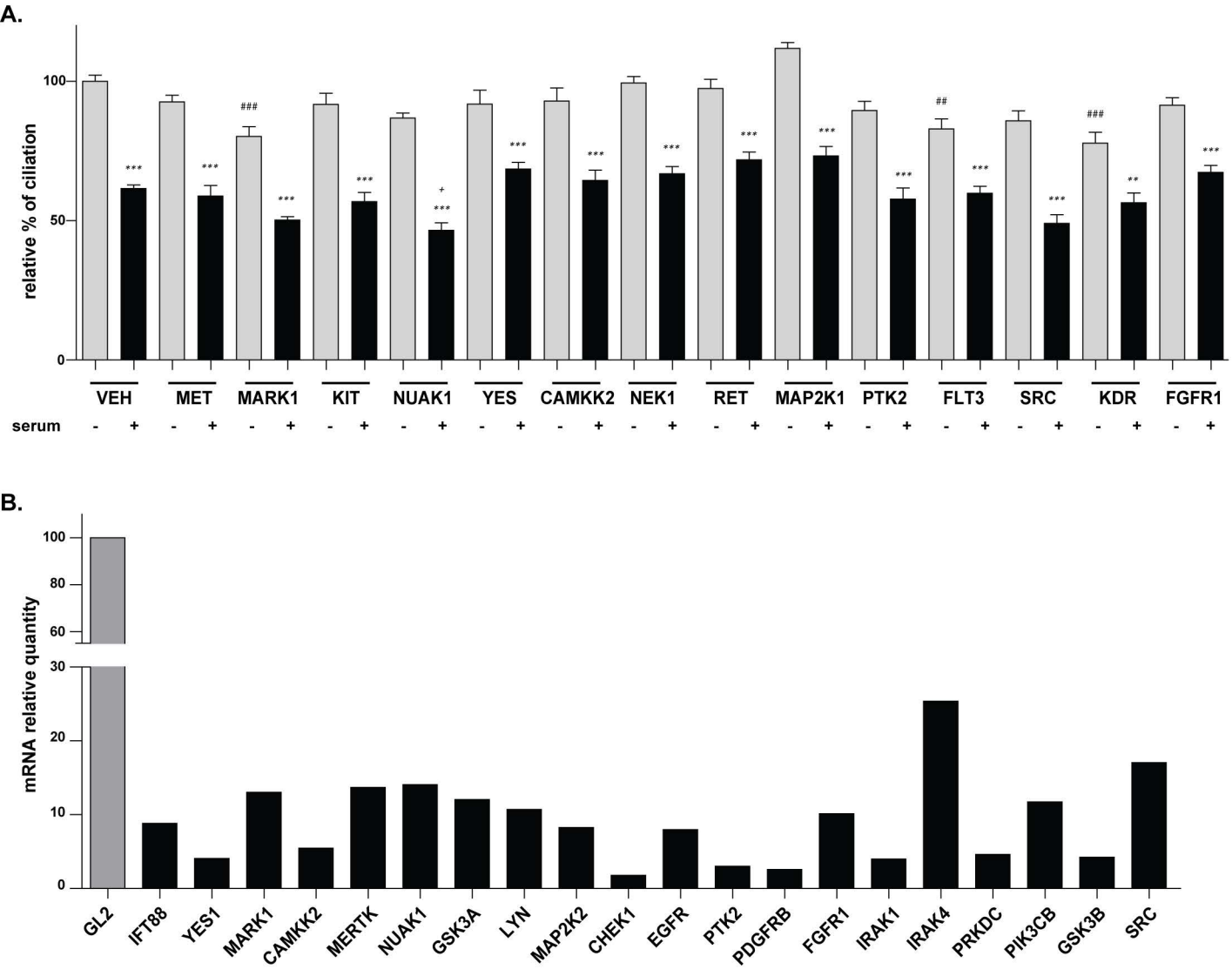
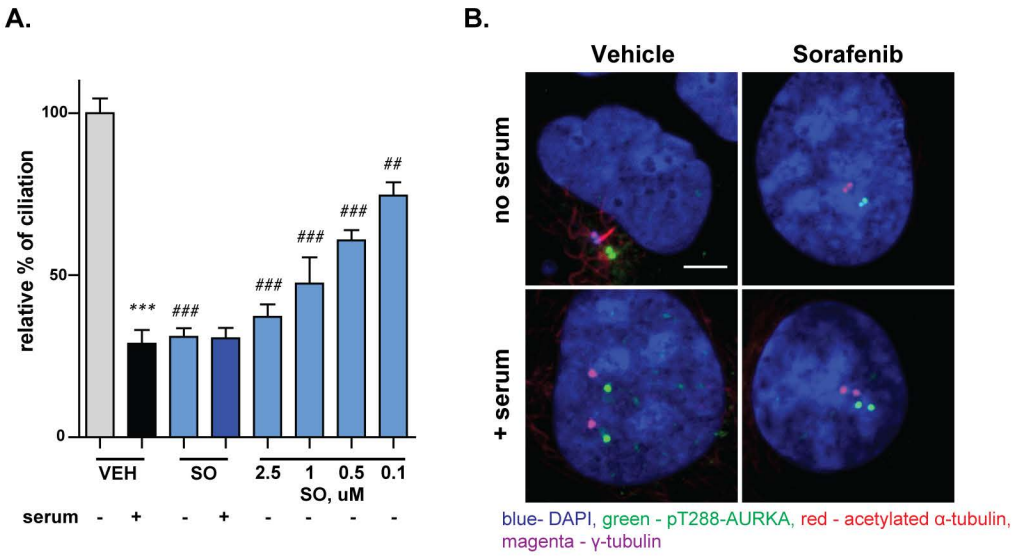
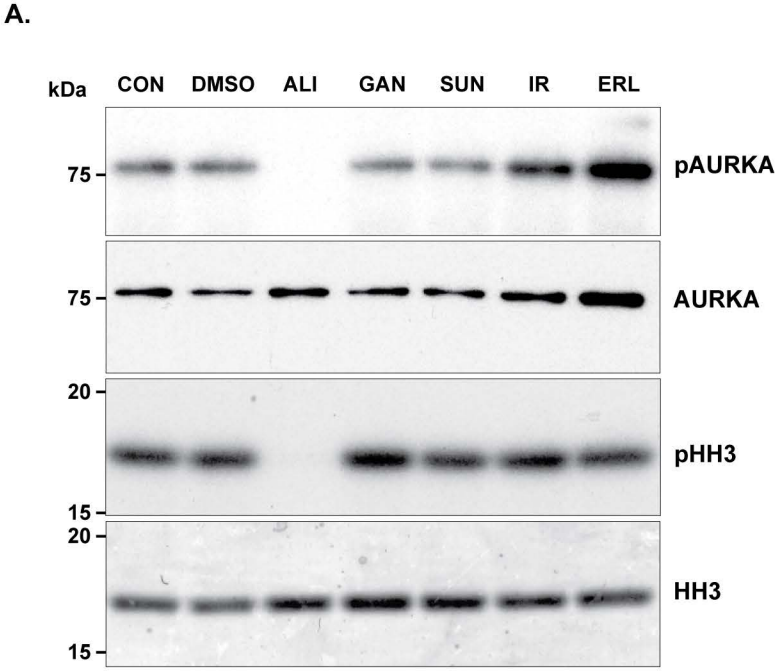
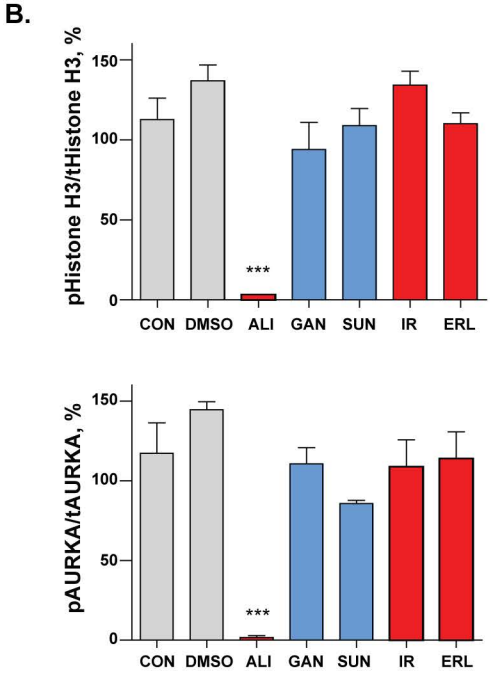


Supplementary Figure S1. Additional analysis of siRNA effects on ciliation and target depleton. A. Candidate protein kinase inhibitor targets that did not affect ciliation. For each datapoint, n ≥ 500 cells (250 from each of two biological repetitions, visualized by confocal), with data analyzed by Tukey test. *, p <0.5; **, p <0.01; ***, p<0.001, for each siRNA in serum versus no serum conditions. #, p <0.5; ##, p <0.01; ###, p<0.001, relative to vehicle, no serum. +, p <0.5; ++, p <0.01; +++, p<0.001, relative to vehicle plus serum. **B.** Quantitative RT-PCR to determine degree of target depletion 48 hours following transfection with the indicated siRNAs; all data normalized to mRNA encoding the ribosomal protein 36B4.



