in vivo* experiments that overcome the presented obstacles.

Figure 1: Primary osteosarcoma malignancies routinely metastasize from the bone to the lungs.



Methods

Figure 2: Cell lines are transduced using lentivirus and cells expressing the gene are selected for with an antibiotic. The **Xenogen Imaging** system is used to validate successful transduction.

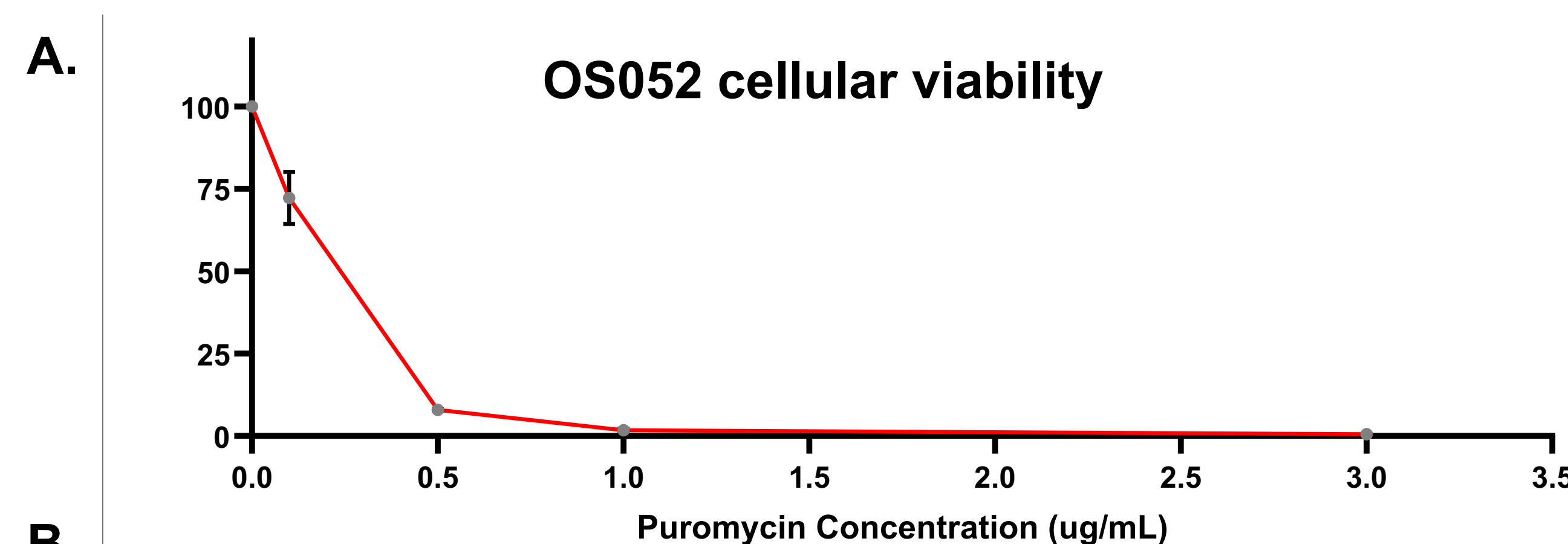
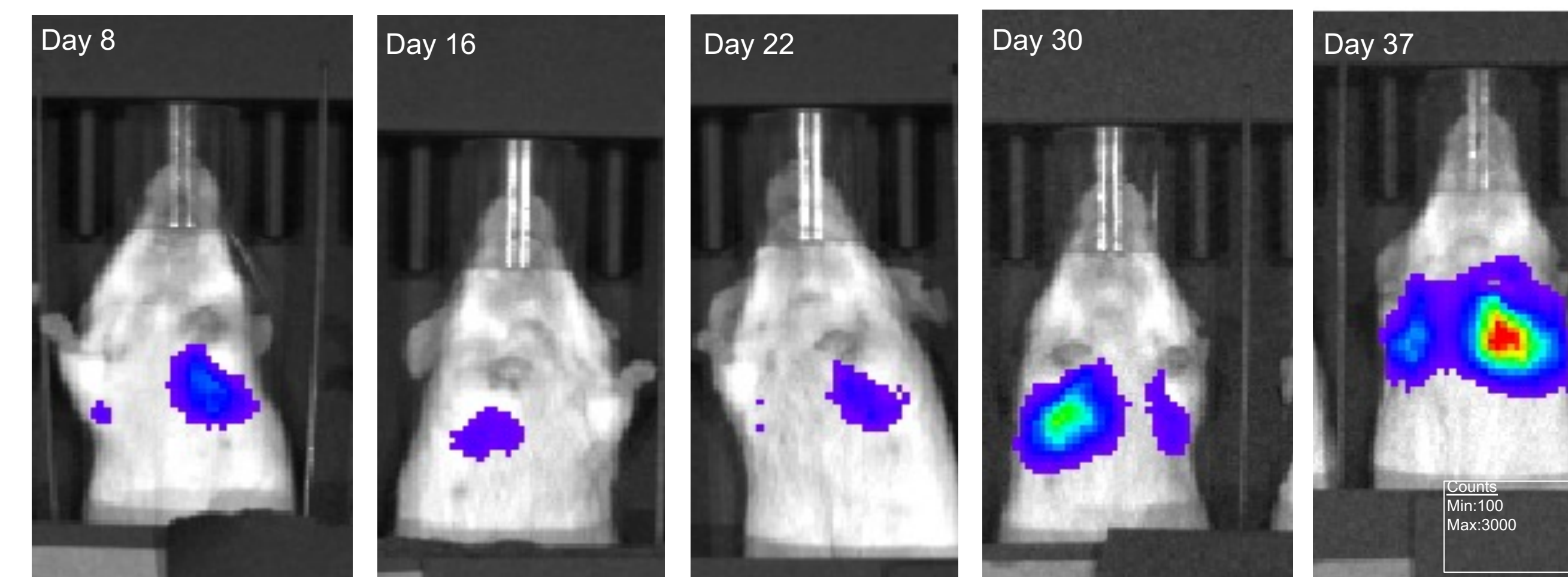


