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Dynamical Systems, Cytokine Storms, and Blood Filtration
GLENN FOSTER, ALFRED HUBLER, Center for Complex Systems Research, University of Illinois at Urbana-Champaign, Department of Physics — Various infections and non-infectious diseases can trigger immune cells and the proteins (cytokines) the cells use to communicate with each other to be caught in a positive feedback loop; this "cytokine storm" is frequently fatal. By examining the network of cytokine-immune cell interactions we will illustrate why anti-mediator drugs have been generally ineffective in stopping this feedback. A more effective approach may be to try and reduce interactions by dampening many signals at once by filtering the cytokines out of the blood directly (think dialysis). We will argue that feedback on an out of control nonlinear dynamical system is easier to understand than its normal healthy state and apply filtration to a toy model of immune response.

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