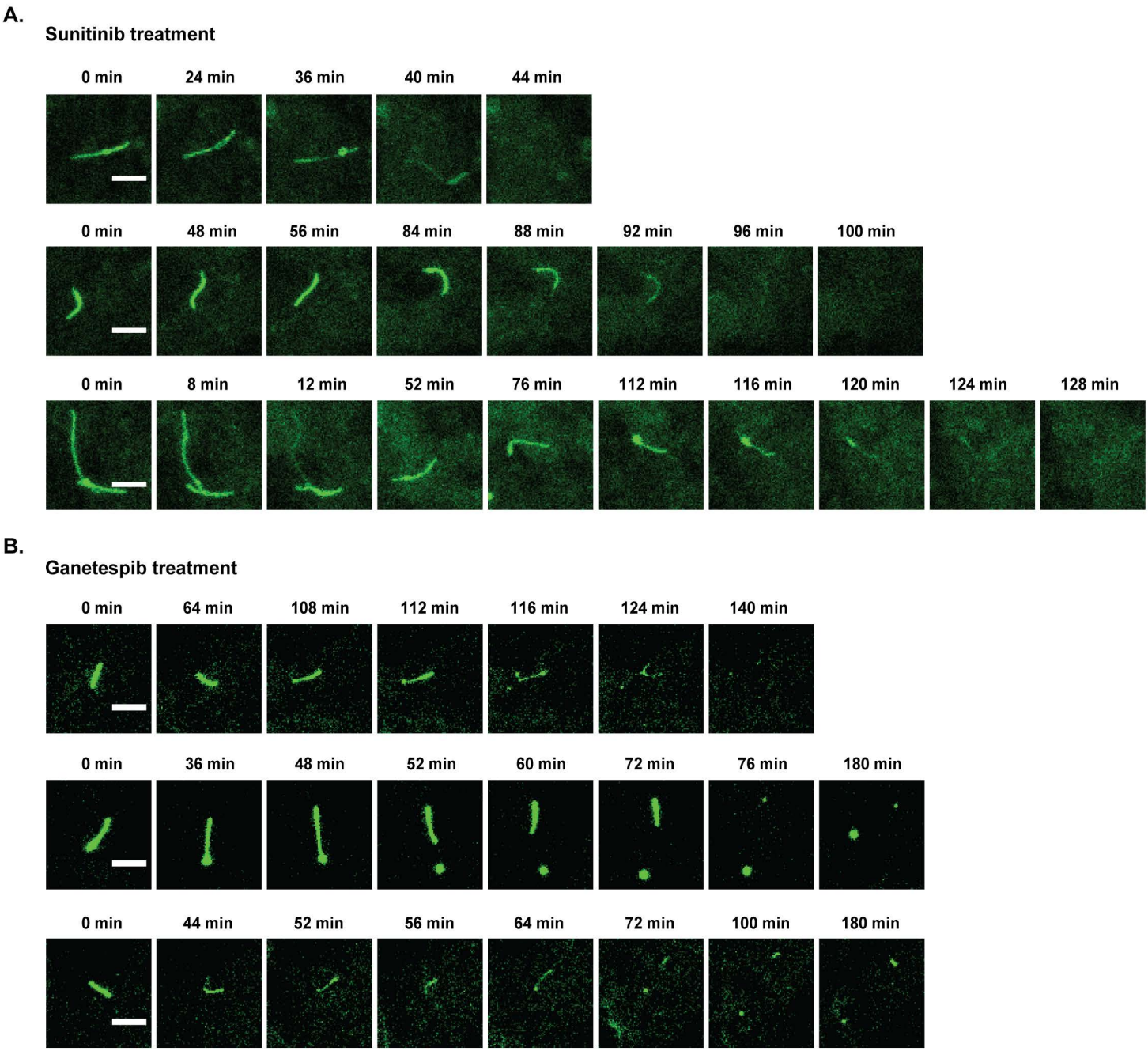
Supplementary Figure S2. Sorafenib is similar to sunitinib in inducing ciliary resorption. A., B. Ciliation rates **(A)** and T288ph-AURKA **(B)** images of hTERT-RPE1 cell line upon treatment with sorafenib. Green, T288ph -AURKA; red, acetylated α-tubulin; magenta, γ-tubulin; signal for T288ph-AURKA and basal body are offset for clarity; (n≥750 cells). Significance calculated by Tukey test, from three independent experiments; *, p <0.5; **, p <0.01; ***, p<0.001, for each drug or siRNA in serum versus no serum conditions. #, p <0.5; ##, p <0.01; ###, p<0.001, relative to vehicle, no serum.