Figure 3: Luciferase-expressing cell lines allow non-invasive monitoring of experimental metastatic disease progression.

A. Metastatic disease progression



C. Treatment response

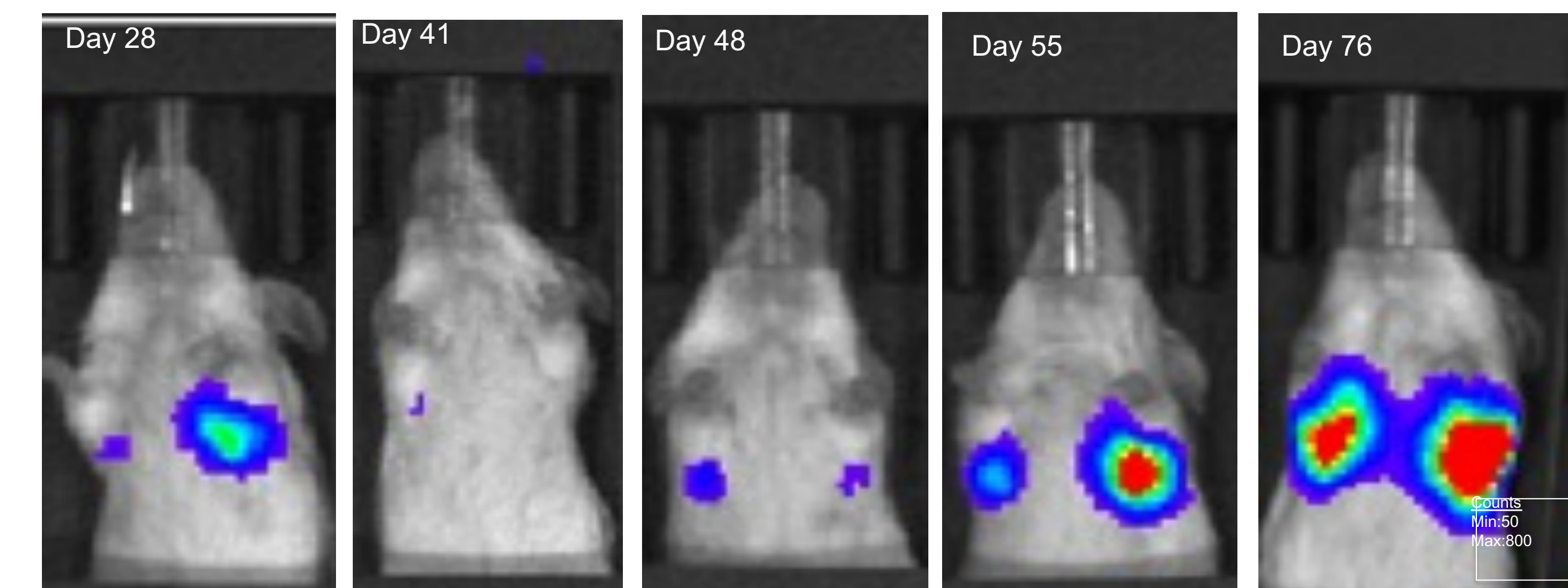
