

Julio A. Aguirre-Ghiso, Ph. D.

Positions:

Endowed Professor, Department of Cell Biology

Member, Ruth L. and David S. Gottesman Institute for Stem Cell and Regenerative Medicine Research

Founding Director, Cancer Dormancy and Tumor Microenvironment Institute

Co-Director, Gruss-Lipper Biophotonics Center

Co-Leader, Tumor Microenvironment and Metastasis Program, Albert Einstein Cancer Center

Albert Einstein College of Medicine

Research interests:

Dr. Aguirre-Ghiso's work focuses on understanding the biology of residual cancer cells that persist in a dormant state after initial therapy. His research team led, along with others, a paradigm shift, revealing novel cancer biology that diverges from the notion that cancer is perpetually proliferating. His team discovered that reciprocal crosstalk between disseminated tumor cells and the microenvironment regulates the inter-conversion between dormancy and proliferation of metastasis. This process requires defined adult and embryonic stem cell programs not previously linked to metastatic progression. His lab has also provided mechanistic advances to the understanding of the process of early dissemination in breast cancer and how pluripotency regulating transcription factors active during blastocyst stage control this process and early disseminated cancer cell dormancy. His work also has mechanistically explored how adaptive pathways such as the unfolded protein response allow cancer cells to persist while quiescent. This knowledge enables targeting these plasticity programs found in stem cells to stop residual cancer before it becomes clinically detectable and thus preventing recurrences. His research, which has been applied in clinical studies, is revealing ways to maintain residual cancer dormancy, kill dormant cancer cells, and utilize markers to determine the dormant or active state of disseminated cancer cells.

Current grant funding:

R01CA109182 (Aguirre-Ghiso PI) (NIH/NCI)	01/12/22 – 06/30/26 Functional Determinants of Metastatic Dormancy
R03CA259656 (Aguirre-Ghiso PI) (NIH/NCI)	12/01/21 – 02/28/23 Immune Regulation of Disseminated Cancer Cell Dormancy
R01CA218024 (Aguirre-Ghiso, Bernstein MPI) (NIH/NCI)	01/11/22 – 05/31/22 Epigenetic & microenvironmental regulation of dormant disseminated cancer
R01CA253977(Aplin,Aguirre-Ghiso MPI) (NIH/NCI)	09/01/20 – 05/31/25 Mechanisms of uveal melanoma dormancy and targeted therapy tolerance

Recent publications (selected):

- Khalil BD, Sanchez R, Rahman T, Rodriguez-Tirado C, Moritsch S, Rodriguez Martinez A, Miles B, Farias E, Mezei M, Cheung JF, Nobre AR, Kale N, Sproll KC, Sosa MS, Aguirre-Ghiso JA. A specific agonist of the orphan nuclear receptor NR2F1 suppresses metastasis through the induction of cancer cell dormancy. *J. Exp. Medicine* (2021).
- Casanova-Acebes M, Dalla E, Leader A, LeBerichel J, Nikolic J, Morales BM, Brown M, Chang M, Troncoso L, Chen ST, Sastre-Perona A, Park MD, Tabachnikov A, Dhainaut M, Hamon P, Maier B, Sawai CM, Agulló-Pascual E, Schober M, Brown B, Reizis B, Marron T, Kenigsberg E, Moussion C, Benaroch P, Aguirre-Ghiso JA, Merad M. Lineage tracing reveals the unique pro-tumorigenic niche role of tissue-resident macrophages in early cancer lesions. *Nature* 595, 578–584 (2021).
- Nobre R, Risson E, Singh DK, Di Martino JS, Cheung JF, Wang J, Johnson J, Russnes HG, Bravo-Cordero JJ, Birbrair A, Naume B, Azhar M, Frenette PS, Aguirre-Ghiso JA. Bone marrow NG2+/Nestin+ mesenchymal stem cells drive DTC dormancy via TGF- β 2. *Nature Cancer* 2, 327–339 (2021).
- Linde N, Casanova-Acebes M, Sosa MS, Mortha A, Rahman A, Farias EF, Harper K, Tardio E, Reyes Torres I, Jones J, Condeelis J, Merad M, and Aguirre-Ghiso JA. Macrophages orchestrate breast cancer early dissemination and metastasis. *Nature Communications* 9, 21(2018)
- Fluegen G, Avivar-Valderas A, Wang Y, Padgen M, Williams JK, Verkhusha V, Cheung JF, Entenberg D, Castracane J, Keely PJ, Condeelis J, Aguirre-Ghiso JA. Phenotypic heterogeneity of disseminated tumor cells is predetermined by primary tumor hypoxic microenvironments. *Nature Cell Biology* (2017)
- Harper K, Sosa MS, Hosseini H, Entenberg D, Avivar-Valderas A, Nagi C, Davis RJ, Farias EF, Condeelis J, Klein C, Aguirre-Ghiso JA. Mechanism of early dissemination and metastasis during early stages of HER2+ mammary cancer. *Nature* (2016) Dec 14. doi: 10.1038/nature20785.
- Hosseini, H, Harper K, Obradovic M, Sosa MS, Nanduri LK, Werno C, Hoffman, M, Ehrl C, Maneck M, Patwary N, Haunschild G, Reimelt C, Weeber F, Hartkopf A, Taran FA, Brucker SY, Fehm T, Meister G, Aguirre-Ghiso JA, Klein CA. Early dissemination seeds metastasis in breast cancer. *Nature*. (2016) Dec 14. doi: 10.1038/nature20609.