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Bursting activity has been reported in many different neurons and associated with a variety of functions of the nervous system. Our study is focused on determining the biophysical and bifurcational mechanisms underlying the emergence and evolution of bursting activity via reduction to 1D Poincare mappings. Bifurcation analysis allows one to study comprehensively the dynamical mechanisms of regulation of temporal and qualitative characteristics of neuronal activity. (Received August 27, 2005)