

Bayesian Statistical Inference in Ion-Channel Models with Exact Missed Event Correction

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The stochastic behaviour of single ion channels is most often described as an aggregated continuous-time Markov process with discrete states. For ligand-gated channels each state can represent a different conformation of the channel protein or a different number of bound ligands. Single channel recordings show only whether the channel is open or shut: states of equal conductance are aggregated, so transitions between them have to be inferred indirectly. The requirement to filter noise from the raw signal further complicates the modelling process, as it limits the time resolution of the data. The consequence of the reduced bandwidth is that openings or shittings that are shorter than the resolution cannot be observed; these are known as missed events and cause many challenges when inferring parameters. In this talk I¹ll give an introduction to the first Bayesian modelling of such ion-channel models with exact missed events correction, and demonstrate why this approach is necessary for avoiding bias in the resulting parameter estimates.