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Fusion versus endocytosis: the stochastic entry of enveloped viruses TOM CHOU, UCLA — Viral infection requires the binding of receptors on the target cell membrane to glycoproteins, or "spikes," on the virus membrane. Fusion peptides that make up part of these spikes on the viral membrane may then be triggered by pH changes or binding of additional coreceptors. Thus, binding of virus envelope proteins to cell surface receptors not only initiates the viral adhesion and the wrapping process necessary for internalization, but also starts the direct fusion process. Both fusion and internalization may be viable pathways for some viruses, under appropriate conditions. We develop a stochastic model for viral entry that incorporates both receptor mediated fusion and endocytosis. The relative probabilities of fusion and endocytosis of a virus particle initially nonspecifically adsorbed on the host cell membrane are computed as functions of receptor concentration, binding strength, and number of spikes. We find the parameter regimes where each pathway is expected to arise and discuss possible experimental tuning of these parameters.

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