

# Siemens Competition

## Math : Science : Technology

### Regional Finalist

**Names:** Kristen Surrao and William Wu

**High School:** Lakeside High School

**Mentor:** Jason Davis

**Project Title:** *The role of the small GTPase ARF1 in mediating the intracellular trafficking and signaling of oncogenic G-protein coupled receptors in prostate cancer cells* (Biology)

Although G-protein coupled receptors (GPCRs) are known to play important roles in regulating prostate tumorigenesis, the molecular mechanisms underlying GPCR spatial localization and signaling processes are unknown. In the present study, we investigated the role of ADP-ribosylation factor 1 (ARF1), a small GTPase, in the intracellular transport and signaling of two GPCRs that drive prostate tumorigenesis, angiotensin II type 1 receptor (AT1R) and chemokine (C-X-C motif) receptor 4 (CXCR4) in prostate cancer cells. After transient transfection of siRNA targeting ARF1 in DU145 prostate cancer cells, confocal fluorescence microscopy analysis revealed that depletion of ARF1 caused a significant increase in the cell surface expression of both receptors. Furthermore, immunoblotting revealed that reduction of ARF1 markedly attenuated both AT1R and CXCR4-mediated activation of mitogen-activated protein kinase (MAPK), a major oncogenic pathway driving the progression of prostate cancer. Altogether, our results indicate a novel interaction, in which ARF1 plays a prominent role in driving the oncogenic effects of these GPCRs in prostate cancer cells by regulating their signaling and trafficking.