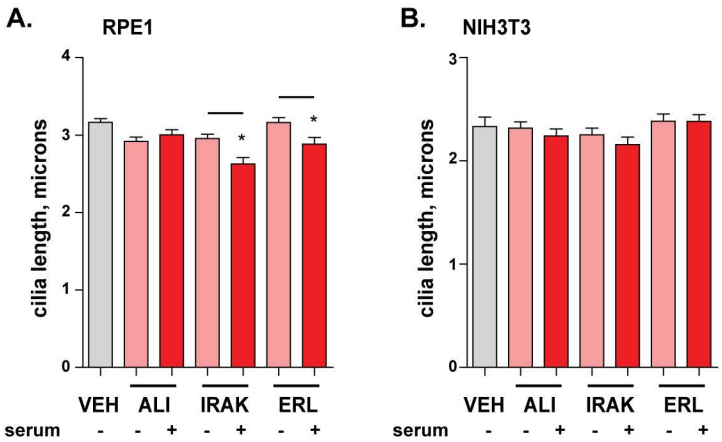


Supplementary Figure S3. Effect of compounds on AURKA catalytic activity. Representative WB images **(A)** and quantification of *in vitro* kinase assay **(B)** demonstrating alisertib inhibits AURKA autophosphorylation and phosphorylation of histone H3 (HH3), but other drugs tested do not, gauged by *in vitro* kinase assay with 32P-ATP. Total AURKA is visualized by antibody, and HH3 by Coomassie blue. CON, no drug diluent; GAN, ganetespib; SUN, sunitinib; IR, IRAK1/4i; ERL, erlotinib. Significance calculated by Tukey test, from three independent experiments; ***, $p<0.001$.

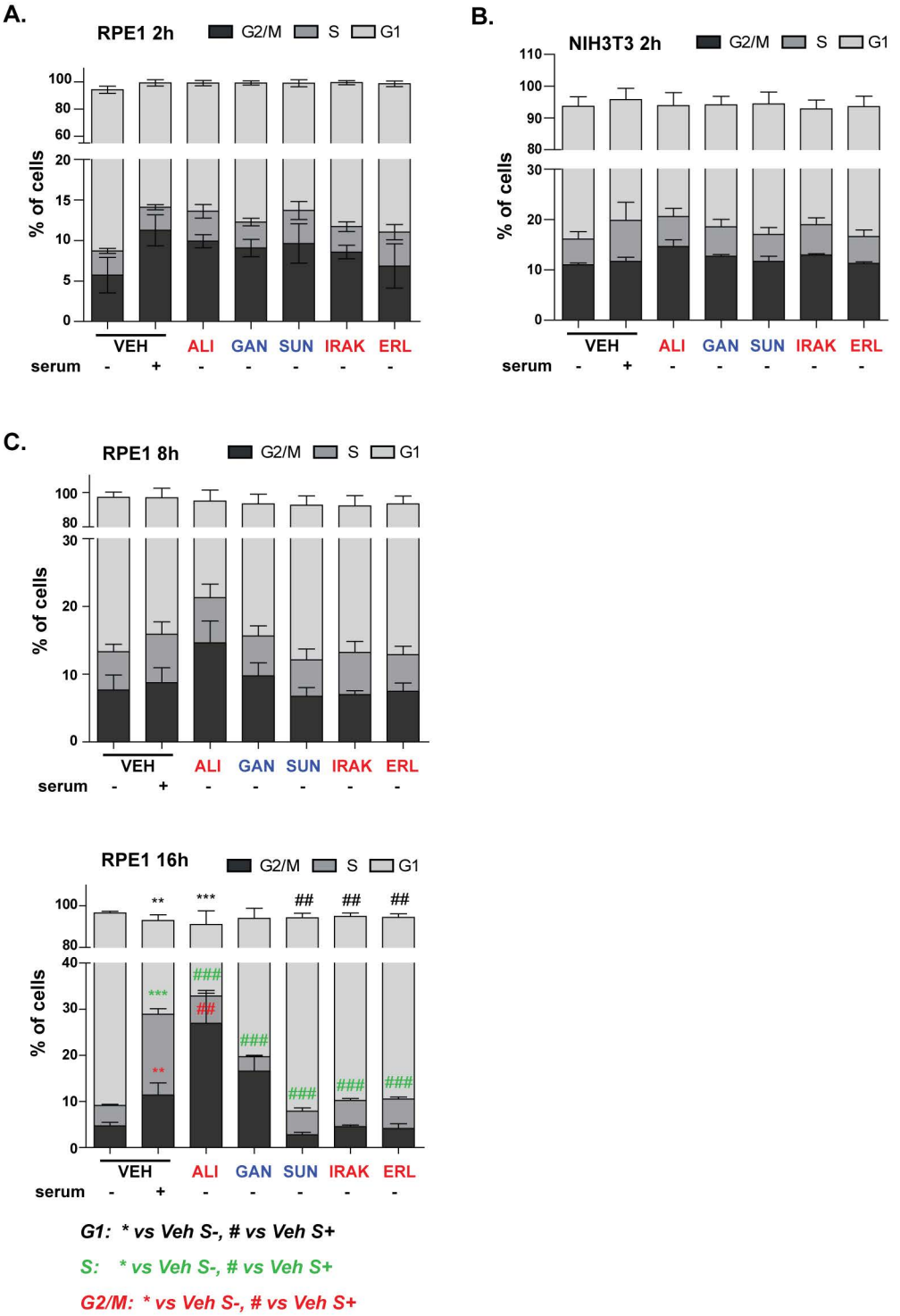
Supp. Figure S3, Kiseleva et al.



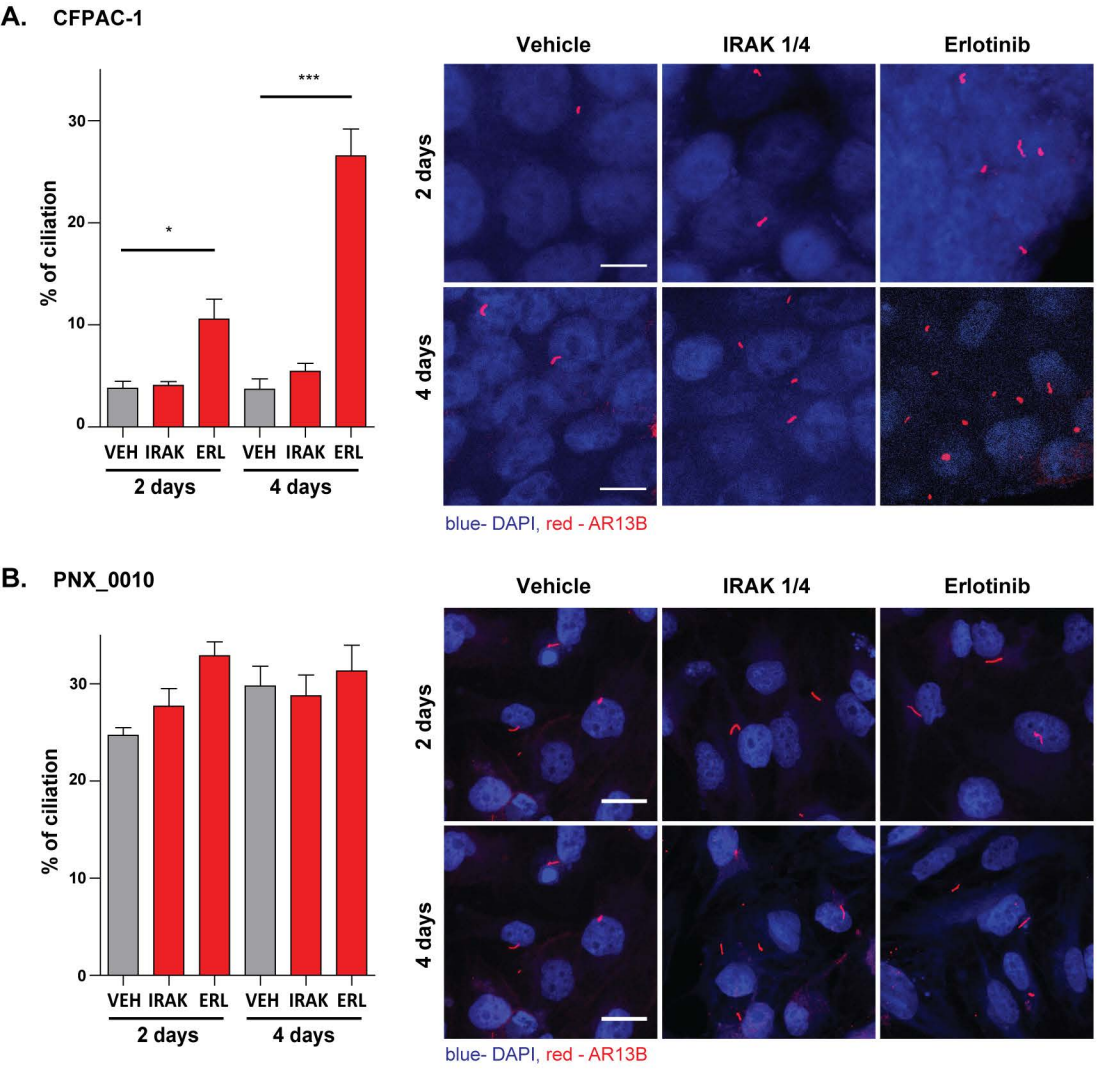
