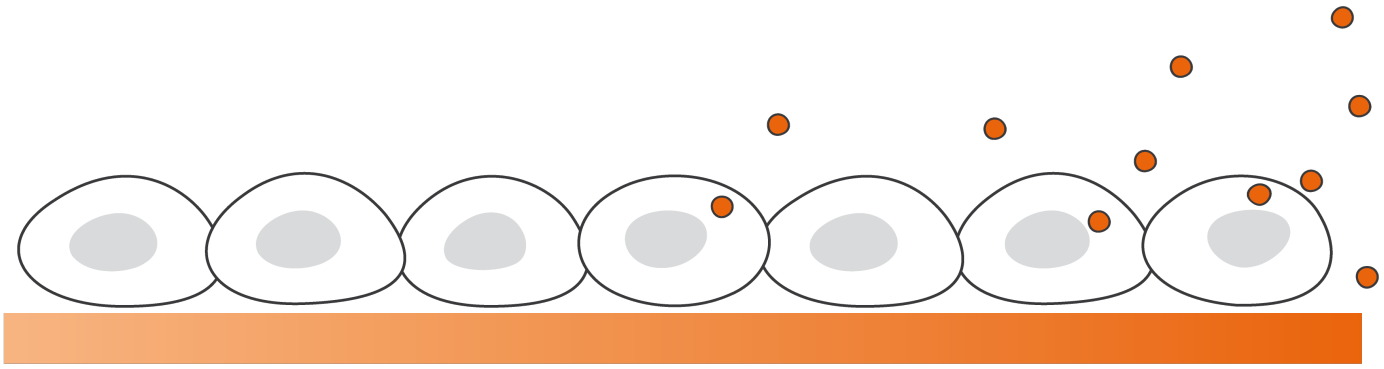
BioNavis

LIVING CELL RESEARCH WITH MP-SPR

The power of label-free, real-time measurements in cell research



Cell applications of MP-SPR

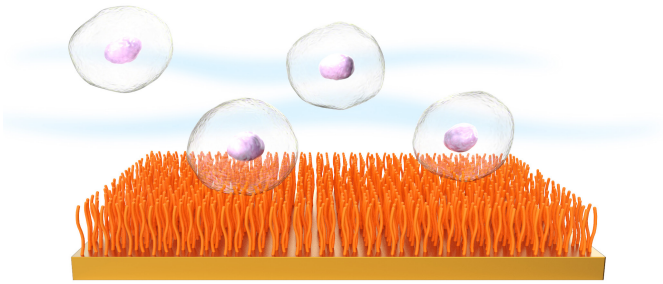
MP-SPR applications for live cell assays are ranging from drug development, regenerative medicine and point-of-care diagnostics, to biosensor development and biological research on immunity or cancer. MP-SPR was able to elucidate nanoparticle uptake kinetics, drug adsorption routes, GPCR activation profiles and T-cell receptor kinetics in recent studies.

KEY QUESTIONS MP-SPR CAN ANSWER IN RESEARCH OF LIVING CELLS:

- What is the drug absorption route of this pharmaceutical?
- Which nanoparticle is the best one for drug delivery?
- How does a nanoparticle or virus enter the cell?
- What is the kinetics of cell attachment to a surface?
- Which surface is the most resistant to bacterial growth?

WHY CHOOSE MP-SPR FOR LIVING CELLS?

- Suitable for a wide variety of cells including HeLa, Jurkat, A431, *E.Coli* and co-culture
- Real-time binding/adhesion studies without labels
- Extended dataset from cellular responses upon sample loading
- Comprehensive selection of sensor substrates
- Physiologically relevant conditions maintained during measurements (controlled temperature and shear-stress)
- Combination of MP-SPR with electrochemistry

