**The role of ion channels and pumps in tumor metastasis**

Metastasis is a major cause of cancer-related deaths. Since ion channels and pumps have been suggested to play a role in metastasis, we studied the metastasis suppressor plasma membrane Ca2+ ATPase (PMCA) and the metastasis promoter voltage gated sodium channels (Nav). We determined the PMCA4b level in 4 melanoma and 10 breast tumor cell lines. Since Nav expression was below detection level, functional experiments will be performed. Using random and targeted migration methods we demonstrated that overexpression of PMCA4b and/or inhibition of Nav decreased cell motility in a non-additive manner. The mechanism of action of Nav inhibitors lidocaine, azido-lidocaine, riluzole and azido-riluzole was also studied. We generated a PMCA homology model and performed molecular dynamics simulations that indicated alterations in the conformation of transmembrane helices in the presence of PIP2. A structural model for Nav1.2 was generated and the binding sites of inhibitors were studied by *in silico* docking.