**Abstract**

XRPro® technology leverages the unique capabilities of X-ray fluorescence for label-free activity measurements of transporters and ion channels. Here, we demonstrate XRPro for analysis of a broad range of pharmacologically important targets, including membrane carrier (SLC) transporters and TRP channels. SLC transporters comprise a diverse set of secondary-active transporters, including families responsible for uptake and efflux of inorganic ions. The ability of XRPro to directly quantify most elements on the periodic table enables measurement of SLC targets including Zn$^{2+}$ (SLC30, SLC39), sodium phosphate (SLC20, SLC34), and nonelectrogenic cation chloride (SLC12) transporters. XRPro analysis of TRP ion channels includes both Rb$^+$ and Sr$^{2+}$ flux measurements for TRPA1, TRPV1 and TRPC5 experiments, in buffer and 100% serum. Combined with straightforward cell biology, XRPro provides a powerful solution for investigating a wide range of otherwise challenging targets.

**Zn$^{2+}$ Transporters**

Zn$^{2+}$ is the second most common trace metal in the body. Zn$^{2+}$ transporters have been linked to a number of diseases, including diabetes (Zip8), pancreatic cancer (Zip4) and Alzheimer’s disease (ZnH3). XRPro quantifies total cellular Zn$^{2+}$ to measure activity of Zn$^{2+}$ transporters.

**Cation Chloride Transporters**

Cation Chloride Cotransporters (CCC) regulate intracellular chloride, and have been implicated in a number of neurological conditions. The ability of XRPro to directly monitor ion flux enables nonradioactive Rb$^+$ flux assays for CCC transporters.

**Sodium Phosphate Transporters**

Sodium phosphate transporters (SLC20, SLC34), are responsible for renal phosphate reabsorption and maintenance of plasma phosphate concentrations. XRPro can monitor both target ions and chemical surrogates enables studies of ions, like phosphate, with high background concentrations in cells.

**TRP Channels**

TRPA1 conducts both monovalent (K$^+$) and divalent (Ca$^{2+}$) ions. Like other drug targets, compounds that inhibit TRPA1 may be significantly bound to serum proteins. Here, we demonstrate the use of XRPro to monitor both monovalent and divalent ion flux to measure compound IC$_{50}$ values in buffer and 100% human serum.

**Results**

- Measurements for monovalent efflux and divalent influx
- Results for TRPA1, TRPV1 and TRPC5 match literature
- Assays In 100% serum for serum shift measurements

**Conclusions**

XRPro provides a direct solution for challenging transporters & ion channels

- Direct measurements with no dyes, fluorophores, or radiolabels
- Flux measurements of transporters & ion channels
  - Analysis of Zn$^{2+}$, phosphate and nonelectrogenic transporters
  - Straight-forward analysis of TRP channels
  - Uptake and efflux measurements
  - Assays in 100% serum and High DMSO

XRPro® technology and other ion channel & transporter services provided by Icagen. Find out more at www.icagen.com