2. Hallmarks of Cancer

1 unit, Ylenia Cendon Florez – November 17, 2026

Instructions to students

1. Read all three papers (Hanahan & Weinberg 2000, 2011; Hanahan 2022) before your group meets. Pay attention not just to the hallmarks themselves, but to how the framework changed over time: which hallmarks were added, which were reframed, and why.

2. For each hallmark, identify the key experiments the papers cite as establishing it. Use the in-text citations and reference list in each paper to trace these back to the primary research articles. Read those primary papers.

3. Prepare a presentation that explains, for each hallmark:

   a. The hallmark's definition and how the Hanahan & Weinberg papers describe its discovery or conceptual development

   b. For each key experiment you identify: the model system used (cell line, mouse model, patient samples, etc.) and why it suited the question being asked

4. Avoid vague summaries. "Researchers found that telomerase helps cells live longer" is not sufficient. State which cells were used, what was manipulated, what was measured, and why the result was convincing evidence for the hallmark.

5. Cite your sources, including the primary papers you traced from the reviews, not just the review articles themselves.

Papers for discussion:

1) Hanahan D, Weinberg RA. The hallmarks of cancer. Cell. 2000 Jan 7;100(1):57-70. doi: 10.1016/s0092-8674(00)81683-9. PMID: 10647931.

   Students: Adelstein, Anna; Hodo, Yuki; Kapadia, Naviya; Kenum, Carson; Parikh, Julie; Schlau, Steven; Yuan, Eric; Zaroogian, Zachary

2) Hanahan D, Weinberg RA. Hallmarks of cancer: the next generation. Cell. 2011 Mar 4;144(5):646-74. doi: 10.1016/j.cell.2011.02.013. PMID: 21376230.

   Students: Artzi, Dorin; Davis, Samantha; Donahue, Rebecca; Kroepfl, Gabrielle; Lin, William; Patwari, Korey; Xu, Shengze

3) Hanahan D. Hallmarks of Cancer: New Dimensions. Cancer Discov. 2022 Jan;12(1):31-46. doi: 10.1158/2159-8290.CD-21-1059. PMID: 35022204.

   Students: Bui, Hien; Deng, Yiran; Hodson, Isabella; Pryor, Nora; Tavakoli, Nassim; Uwayesu, Rosine; White, Christian; Xing, Kristi