

DECIPHERING THE INSIDE CELL'S STORY BY CYTOCHECK SPACHIP®!

Unleashing the power of multiplexed live analytics in cell biology: pH and Calcium.

CytoCHECK SPachip® CALCIUM and pH Multi-detection kit enables continuous, simultaneous, and precise monitoring of both pH and calcium in living single cells.

Cells are continuously challenged by insults and stimuli from the extracellular environment, including drugs and xenobiotics. In response to these challenges, a series of intracellular molecules and ions act as signaling mediators, effectors or transducers which will ultimately result into physiological changes. In this context, noteworthy cellular messengers and hallmarks are pH, Ca²⁺, ROS, O₂, ATP, cAMP, IP₃, etc. Dynamic monitoring of these physicochemical markers allows for a more comprehensive study of single-cell physiology. Composed of fluorescently labeled silicon microparticles that can be internalized in the cytosol of cultured cells, **SPachip® TECHNOLOGY** developed by A4cell enables analytics of cell health and physiological hallmarks. Our biosensors can accurately monitor transitions between cell health states, both in continuous kinetics and end-point mode.

Now, you are not limited to only monitoring one single physiological marker per sample: SPachip® CALCIUM and pH multi-detection kit allows you to easily multiplex pH and calcium detection inside individual living cells without any perturbation of their physiological state over long periods of time.

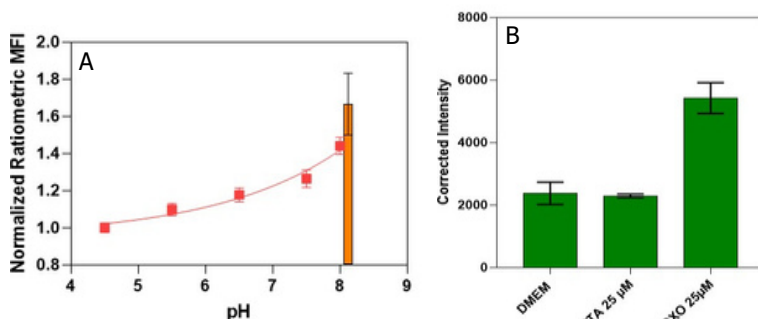


Figure 1: CytoCHECK SPachip® Multi-Detection kit in SH-SY5Y cell line (neuroblastoma cells). (A) pH (red channel), orange bar shows data for an "unknown sample". (B) calcium (green channel), 24h treatment.

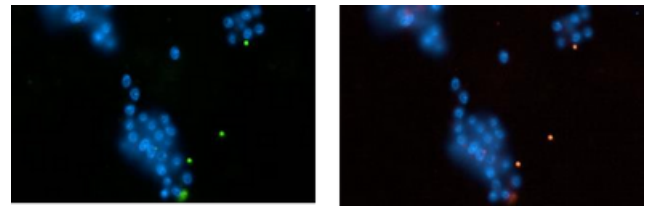


Figure 2: SH-SY5Y cell line (neuroblastoma cells) with nuclei stained in blue and CytoCHECK SPachip® Multi-detection kit in (A) green channel (Calcium) and (B) red channel (pH).

How does dual monitoring of intracellular pH and calcium add value to cell biology researchers?

- **pH and calcium**, together with other biomarkers such as ROS and oxygen, **are interplayed hallmarks** of mitochondria and cell health, homeostasis, oxidative metabolism, and bioenergetics. There is abundant literature around the link between calcium and pH. Examples below (Bibliography).
- Some insults may produce a cumulative and less selective response by targeting several receptors and pathways beyond their primary mode of action, which result in **pleiotropic effects** and changes in multiple markers.
- Cellular health, homeostasis, and activation of cell death/survival pathways result in cell **transitions to a cellular new state** in which several biochemical parameters in conjunction are altered, e.g. pH, calcium.
- **Biological samples are precious and unique.** The more information you extract from your single specimen, **the more time and cost you save.**
- Experimental readouts obtained from the same single cell diminishes variability and allows to establish **more reliable correlations.**

Multi-detection kit will allow researchers to interrogate complex biological phenomena more thoroughly in which changes in calcium and pH are interplayed

Bibliography

- Lysosomal cell death is controlled by pH-dependent calcium channels (<https://doi.org/10.1126/sciadv.abe5469>).
- Control of calcium homeostasis in mitochondria is dependent upon extracellular pH (<https://doi.org/10.1074/jbc.M411507200>).
- Mitochondrial proton gradient is regulated by cytosolic calcium signals (<https://doi.org/10.1007/s00424-012-1106-y>).
- Extracellular acidic environment induces apoptosis through an augmentation in intracellular calcium level and generation of endoplasmic reticulum stress, without any contribution of reactive oxygen species (ROS) (<https://doi.org/10.1007/s12192-014-0568-6>).

FUTURE-READY WITH CYTOCHECK SPACHIP®!