

ZOLTÁN VARGA



University of Debrecen
Faculty of Medicine
Department of Biophysics and Cell Biology

Address: Egyetem tér 1., H-4032 Debrecen, Hungary,
Life Science Building

RESEARCH AREA

My main research profile is the study of plasma membrane ion channels, especially the structure-function relationship and pharmacological properties of voltage-gated K⁺ (Kv) channels. We have studied the function of human T cell Kv channels with non-peptide and scorpion-venom-derived peptide inhibitors. We have identified numerous peptide toxin inhibitors of these channels and performed their biophysical characterization and selectivity profiling. We have made targeted mutations in one such toxin to improve its selectivity while maintaining its high affinity for potential therapeutic use. We also study Kv channel gating at the molecular level, such as the communication between the voltage-sensing and the pore domains, and the factors that may influence this, like the cholesterol content of the membrane. For that purpose I introduced the Voltage-Clamp Fluorometry technique to our lab. Our new research focus is the physiological and pathophysiological role of the Hv1 proton channel, e.g. in the calcification of vascular smooth muscle cells, and the development of inhibitors of this channel with therapeutic potential.

TECHNIQUES AVAILABLE IN THE LAB

Electrophysiological recording techniques: patch clamp, two-electrode voltage-clamp, voltage-clamp fluorometry, cell culturing, cell transfection, gel electrophoresis, mutagenesis, PCR, Western blot

SELECTED PUBLICATIONS

Fehér, Á., Pócsi, M., Papp, F., Szántó, G., Csóti, Á., Fejes, Z., Nagy, B., Nemes, B., **Varga, Z.** (2022) Functional Voltage-Gated Sodium Channels Are Present in the Human B Cell Membrane. *Cells* **7**: 1225.

Varga, Z., Tajti, G., Panyi, G. (2021) The Kv1.3 K⁺ channel in the immune system and its „precision pharmacology” using peptide toxins. *Biol Futura* **72**: 75-83.

Zákány, F., Kovács, T., Panyi, G., **Varga, Z.** (2020) Direct and indirect cholesterol effects on membrane proteins with special focus on potassium channels. *Biochim Biophys Acta Mol Cell Biol Lipids* **1865**: 158706.

Zákány, F., Pap, P., Papp, F., Kovács, T., Nagy, P., Péter, M., Szente, L., Panyi, G., **Varga, Z.** (2019) Determining the target of membrane sterols on voltage-gated potassium channels. *Biochim Biophys Acta Mol Cell Biol Lipids* **1864**: 312-325.