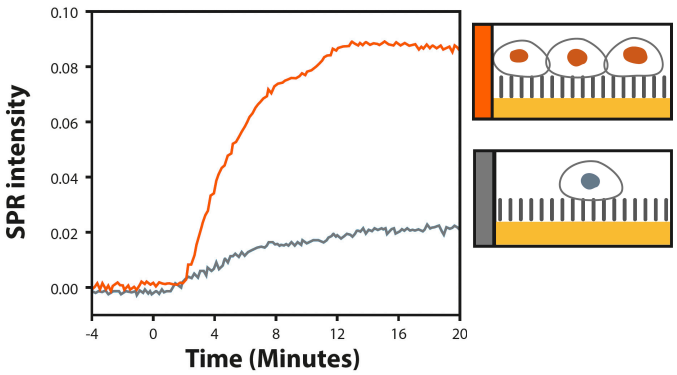


Binding and adhesion studies

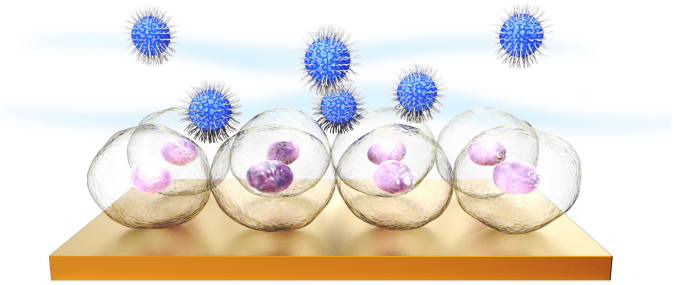
Live cells are introduced in the liquid (cell medium) flowing over the sensor surface, which has been modified with a given surface coating (e.g. antifouling coating, lipid membrane) or surface ligand (receptor).

Obtain details about:

- Cells' affinity to surface receptor e.g. peptide
- Kinetic profile of cell attachment on coating
- Bound cells' dissociation rate from surfaces
- Optimal antifouling or antimicrobial properties of a surface



Binding of cancer cells to a targeted peptide surface is stronger than of healthy cells. Application Note #154



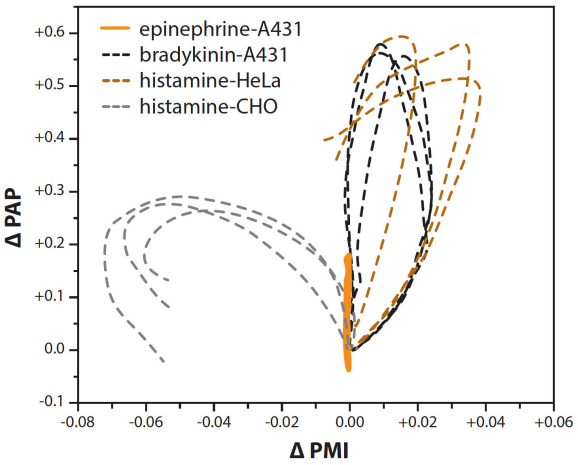
Prove internalization label-free

Cells are grown on the sensor surface *ex situ,* using standard cell culture protocols. Real-time cellular responses to the analyte (drug compound, nanoparticle) are assessed, and cell activation or cell uptake profiles are elucidated. Upon drug uptake by cells or drug binding to receptors such as GPCR, the cell signaling cascade typically makes the cell to undergo dynamic mass redistribution (DMR) which can be clearly observed in the MP-SPR multiparametric plots.

Obtain details about:

- Adsorption routes of a given pharmaceutical compound
- Optimal nanoparticle for drug delivery
- Half-maximal effective concentration (EC50) of the sample for live cells
- Mode of entry of nanoparticles or virus into cells

Our customers have successfully performed cell-based assays with analytes ranging from small molecular weight drug compounds, hormones and proteins, up to inorganic nanoparticles and liposomes and extracellular vesicles.



PMI-PAP response profiles, in which PAP (peak angular position) response is plotted against PMI (peak minimum intensity) response, displaying unambiguously distinguishable patterns for different agonists and cell lines. Application Note #170

Further reading

AN#170 GPCR stimulation with small drugs in live cells

AN#167 T-cell membrane receptor activity

AN#160 Bacteria detection from powdered milk

AN#156 Nanoparticle uptake by living cells

AN#154 Cancer cell detection and cells ahdesion on implant material surface

AN#145 Virus interaction studies using MP-SPR

AN#137 Drug - living cell interaction

Selected publications

Trans- and paracellular drug adsorption route
(Viitala *et al*., PLoS ONE, 2013)

Properties of layer-by-layer extracellular matrix (ECM) nanofilms and interactions with living cell
(Nishiguchi *et al*., ACS Biomaterials Science & Engineering, 2015)

Real-time monitoring of nanoparticle uptake by living cells
(Koponen *et al*., Biosensors & Bioelectronics, 2020)

Binding of cancer cells on target peptide
(Etayash *et al*. Nature Scientific Reports, 2015)

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