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Jianjun Paul Tian* (jtian@nmsu.edu), 259 SH, Department of Mathematical Sciences, New Mexico State University, Las Cruces, NM 88001. *Stochastic growth pattern of untreated human glioblastomas predicts the survival time for patients.* Preliminary report.

Glioblastomas are highly malignant brain tumors. Knowledge of growth rates and growth patterns is useful for understanding tumor biology and planning treatment logistics. Based on untreated human glioblastoma data collected in Trondheim, Norway, we first fit the average growth to a Gompertz curve, then find a best fitted white noise term for the growth rate variance. Combining these two fits, we obtain a new type of Gompertz diffusion dynamics, which is a stochastic differential equation (SDE). Newly collected untreated human glioblastoma data in Seattle, US, verifies our model. Instead of growth curves predicted by deterministic models, our SDE model predicts a band with a center curve as the tumor size average and its width as the tumor size variance over time. Given the glioblastoma size in a patient, our model can predict the patient survival time with a prescribed probability. Our model can be applied to studies of tumor treatments. As a demonstration, we investigate different protocols of surgical resection using our model and provide detailed strategies. This is a joint work with Ziwei Ma, Ben Niu, Tuan Phan, Philip Maini, Eric Holland, et al. (Received September 17, 2019)