

Stochastic State Transitions Give Rise to Phenotypic Equilibrium in Populations of Cancer Cells

Piyush B. Gupta,^{1,6,*} Christine M. Fillmore,² Guozhi Jiang,¹ Sagi D. Shapira,¹ Kai Tao,³ Charlotte Kuperwasser,^{2,3} and Eric S. Lander^{1,4,5,*}

¹Broad Institute, Cambridge, MA 02142, USA

²Department of Anatomy and Cellular Biology, Sackler School of Graduate Biomedical Sciences, Tufts University School of Medicine, 136 Harrison Avenue, Boston, MA 02111, USA

³Molecular Oncology Research Institute, Tufts Medical Center, Boston, MA 02111, USA

⁴Department of Biology, Massachusetts Institute of Technology, Cambridge, MA 02142, USA

⁵Department of Systems Biology, Harvard Medical School, Boston, MA 02115, USA

⁶Present address: Department of Biology, Massachusetts Institute of Technology, and Whitehead Institute for Biomedical Research, Cambridge, MA 02142, USA

*Correspondence: pgupta@wi.mit.edu (P.B.G.), lander@broadinstitute.org (E.S.L.)

DOI 10.1016/j.cell.2011.07.026

SUMMARY

Cancer cells within individual tumors often exist in distinct phenotypic states that differ in functional attributes. While cancer cell populations typically display distinctive equilibria in the proportion of cells in various states, the mechanisms by which this occurs are poorly understood. Here, we study the