

Abstract Submitted  
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**The effects of nongenetic memory on population level sensitivity to stress**<sup>1</sup> RHYS ADAMS, DMITRY NEVOZHAY, The University of Texas MD Anderson Cancer Center, ELIZABETH VAN ITALLIE, MATTHEW BENNETT, Rice University, GABOR BALAZSI, The University of Texas MD Anderson Cancer Center — While gene expression is often thought of as a unidirectional determinant of cellular fitness, recent studies have shown how growth retardation due to protein expression can affect gene expression levels in single cells. We developed two yeast strains carrying a drug resistance protein under the control of different synthetic gene constructs, one of which was monostable, while the other was bistable. The gene expression of these cell populations was tuned using a molecular inducer so that their respective means and noises were identical, while their nongenetic memory properties were different. We tested the sensitivity of these two cell population distributions to the antibiotic zeocin. We found that the gene expression distributions of bistable cell populations were sensitive to stressful environments, while the gene expression distribution of monostable cells were nearly unchanged by stress. We conclude that cell populations with high nongenetic memory are more adaptable to their environment.

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