Nonlinear dynamics of respiration, from frog to man

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Intuitive thinking would suggest that human ventilation is a repetitive monotonous phenomenon. In fact it is not and breath-by-breath variability seems to characterize health. Beyond that, the trajectory of the human ventilatory flow at rest adopts a chaos-like dynamics with nonlinear behavior and decrease in predictability as time elapses. The physiological meaning of such a property is not yet clear. Experimental data obtained in humans suggest that it may take its source at the level of the automatic, neurovegetative command of breathing located in the brainstem. Recordings performed on the isolated brainstem of the tadpole show that the trajectory of the motor respiratory output also adopts nonlinear chaos-like dynamics. Thus, nonlinear dynamics of breathing take likely their source in the automatic command of breathing and may be a feature common to many vertebrates. Further investigations are needed to elucidate its phylogenetic meaning.