BIOGRAPHICAL SKETCH

NAME: Olivier Pertz

POSITION TITLE: Associate Professor for Cellular Dynamics

INSTITUTION AND LOCATION	DEGREE	Completion Date MM/YYYY	FIELD OF STUDY
University of Lausanne, CH	Diploma	1995	Biology
University of Basel, CH	PhD	1999	Biophysics
Scripps Research Institute, CA, USA	Postdoc	2004	Cell Biology
University of California San Diego, CA, USA	Staff scientist	2007	Cell Biology
University of Basel, CH	Assistant Prof	2008	Cell Biology
University of Bern, CH	Associate Prof	2016	Cell Biology
University of Bern, CH	Full Prof	2024	Cell Biology

Lab website: https://www.pertzlab.net/
Google scholar ID : https://scholar.google.ch/citations?user=_dYonf8AAAAJ&hl=en&oi=ao
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Personal Statement
My research focuses on the spatio-temporal signaling events that regulate Cell Morphogenesis and Fate Decisions. The main hypothesis relevant to our research is that these signaling events are highly dynamic, are precisely regulated in time and space, and can be highly heterogeneous within distinct cells of a population. An important current limitation in our field is that this spatio-temporal resolution of signaling is missed in classic biochemical methods that average populations of thousands of cells, or that rely on the analysis of static, steady-states. To address these challenges, we devise novel quantitative approaches to measure/manipulate signaling dynamics at biologically relevant time/length scales. This includes the development of multiplexed biosensor systems to image signaling dynamics at the single cell level, the development of optogenetic and microfluidic actuators to manipulate single cells with unprecedented spatio-temporal resolution, computer vision approaches to automate image analysis of large datasets, statistical analysis and mathematical modelling to make sense of the large datasets we produce. Our research provides new insights to target oncogenic signaling during cancer, as well as aberrant morphogenetic processes such as cell migration and invasion, and neuronal development and regeneration.

Employment history

2024-   : Full Professor
2016-2023 : Associate Professor, Institute of Cell Biology, University of Bern, Switzerland
2014-2015 : Assistant Professor, Department of Biomedicine, University of Basel, Switzerland
2008-2013 : SNF Professor, Department of Biomedicine, University of Basel, Switzerland
2004-2007 : Staff scientist in the group of Richard Klemke, University of California San Diego, USA
2001-2004 : Postdoc in the group of Klaus Hahn, The Scripps Research Institute, La Jolla, CA, USA
2000-2001 : Postdoc in the group of Glen Nemerow, The Scripps Research Institute, La Jolla, CA, USA
1995-1999 : PhD thesis in the group of Juergen Engel, Biocenter of the University Basel, Basel, CH

Honors and awards

12/2015:   Best publication of the year award, Dept. of Biomedicine, University of Basel
03/2005:   Special symposium award at Roche Symposium for leading bioscientists
07/2004-06/2006: Philip Morris External Research Program Postdoctoral Fellowship
07/2002-06/2004: Swiss National Science Foundation Advanced Postdoctoral Fellowship
07/2001-06/2002: Roche Research Foundation and Novartis Postdoctoral Fellowships
01/2000-06/2001: Swiss National Science Foundation Postdoctoral Fellowship

Research projects as principal investigator (last 5 years)

2016-2018	ca 200 k$.	Systems X.ch. Deciphering a prototypical receptor tyrosine kinase signaling network at the single cell level using a genetically-encodable optogenetic circuit.
2016-2018	ca 600 k$	Swiss National Science Foundation. Mapping Rho GTPase signaling networks through acute, dynamic perturbation of spatio-temporal signaling fluxes.
2016-2018	ca 250 k$	Swiss National Science Foundation joint. Understanding single cell-level MAPK activation dynamics for manipulation of neuronal stem cell self-renewal and differentiation fates.
2016-2018	ca 360 k$	Swiss cancer league. A tumor on a chip approach to understand signaling networks mediating melanoma drug resistance at the single cell level.
2017-2019	ca 250 k$	Swiss National Science Foundation. Dissecting a Rho GTPase spatio-temporal signaling network regulating growth cone motility, neurite and axonal outgrowth.
2018	ca 350 k$	Swiss National Science Foundation R'equip. A high content confocal microscope for fast 3D imaging of living samples.
2018-2019	ca 135 k$.	UniBE interdisciplinary grant. An integrated microscopy/computer vision platform for high content 3D imaging of aberrant proliferative signalling in cancer organoids.
2019-2023	ca 759 k$	Swiss National Science Foundation. Decoding and Re-encoding Receptor Tyrosine Kinase Fate decision signalling.
2019-2024	ca 656 k$	Swiss National Science Foundation. Real time Exploration of GTPase-Cytoskeletal feedback underlying Contractile Actomyosin Systems.
2019-2023	350 k$	Human Frontier Science Program. A spatiotemporal map of signaling processes controlling human stem cell renewal and differentiation.
2020	ca 60 k$	Novartis Foundation. Realtime Control of Fate Decision Signaling to understand and manipulate Epithelial Homeostasis.
2021-2024	ca 227 k$	Uniscientia Foundation. Real time feedback microscopy to identify emergent properties of an epithelial ecosystem.
2022	ca 25 k$	CZI. Democratizing Image Analysis with an Easy-to-Train Classifier.
2023-2026	ca 860 k$	Swiss National Science Foundation. Multiscale mapping of fate decision receptor Tyrosine kinase signaling.

