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New dimensions in Gompertzian growth. (English) Zbl 0962.92029

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Summary: The Gompertz function was formulated to represent an actuarial curve, yet it often fits growth of organisms, organs and tumors. Despite numerous attempts, no consensus has been forged about the biological foundation of the broad applicability of the model. Here we revisit the Gompertzian notion of the “power to grow” and equate it with growth fraction. Aside from conferring biological interpretability to the model, this approach allows a conceptual separation of the growth fraction term from the kinetic term in the model, leading to the possibility of exploring the behavior of Gompertzian growth with fractal kinetics. Significantly, we found that empirical models such as the logistic model, the von Bertalanffy model and the von Bertalanffy-Richards model, together with the originative Gompertz model, are special cases of Gompertzian growth in fractal space. This finding permits an analysis of the growth kinetics of tumors which might affect model-based design of chemotherapy protocols.

MSC:

[92D25](#) Population dynamics (general)

[92C50](#) Medical applications (general)

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[Gompertz formula](#); [fractal kinetics](#); [tumors](#); [growth fraction](#)

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