A kinetic model for chemical neurotransmission[1] GUILLERMO
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tuto de Fisiologia Celular, UNAM — Recent experimental observations in presy-
naptic terminals at the neuromuscular junction indicate that there are stereotyped
patterns of cooperativeness in the fusion of adjacent vesicles. That is, a vesicle in
hemifusion process appears on the side of a fused vesicle and which is followed by
another vesicle in a priming state while the next one is in a docking state. In this
talk we present a kinetic model for this morphological pattern in which each vesi-
cle state previous to the exocytosis is represented by a kinetic state. This chain
states kinetic model can be analyzed by means of a Master equation whose solu-
tion is simulated with the stochastic Gillespie algorithm. With this approach we
have reproduced the responses to the basal release in the absence of stimulation
evoked by the electrical activity and the phenomena of facilitation and depression of
neuromuscular synapses. This model offers new perspectives to understand the un-
derlying phenomena in chemical neurotransmission based on molecular interactions
that result in the cooperativity between vesicles during neurotransmitter release.

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