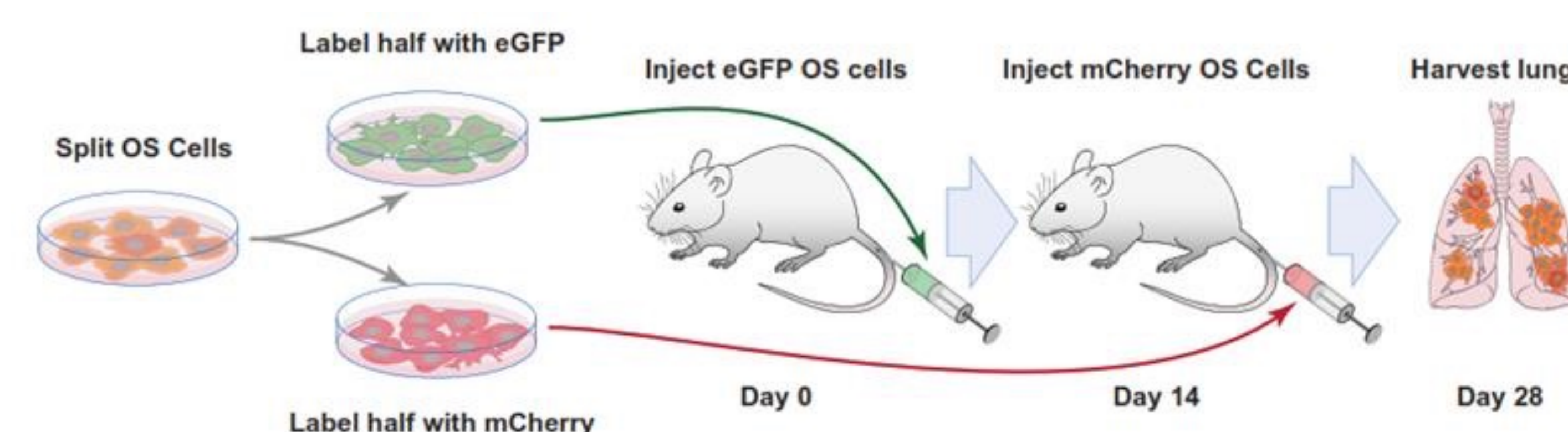
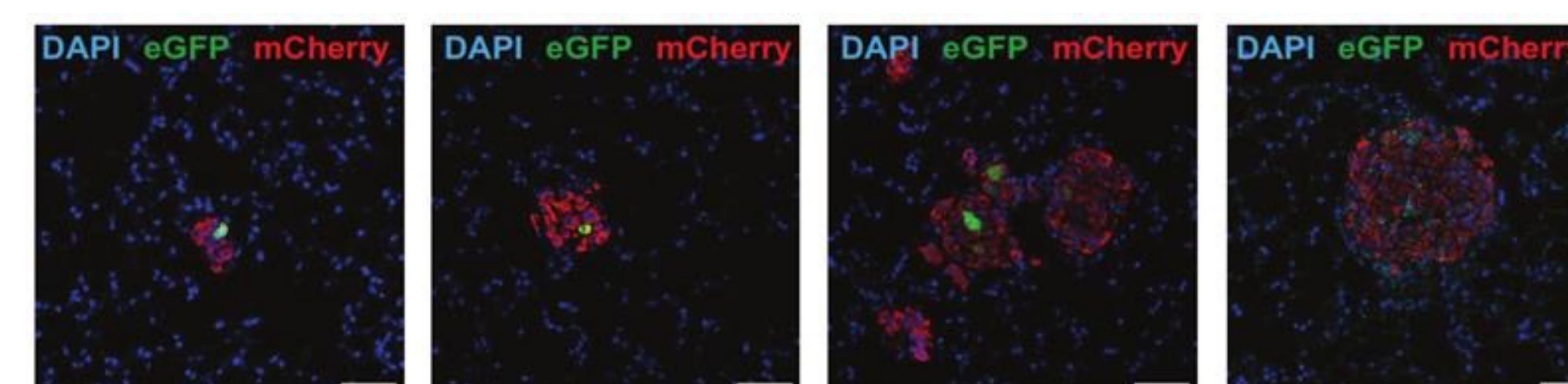


Figure 4: Cells are transduced with GFP or mCherry lentivirus before being injected at different timepoints.

