

34. Metastasis and the Brain

2 units, Adrienne Boire, M.D., Ph.D., April 13-14, 2026

While this may appear to be a hyper-specialized topic, it is my hope that this lecture and discussion will highlight basic principles of cancer cell-microenvironmental interactions. Indeed, these interactions have proven extraordinarily important in metastasis to the central nervous system. We will focus on both the principles that have been recently discovered as well as the tools and techniques that have enabled us to reach our current level of understanding. Foundational papers from major investigators in the field of CNS metastasis will be presented. We will take advantage of knowledge gained from both clinical and basic science-based investigations to generate a balanced view of the field:

April 13, 2026 Part I:

- I. Introduction to CNS metastasis
 1. Anatomy of CNS metastases
 2. Clinical scope of the problem
 3. Clinical management of CNS metastases
- II. Current concepts and questions in CNS metastasis
 1. Modeling CNS metastasis
 2. Cancer cell evolution
 3. Microenvironmental selective pressure
 4. CNS barriers
 5. CNS immune surveillance

April 14, 2026 Part 2:

- III. Paper discussion: Ferraro GB et al Fatty acid synthesis is required for breast cancer brain metastasis. *Nat Cancer* 2021 Apr;2(4):414-428.
 - a. Student introduction
 - b. Student presentation of paper
 - c. Discussion
- IV. Novel work in CNS metastasis
 1. Adaptation of neuroscience techniques and approaches to CNS mets
 2. Liquid biopsy in CNS mets
 3. Microenvironmental-based therapeutic approaches
 4. "Omics" limitations and opportunities in CNS mets
- V. Final Q&A, Discussion