

Citation on Dr. Ankit Rai Research Work

Dr. Rai is working in the field of cytoskeleton dynamics, studying the interaction of cancer drugs with microtubules and the mechanisms of resistance development to these drugs. Dr. Rai has investigated the molecular mechanism underlying the action of microtubule-binding cancer drugs by employing advanced in vitro reconstitution assays. He directly visualized drug-microtubule interactions in real time using high-resolution microscopy, including single-molecule imaging. Dr. Rai has made the unexpected discovery (published in **Nature Materials**) that the extensively studied microtubule-stabilizing cancer drug Taxol can specifically bind to microtubule ends when microtubule structure is perturbed, stabilize these ends but prevent their closure into tubes. Microtubule polymers grown in the presence of Taxol thus contain stable “holes” in their regular lattice. Subsequently, Dr. Rai has shown that microtubule lattice defects induced by Taxol and related drugs can exert effects that can propagate over long distances and affect the dynamic state of the microtubule end. Dr. Rai has published this study in **Proc. Natl. Acad. Sci. USA** which fundamentally affects thinking on how microtubule dynamics is regulated and helps to explain the enigmatic phenomenon of microtubule aging. An interesting therapeutically relevant implication of these findings is the unexpected cooperativity between microtubule destabilising and stabilising compounds in their ability to inhibit cancer cell growth which open a new window for combination therapy for cancer treatment. Dr. Rai’s research work is opening up new avenues for improving cancer chemotherapy.



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