A. "Red-Green" experiment set up

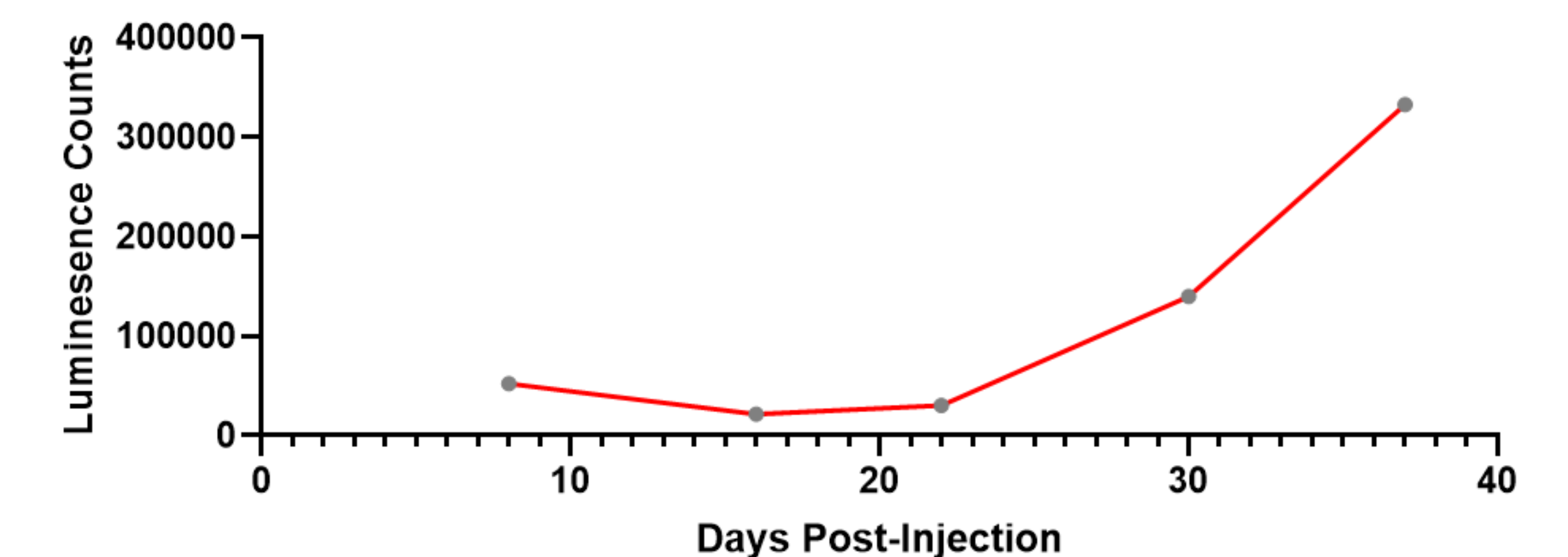


B. Resulting fluorescence microscopy images



Applications

B. Quantitative representation of disease progression



D. Quantitative representation of treatment response

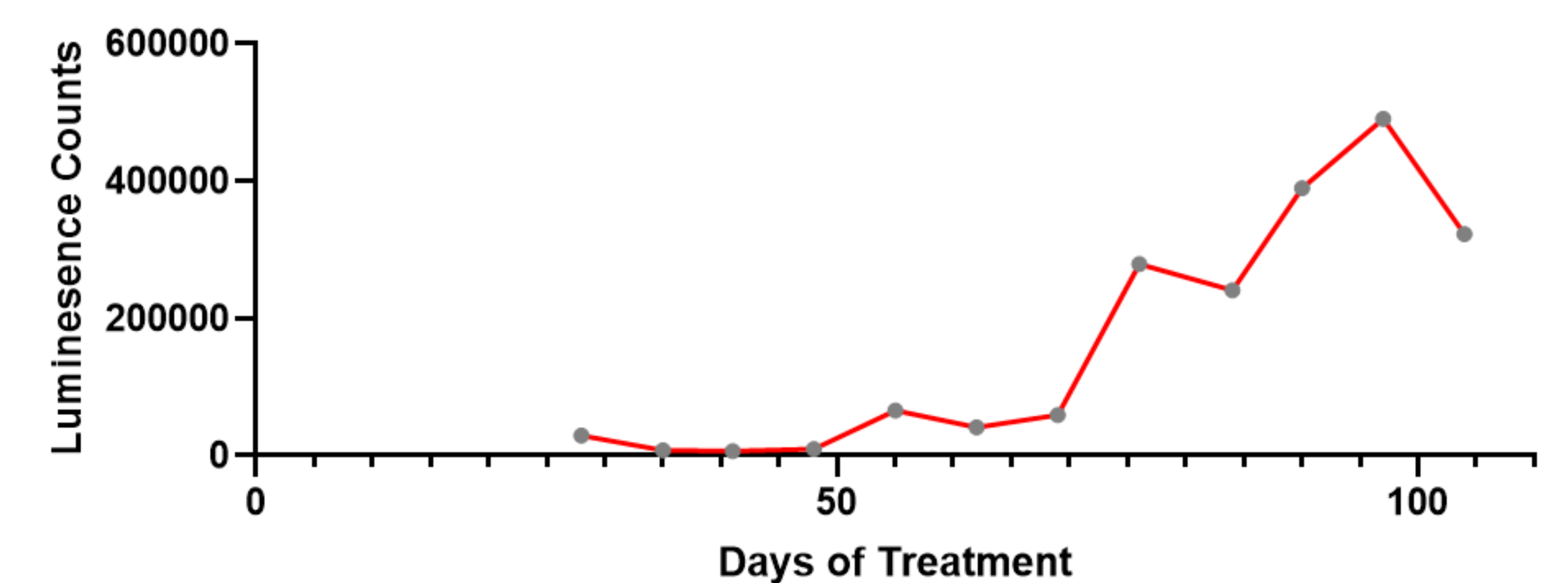
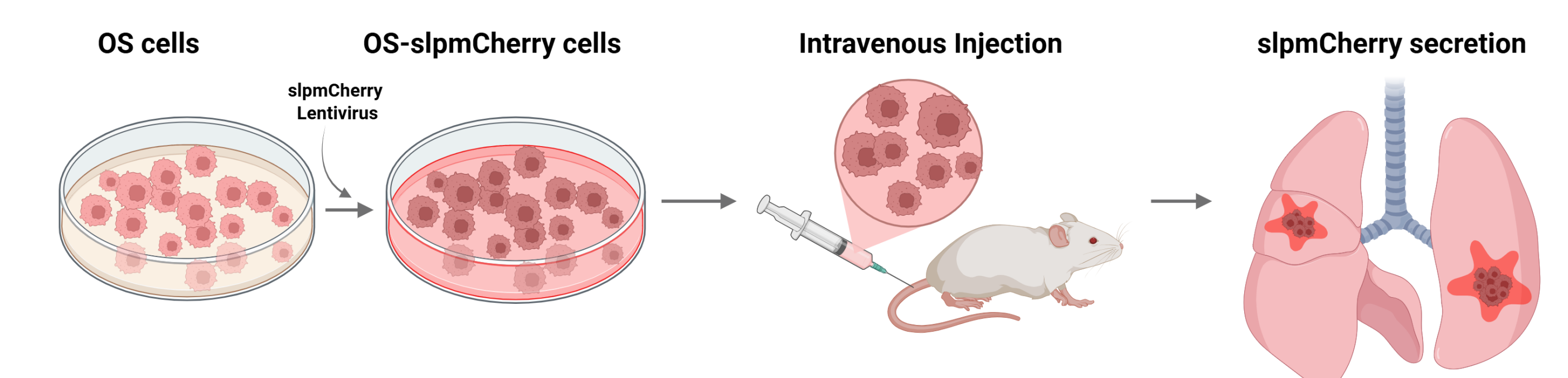


Figure 5: Cell lines are transduced to produce secretable soluble proteins that the surrounding micro-environment absorb.



Conclusions and Discussion

Leveraging these lentivirus systems has allowed our research to overcome previous challenges.

- ✓ Experimental disease progression can be monitored non-invasively
- ✓ Different phenotypes can be visually assessed and separated during analysis
- ✓ Tumor micro-environment is distinguishable from surrounding tissue

These systems could be employed in other experimental diseases, since other researchers often face similar obstacles, and further manipulations of cell lines using lentiviral systems could be developed.