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**Nicholas K Eriksson\*** (eriksson@math.berkeley.edu) and **Niko Beerenwinkel**. *Evolution on partially ordered sets*.

We present a model of evolution and apply it to the development of drug-resistance in HIV. In this model, we consider a set of  $n$  specific mutations which are the difference between the wild type and a resistant type. The realistic assumption that these mutations can only occur in certain orders leads to a multi-state branching process on a partially ordered set, corresponding to the possible mutation patterns the virus can take.

We show that the risk of escape (that is, the risk of mutation from the wild type to the resistant type) is closely related to the order complex of the poset and can be computed using algebraic techniques. We study the combinatorics of the *risk polynomial* and apply these methods to analyze the risk of drug resistance for three HIV therapies. (Received September 27, 2005)