Table S2: Simulation Parameters: EB1 Dynamics

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| --- | --- | --- | --- | --- |
| Parameter | Description | Simulation Baseline Value | Reported Literature Values | Reference |
| [EB1] | Free EB1 concentration in the simulation | 200 nM | N/A | Matched to Experiment |
| *kon, Lattice* | EB1 on-rate constant per closed-lattice binding site (GTP or GDP) | ~0.09-0.18 s-1 nM-1*(for comparison purposes, this value was scaled up from 2.3x10-5 nM-1 site-1 s-1 using the mean ± sd of MT length in simulation)**[Figs. 2G, H, S2, S3: 4.7x10-5 nM-1 site-1 s-1* *~0.18±0.02 s-1nM-1]* | ~0.12 s-1 nM-1 | (Maurer et al., 2014; Song et al., 2020) |
| *kon, Edge* | EB1 on-rate constant per protofilament-edge binding site (GTP or GDP) | 1.6x10-3 nM-1 site-1 s-1 *(70X increase in on-rate at proto. edges)**[Figs. 2G, H, S2, S3: 2.3x10-3 nM-1 site-1 s-1* *(50X increase in on-rate at proto. edges)]* | 50-70X faster than lattice sites | (Reid et al., 2019)  |
| *koff, GDP Lattice* | EB1 off-rate constant from GDP closed-lattice sites | 1.7-3.3 s-1 *[Figs. 2G, H, S2, S3:* *3.3 s-1]* | 3.4±0.2 s-1 | (Maurer et al., 2014; Song et al., 2020) |
| *koff, GTP Lattice* | EB1 off-rate constant from GTP closed-lattice sites | 0.29 s-1 | ~0.38 s-1 *(Estimated from* *koff, lattice above, and reported Kd ratio for tip:GDP [=] 285/31 = 9)* | (Maurer et al., 2014; Song et al., 2020) |
| *koff, GTP Edge* | EB1 off-rate constant from GTP protofilament-edge sites | 2.9 s-1 *(10X increase from GTP closed-lattice sites)* | N/A | 1See bond energy justification |

1Off-rate from protofilament-edges relative to closed-lattice sites was estimated using bond energy arguments. EB1 bonded to a closed lattice site has 4 bonds, while EB1 bonded to a protofilament-edge site has 2 bonds. Therefore, the off-rates could be related to the energies via:

$\frac{k\_{off,edge}}{k\_{off,lattice}}\~\frac{e^{-\frac{2∆G}{k\_{b}T}}}{e^{-\frac{4∆G}{k\_{b}T}}}=e^{\frac{∆G}{k\_{BT}}\left(-2+4\right)}$ (1)

Thus, a rough estimate of the fold-increase in EB1 off-rates from 4-bond closed lattice sites to 2-bond protofilament edges could be e2 = 7. Because an increased off-rate from protofilament edges would decrease the residence time on the protofilament-edges, we used a conservative estimate of a 10-fold increase in EB1 off-rate from GTP-tubulin protofilament edges relatively to GTP-tubulin closed-lattice sites. The simulation was insensitive to the GDP-tubulin protofilament edge off-rate value used (Fig. 1- Fig. supplement 2G-I), because GDP-tubulin edge sites were rarely present in the simulation.