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How stability can lead to variability: Induction timecourse of a eukaryotic gene WILLIAM BLAKE, GABOR BALAZSI, Applied BioDynamics Laboratory, Boston University, FARREN ISAACS, Genetics Department, Harvard Medical School, KEVIN MURPHY, Applied BioDynamics Laboratory, Boston University, YINA KUANG, DAVID R. WALT, Department of Chemistry, Tufts University, JAMES J. COLLINS, Applied BioDynamics Laboratory, Boston University — Using an engineered GAL1 promoter as a model, we study the effect of the promoter-scaffold stability on the mean and noise of gene expression during an induction timecourse. In agreement with experimental observations, we find that decreasing transcription scaffold stability results in slower buildup of protein product and lower levels of noise at the protein level. This is a consequence of "transcriptional bursting," observed in the simulations as well as experiment, where optical fiber-based technology was used to monitor induction timecourses in individual cells.

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