Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Determining behaviors of biological networks with dynamic logic method. SUPING LYU, Medtronic Inc — Dynamic logic method was used to study dynamic behaviors of some network motifs. This method combines logic operations and kinetic parameters of biological interactions (response or delay times). The analysis is simple because it is pure symbolic operation without numerical calculation. We proved in general that if networks are cycles with an odd number of suppression interactions, the cycles will oscillate. Delay times are necessary for oscillatory networks. If delay times are zero, the systems stay at stable states. If there are an even number of suppression interactions, the cycles have two stable states. Signal travel in chain-like networks was also studied. The depths of travel depend on the pulse width of signals and the filters of chains. Same signals with different pulse widths can have different biological responses (one stimulation to multiple responses). When pulsive signal travel in cycles, they can remain to be pulses, die, or become flat (all active) depending on the filters of cycles. The coupled cycles have complicated behaviors that are determined by their intrinsic structures and filters. Interestingly, chaotic behaviors were very rarely observed from analysis.

SuPing Lyu
Medtronic Inc

Date submitted: 27 Nov 2007 Electronic form version 1.4