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A preliminary model of phosphorylation states of endothelial nitric oxide synthase. Preliminary report.

Nitric oxide is an important cellular signaling molecule, and endothelial nitric oxide synthase (eNOS) serves as a signaling junction box receiving various inputs and regulating NO production for control in processes of homeostasis, adaptation, and development (e.g. vascular tone, insulin production, angiogenesis, etc.). Various agents influence NO production via phosphorylation and dephosphorylation of eNOS. Evidence of oscillation between inactive and active states of kinases and phosphatases has been detected experimentally consistent with feedback mechanism in signal transduction. We consider a feedback model for phosphorylation in eNOS signaling described by a coupled system of ordinary differential equations. Introduction of time delays (corresponding to formation of protein complexes, diffusion, interactions of unspecified intermediaries, etc.) is considered and is shown to produce oscillatory behavior. (Received September 11, 2014)