Memberships in panels and scientific reviewing activities

2007 -	Peer reviewer of more than 70 original manuscripts (including *Science*, *PNAS*, *Elife, Journal of Cell Biology, Developmental Cell, Nature Communications, …*) and more than 50 project grants (including Swiss, French, German, … National Science Foundation and Cancer Leagues).
2016 -	"Molecular Biology & Biochemistry" Expert Committee, Graduate School for Cellular and Biomedical Sciences, University of Bern
2017 – 2022	Science faculty representative at the board of the Microscopy Imaging Center
2017 – 2022	Science faculty representative at the board of the IT services
2021 -	Member of the Precision Medicine Center and Bern Data Science Initiative at University of Bern
2016 -	Member of multiple hiring committees

Supervision of junior researchers

2008-2015	Department of Biomedicine, University of Basel: 7 postdocs, 4 PhD students, 1 master student
2016-	Institute of Cell Biology, University of Bern: 5 postdocs, 9 PhD students, 8 master students, 15 bachelor students

Invited speaker at international conferences (selected, last 5 years)

2023	European Light Microscopy Initiative meeting. Leiden, Netherlands.

At the interface of cell fate and tissue dynamics. Muenster, Germany.

2022   3rd Franco-Japanese Developmental meeting. Strasbourg, France

Inserm Optobiology workshop. Online.

AIChE 3rd optogenetics technologies and applications. Heidelberg, Germany.

Emerging Systems Medecine. Stockholm, Sweden

2021   Spatio-temporal encoding and decoding in cell signaling. Online.

2020   Conferences canceled due to COVID19

2019   French optogenetics club meeting. Paris, France

2018   European Cytoskeletal meeting. Prague, Czech Republic.

Unito-Polito conference series in cancer. Turin, Italy.

List of publications (past five years)

Lu L., Guyomar T., Vagne Q., Berthoz R., Torres-Sánchez A., Lieb M., Martin-Lemaitre C., Van Unen K., Honigmann A., **Pertz O.**, Salbreux G., Riveline D. Polarity-driven three-dimensional spontaneous rotation of a cell doublet. In press at Nature physics.
https://www.biorxiv.org/content/10.1101/2022.12.21.521355v1

Spontaneous rotations in epithelia as an interplay between cell polarity and RhoA activity at boundaries. Lo Vecchio S., **Pertz O**, Szopos M., Navoret L., Riveline D. In press at Nature Physics.
https://www.biorxiv.org/content/10.1101/2021.11.11.468187v1

Heydasch M., van Unen J., Hinderling L., Dobrzynski M., **Pertz O**. GTPase activating protein DLC1 spatio-temporally regulates Rho signaling. Reviewed preprint at Elife.
https://elifesciences.org/reviewed-preprints/90305v1

Pulfer A, Pizzagalli D.U. Gagliardi P.A., Hinderling L., Lopez P., Zayats P., Carrillo-Barbera P., Antonello P., Palomino-Segura M., Giusti A., Thelen M., Gambardella L.M., Murooka T.T., **Pertz O.**, Krause R., Fernandez Gonzalez S. Transformer-based spatial-temporal detection of apoptotic cell death in live-cell imaging. Reviewed Preprint at Elife.
https://elifesciences.org/reviewed-preprints/90502

Gagliardi P.A., Graedel B., Jacques M-A., Hinderling L., Pertz O., Dobrzynski M. ARCOS, Automatic Recognition of Collective Signaling Events. J Cell Biol. 2023 Oct 2;222(10):e202207048.
Preprint highlight: https://www.molbiolcell.org/doi/full/10.1091/mbc.P22-08-1005

Nałęcz-Jawecki P., Gagliardi P.A., Kochańczyk M., Dessauges C., **Pertz O.**, Lipniacki T. The MAPK/ERK channel capacity exceeds 6 bit/hour. PLoS Comput Biol 19(5): e1011155. https://doi.org/10.1371/journal.pcbi.1011155.

Duerr L., Reinhardt J., Dobrzyński M., Hell T., Smiesko M., **Pertz O.**, Hamburger M., Garo E. Dimerosesquiterpene and sesquiterpene lactones from Artemisia argyi inhibiting oncogenic PI3K/AKT signaling in melanoma cells. Journal of Nat. Prod. **2022** Nov 9.

Hell T., Dobrzyński M., Gröflina F., Reinhardt J., Duerr L., **Pertz O.**, Hamburger M., Wolfender J.L., Garo E. Flavonoids from Ericameria nauseosa inhibiting PI3K/AKT pathway in human melanoma cells. Biomedicine and Pharmacotherapy. Biomed Pharmacother. **2022** Oct 17;156:113754.

