Derivation of potential energy function for cell survival from an age-structured population model

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Applications of potential energy have contributed to infer a possible configuration of chemical particles as a stable state in an energy landscape at which associated potential energy attains its minimum [1]. Although conceptual use of potential energy and landscape exists to describe cell differentiation in the field of life-science, a quantitative and mathematical formulation for potential energy have not been fully developed yet. Applications of DNA sequencers (next generation sequencers: NGS) such as single cell transcriptomics give opportunities to perform data-driven inference of cell differentiation.

In this talk, we present our recent progress on investigating a relationship between popular data analysis method based on the inference of potential energy with the mathematical formulation of a potential energy function. More specifically, we show that a potential energy function for cell survival is derived from a quantitative mathematical model describing *in vitro* cell proliferation dynamics which is described by a basic age-structured population model.

References

[1] David Wales, *Energy Landscapes: Applications to Clusters, Biomolecules and Glasses (Cambridge Molecular Science)*. Cambridge University Press, 1st Edition, 2004.

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