Cancer Vulnerability Unveiled by Targeting Ion Channels:

A Novel Discovery and Therapeutic Approach

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Decades of studies on ion channels have vastly demonstrated the critical functions of these proteins in many physiological and pathological conditions and have provided for an extraordinary pharmacopeia of useful compounds, often with selective actions and minimal side effects. Nevertheless, the function of ion channels in controlling cancer biology is still unknown and underexplored.

Despite significant efforts in the development of cancer therapeutics, limited drug availability, side effects, and drug resistance and most importantly by the difficulty in targeting genes/proteins governing important stages of the metastatic cascade has severely hindered treatment of carcinomas especially metastatic carcinoma. Consequently, cancer is still a fatal disease.

Our research had demonstrated that different cancer cell types, e.g., breast, ovarian and melanoma express specific K+ channels that are a key factor in cancer homeostasis. We demonstrated that the activity of specific K+ channels could control critical signaling cascades involved in proliferation, motility, and metabolism of different cancer cells which are essential hallmarks of cancer.

During our investigation to assess whether K+ channels could be considered potential targets for cancer therapy, we found that pharmacological manipulation (including FDA approved drugs) of specific ion channels, severely affects tumor growth and metastasis.

In this talk, I will explain our findings on the biochemical cascades that are controlled by Kv11.1, or Kir6.2 potassium channels in breast cancer and ovarian cancer. Also, I propose that the use of activator molecules that stimulate the activity of these channels could be considered as potential and safe therapeutic tools against cancer.

These studies are important because they contribute to a better understanding of the role of ion channels in cancer and provide an opportunity to design a novel clinically effective and safe therapeutic strategy against cancer.