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Behavior of T-Tubulin-Interactions at Low Concentrations of Colchicine in the Microtubule Steady State

MITRA SHOJANIA FEIZ-ABADI, Physics Department, Virginia Tech, WILLIAM B. SPILLMAN, Physics Department, Virginia Tech, APPLIED BIOSCIENCE CENTER OF VIRGINIA TECH COLLABORATION — Microtubules are the target for a large number of anti-mitotic agents including colchicine. Colchicine is a well studied inhibitor that is believed to act by disrupting the microtubule requirements for chromosome movement during mitosis. The mechanism of action of colchicine in vitro and at low concentration is due to kinetic stabilization of spindle microtubule dynamics. In this study we investigate the behavior of free T-tubulin concentration in the microtubule steady state and in the presence colchicine. We assume that there is an excess of GTP (guanosine tri-phosphate) available in the solution, and that the D-tubulin in the solution will exchange its unit of GDP (guanosine di-phosphate) with a unit of GTP. By numerical analysis, the concentration of T-tubulin in the steady state as a function of regeneration rate was investigated in the presence and absence of colchicine. Our results show that low concentration of colchicine in the steady state does not significantly alter the amount of free total T-tubulin concentration or the polymer mass, in good agreement with experimental observations.

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