

**CRUNCH Seminars at Brown, Division of Applied Mathematics**

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**(Systems biology informed deep learning applied to a red blood cell clearance model)**

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**Biological systems can be modeled using a set of ODEs. With only a few experimental measurements, not all of the parameters and dynamics of a biological system can be recovered. Predicting the unknown parameters and dynamics of these systems is a key objective in systems biology. Achieving this can be done by using a systems-informed neural network. A systems-informed neural network includes the system of ODEs, which adds constraints to the optimization method and makes it robust to noisy data. In this work, a systems-informed neural network is used to infer unknown parameters and unobserved species' dynamics for a model of red blood cell clearance occurring in the spleen. Furthermore, the initial conditions and parameter values of the ODE system are patient-specific, so these values are adjusted for the model to be applicable to individuals with sickle cell disease in addition to individuals with no red blood cell disorders.**