Ender P., Gagliardi P.A., Dobrzyński M., Dessauges C., Höhener T., Jacques M-A, Cohen A.R, **Pertz O**. Spatio-temporal Control of ERK Pulse Frequency Coordinates Fate Decisions during Mammary Acinar Morphogenesis. Dev Cell. **2022** Sep 7:S1534-5807(22)00594-9.
Preview in Dev Cell: https://www.cell.com/developmental-cell/fulltext/S1534-5807(22)00631-1

Höhener T., Landolt A, Dessauges C, Gagliardi P.A, **Pertz O.** LITOS - a versatile LED illumination tool for optogenetic stimulation. Sci Rep. **2022** Jul 30;12(1):13139.

Dessauges C., Mikelson J., Dobrzyński M., Jacques M.A., Frismantiene A., Gagliardi P.A., Khammash M., **Pertz O**. Optogenetic actuator - ERK biosensor circuits identify MAPK network nodes that shape ERK dynamics. Mol Syst Biol. **2022** Jun;18(6):e10670.

Hell T., Rutz A., Duerr L., Dobrzyński M., Reinhardt J., Lehner T., Keller M., John A., Gupta M.P., **Pertz O.**, Hamburger M., Wolfender J.L., Garo E. Combining HPLC-Based Activity Profiling with Advanced UHPLC-HRMS/MS Annotation to Accelerate the Discovery of Natural Products Targeting Oncogenic Signaling in Melanoma. J. Nat. Prod. **2022** May 31.

Mining of Single-Cell Signaling Time-Series for Dynamic Phenotypes with Clustering. Dobrzyński M, Jacques MA, **Pertz O**. Methods Mol Biol. **2022**;2488:183-206.

Dürr L., Hell T., Dobrzynski M., Mattei A., John A., Augsburger N., Bradanini G., Reinhardt J., Rossberg F., Drobnjakovic M., Gupta M.P., Hamburger M., **Pertz O.**, Garo E. High Content Screening Pipeline for Natural Products Targeting Oncogenic Signaling in Melanoma. J. Nat. Prod. **2022** Apr 22;85(4):1006-1017.

Loewith R, Roux A., **Pertz O**. Chemical-Biology-derived in vivo Sensors: Past, Present, and Future. Chimia (Aarau). **2021** Dec 22;75(12):1017-1021.

Gagliardi P.A., Dobrzyński M., Jacques M-A., Dessauges C., Ender P., Blum Y., Hughes R.M., Cohen A.R., **Pertz O**. Collective ERK/Akt activity waves orchestrate epithelial homeostasis by driving apoptosis-induced survival. Developmental Cell. **2021** May 28:S1534-5807(21)00436-6.
Highlighted in Science Signaling: https://www.science.org/doi/10.1126/scisignal.abk1364

Jacques M-A, Dobrzyński M., Gagliardi P.A., Sznitman R. and **Pertz O**. CODEX, a neural network approach to explore signaling dynamics landscapes. Mol Syst Biol (**2021**)17:e10026

Müller P.M., Rademacher J., Bagshaw R.D., Wortmann C., Barth C., van Unen J., Alp K.M., Giudice G., Eccles R.L., Heinrich L.E., Pascual-Vargas P., Sanchez-Castro M., Brandenburg L., Mbamalu G., Tucholska M., Spatt L., Czajkowski M.T., Welke R.W., Zhang S., Nguyen V., Rrustemi T., Trnka P., Freitag K., Larsen B., Popp O., Mertins P., Gingras A.C., Roth F.P., Colwill K., Bakal C., **Pertz O.**, Pawson T., Petsalaki E., Rocks O. Systems analysis of RhoGEF and RhoGAP regulatory proteins reveals spatially organized RAC1 signalling from integrin adhesions. Nat Cell Biol. **2020** Apr;22(4):498-511.

Dobrzynski M., Jacques M.A., **Pertz O.** Mining single-cell time-series datasets with Time Course Inspector. Bioinformatics, Volume 36, Issue 6, 15 March **2020**, Pages 1968–1969.

Blum Y.[*], Mikelson J.[*], Dobrzynski M.[*], Ryu H., Jacques M.A., Jeon N.L., Khammash M., **Pertz O.** Temporal perturbation of ERK dynamics reveals network architecture of FGF2/MAPK signaling. Mol Syst Biol. **2019** Nov;15(11):e8947. Authors contributed equally.

Gagliardi P., **Pertz O.** Developmental ERK Signaling Illuminated. Developmental Cell. **2019** Feb 11;48(3):289-290.

Bagonis M., Fusco L., **Pertz O.**[*], Danuser G.[*] Automated profiling of growth cone heterogeneity defines relations between morphology and motility. J Cell Biol. **2019** Jan 7;218(1):350-379. [*] Both authors contributed equally.

Olivier Pertz, 23-12-2023