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Calculating the mean time to capture for tethered ligands and its effect on the chemical equilibrium of bound ligand pairs[1] LU SHEN, CAITLIN DECKER, HEATHER MAYNARD, ALEX LEVINE, UCLA — Cells interact with a number of extracellular proteins including growth factors, which are essential for e.g., wound healing and development. Some of these growth factors must form dimers on the cell surface to initiate their signaling pathway. This suggests one can more efficiently induce signaling via polymer-linked proteins. Motivated by experiments on a family of fibroblast growth factors linked by polymers of varying molecular weight [C.G. Decker et al., Biomaterials 81, 157 (2016)] we investigate theoretically the effect of the length of the linking polymer on the binding kinetics of the dimers to a receptor-covered surface. We show, through a first-passage time calculation, how the number of bound dimers in chemical equilibrium depends on the linker molecular weight. We discuss more broadly the implications for a variety of signaling molecules.

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