Supplementary Figure S4. Representative images demonstrating the effect of sunitinib (A) and ganetespib (B) on cilia resorption in hTERT-RPE1-Arl13b-GFP cells. Three examples are shown; green stain reflects Arl13b-GFP signal. Scale bar, 5 μm.



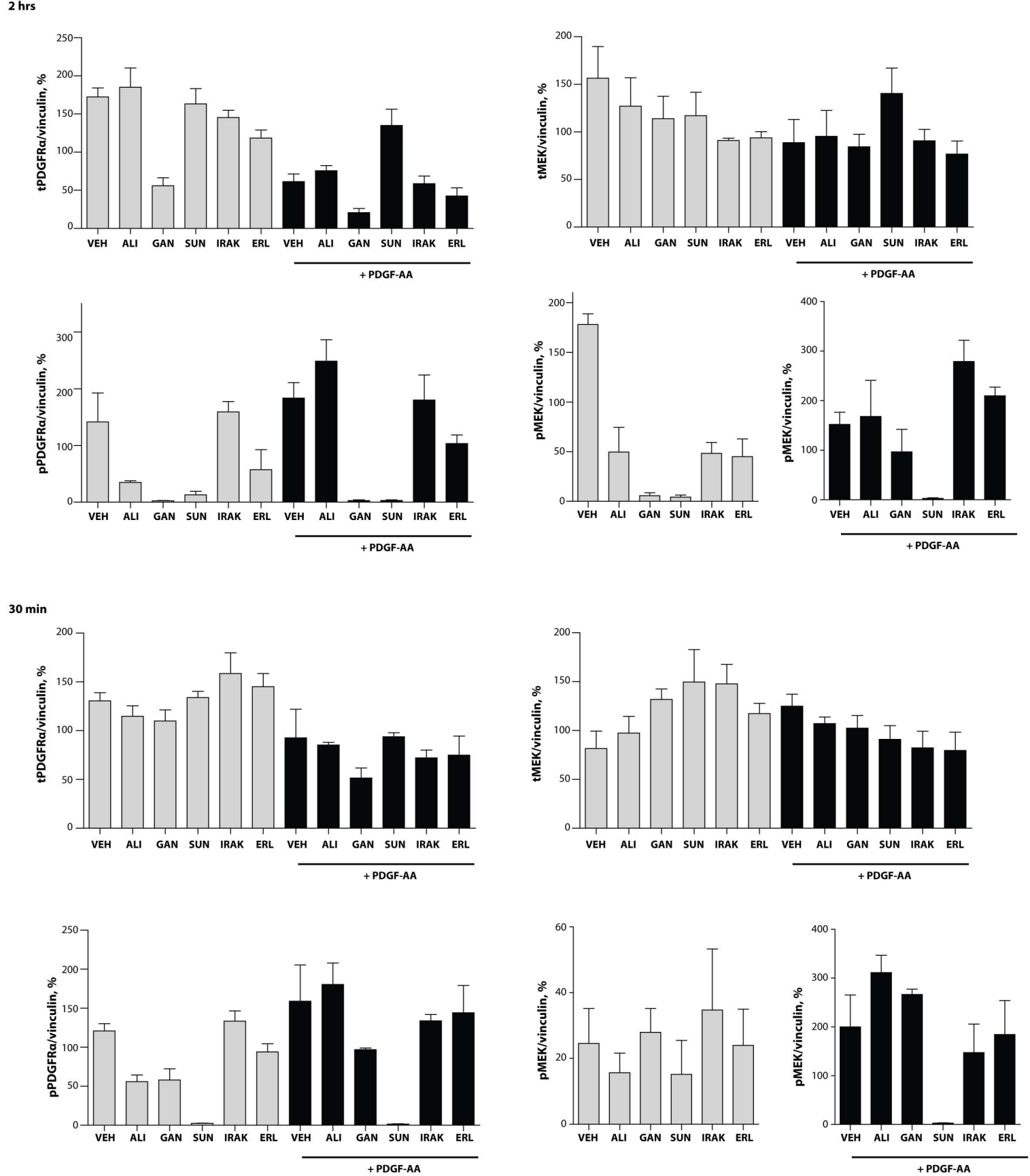
Supplementary Figure S5. Cilia length upon treatment with indicated cilia-stabilizing compounds in hTERT-RPE1 **(A)** and NIH3T3 **(B)** cell lines. n≥150 cells (in each of 2 independent repetitions), based on Tukey test. *, p <0.5; **, p <0.01; ***, p<0.001, for each drug in serum versus no serum conditions.



Supplementary Figure S6. Drug effects on ciliation correspond to changes in cell cycle over time. Cell cycle distribution of hTERT-RPE1 **(A)** and NIH3T3 **(B)** cells treated for 2.5 hours with the indicated drugs, based on FACS. **(C)** Cell cycle distribution of hTERT-RPE1 cells treated for 8 and 16 hours with the indicated drugs. Significance calculated by Tukey test in all cases, from three independent experiments. * or #, p <0.5; ** or ##, p <0.01; *** or ###, p<0.001.



Supplementary Figure S7. Erlotinib increases ciliation in CFPAC-1 but not in PNX0010 cell line. Ciliation rates and representative images of CFPAC-1 **(A)** and PNX0010 **(B)** cell lines after 2 and 4 days incubation with IRAK1/4i or erlotinib. Red, ARL13B; blue, DAPI. Scale bar for (A) 10 μm, for (B) 20 μm. n≥750 cells, reflecting n≥250 from each of 3 independent experiments. Statistics determined by Tukey test in all cases; *, p <0.5; **, p <0.01; ***, p<0.001, for each drug in serum versus no serum conditions.



Supplementary Figure S8. Sorafenib is similar to sunitinib in inducing ciliary resorption. Representative Western blot images and quantitation of PDGF-AA-induced activation of PDGFR and MEK1/2 in NIH3T3 cells, related to **Figure 3F, G**. Cells were treated with indicated drugs for 2 h (top 4 panels) or 30 min (bottom 4 panels); values represent data normalized to vinculin loading control for phosphorylated and total protein, (n=3, n, number of biological replicates). Statistics determined by Tukey test in all cases; *, p <0.5; **, p <0.01; ***, p<0.001, relative to vehicle, no ligand; #, p <0.5; ##, p <0.01; ###, p<0.001, relative to vehicle, plus