Site-Specific Tumor Modeling: DIPG and Meningioma in Mice

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DIPG Model

- **Diffuse intrinsic pontine glioma (DIPG)** is an aggressive pediatric tumor of the pons, responsible for critical autonomic and motor functions. It accounts for 80% of childhood brainstem tumors and typically affects children age 5–10, with approximately 300 U.S. cases per year. The tumor is highly infiltrative and unresectable; radiation offers only transient benefit, and median survival remains 9–12 months1.
- Subcutaneous (s.c.) implantation shows poor tumor growth in both NCG and Athymic Nude mice, limiting utility for standard s.c. in vivo studies.
- Orthotopic implantation into the pons results in tumor growth, consistent with DIPG biology.
- Pons-resident tumors maintain disease-relevant behavior, supporting use for translational studies.

DIPG *in vivo* Growth

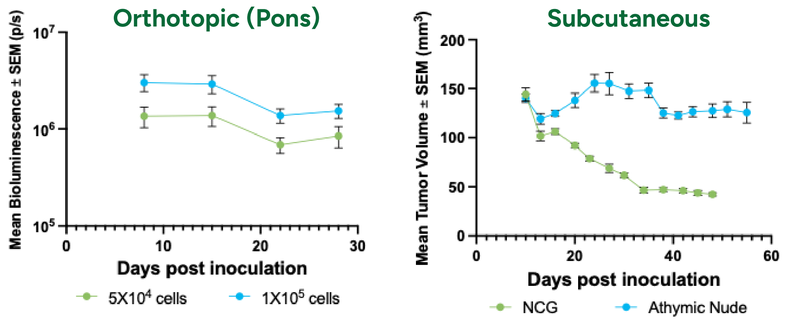

Figure 1: Comparison of SF8628 tumor growth following pons versus subcutaneous inoculation. A localized luminescent signal was observed in the pons region of athymic nude mice receiving intracranial inoculations of 5×10^4 or 1×10^5 cells. In contrast, subcutaneous inoculation of 1×10^7 cells (1:1 Matrigel:Serum-Free Media) in NCG mice resulted in tumor regression to volumes below 50 mm^3 over time. Subcutaneous implantation of 4×10^6 cells (1:1 Matrigel:Serum-Free Media) in athymic nude mice produced tumors that stabilized at approximately 120 mm^3.

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DIPG In-Life Imaging

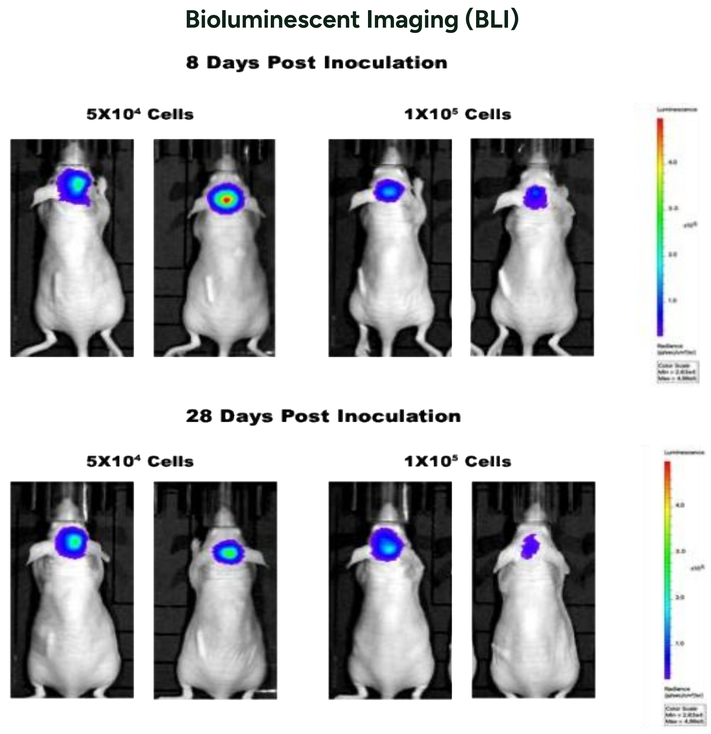

Figure 2: Evaluation of DIPG Tumor Growth in the Pons. Luminescent signal from pons-inoculated DIPG tumor cells was detectable at Day 8 and remained present at Day 28, with a modest decline possibly due to reduced luciferin delivery, hypoxia, and photon attenuation. Thirty days post inoculation, MRI showed a 5.4 mm inoculation tract extending from the skull surface to the right pons (short T2-weighted signal ~1.2 mm from the midline). A small subcutaneous chronic hemorrhage near the injection site was visible in both animals (2.5 × 0.2 mm and 1.2 × 0.4 mm).

