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Multifractal characteristics of BK channels' activity in human glioblastoma cells

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BK channels are voltage-gated potassium channels that exhibit large single-channel conductance. They are involved in a number of important physiological processes including the pathogenesis of several diseases. In this work, we analyze the multifractal properties of glioblastoma BK channels activity in different experimental conditions. The sequences of ion currents and dwell times of BK channels' states are analyzed under the influence of such factors like the mechanical strain of the cell membrane at its hyper- and depolarization. In addition, the different stages of membrane fatigue obtained by the repeated membrane stimulation (by suction) are taken into consideration. Among the several methods used for the investigation of the ion channels dynamics here, the advantage lies within the techniques which take into account its nonlinear character. This approach offers a better insight into a complex nature of the biosystem and is closely related to the real phenomena associated with its ability to adapt to the ever-changing environment. For a comprehensive evaluation of analyzed time series, the Multifractal Detrended Fluctuation Analysis was applied. Through this method, the long-range memory effect measured by the Hurst exponent was examined at different scaling regimes.

- [1] Zheng, Jie, and Matthew C. Trudeau, eds. Handbook of ion channels. CRC Press, 2015.
- [2] Liebovitch, Larry S., et al. "Fractal methods to analyze ion channel kinetics." *Methods* 24.4 (2001): 359-375.
- [3] Siwy, Zuzanna, Marcel Ausloos, and Kristinka Ivanova. "Correlation studies of open and closed state fluctuations in an ion channel: Analysis of ion current through a large-conductance locust potassium channel." *Physical Review E* 65.3 (2002): 031907.

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