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Effects of initial telomere length distribution on senescence onset and heterogeneity

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Abstract. Replicative senescence, induced by telomere shortening, exhibits considerable asynchrony and heterogeneity, the origins of which remain unclear. Here, we formally study how telomere shortening mechanisms impact on senescence kinetics and define two regimes of senescence, depending on the initial telomere length variance. We provide analytical solutions to the model, highlighting a non-linear relationship between senescence onset and initial telomere length distribution. This study reveals the complexity of the collective behavior of telomeres as they shorten, leading to senescence heterogeneity.

Keywords: stochastic model, telomere, telomerase, replicative senescence, yeast

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