Meningioma Model

- Meningiomas are the most common primary central nervous system tumors, constituting nearly 40% of intracranial tumors, and while generally benign, some exhibit invasive growth and recurrence requiring repeated treatment2
- Subcutaneous implantation models often show poor or unreliable tumor development, limiting their usefulness for translational studies, whereas orthotopic intracranial or subdural implantation produces tumors that closely mimic human meningiomas..2
- Subcutaneous (s.c.) implantation shows poor tumor growth in C.B-17 scid mice, limiting utility for standard s.c. in vivo studies.
- Orthotopic implantation into the meningioma results in tumor growth, consistent with meningioma biology.
- Subdural-resident tumors maintain disease-relevant behavior, supporting use for translational studies.

Meningioma *In Vivo* Growth

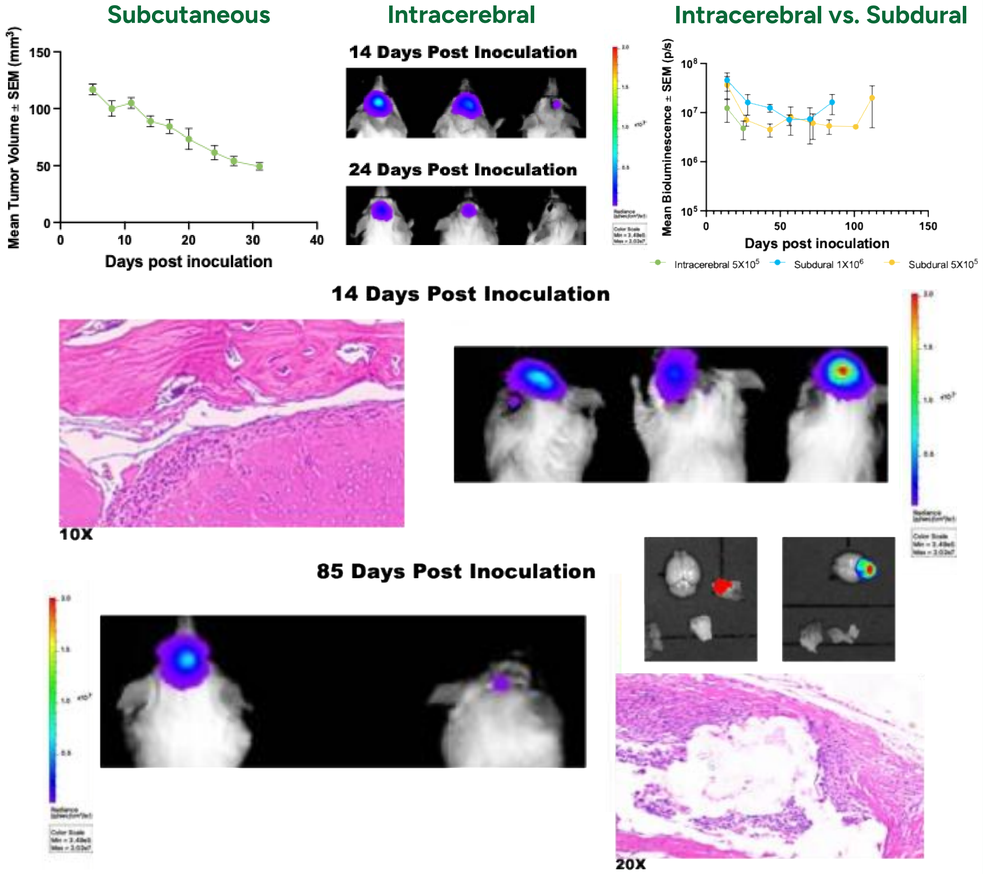

Figure 3: Comparison of Ben Men-1-luc tumor growth in C.B-17 SCID mice following subcutaneous, intracerebral, or subdural implantation. Subcutaneous inoculation of 1×10^7 Ben Men-1-luc cells (1:1 Matrigel:Serum-Free Media) resulted in declining tumor size over time, with an average tumor volume of 49.34 mm^3 at Day 31. Intracerebral implantation of 5×10^5 cells (1:1 Matrigel:HBSS) produced a luminescent signal that decreased by Day 24. In contrast, subdural implantation of 5×10^5 or 1×10^6 cells generated stable bioluminescent signal from Days 27 and 21 onward, respectively, with evidence of progressive growth by Days 101 and 85. *Ex vivo* luminescent and H&E imaging at termination confirmed tumors localized either to the brain surface or inner skull.

References

1. Diffuse Intrinsic Pontine Glioma – UpToDate (Marcus et al., 2025).
2. Khan M, et. al,, Modeling Meningiomas, Neurosurgery Clinics, 2023; 34, 479-492