

SIMOA ANALYZER

Shorena Janelidze

Short description of the infrastructure.

Quanterix SR-X Ultra-Sensitive Biomarker Detection System

The Simoa is particularly useful for measurements of biomarkers at ultra-low levels. The approach is based on the counting of thousands of single immunocomplexes in femtoliter-sized reaction chambers which are termed Simoa - Single Molecule Arrays. Simoa uses the same reagents as conventional ELISA, but antibody capture agents are attached to the surface of paramagnetic beads that are used to concentrate a dilute solution of target molecules. The beads are loaded to discs containing arrays of femtoliter-sized wells that hold only one bead per well. In wells containing a bead with a single target molecule, the formation of an immunocomplex will result in enzymatic cleavage of a substrate, which will be converted to a fluorescent product imaged by the SR-X reader.

- 1. Is this infrastructure receiving support also from other Strategic Research Areas (SRAs) or organizations at Lund University (e.g. Medical faculty, LBIC). If yes, please specify the type of support and its amount.**
- 2. Number and names of MultiPark senior researchers using the infrastructure in the period 2018-2020¹.**

Oskar Hansson (Memory research Unit)
Andreas Puschmann (Neurology)
Niklas Mattsson-Carlgrén (Neurology)
Sebastian Palmqvist (Memory research Unit)
Alexander F Santillo (Psychiatry)
Ruben Smith (Neurology)
Niklas Marklund (Neurosurgery) planned for 2021

- 3. Number and names of senior researchers outside of Multipark and/or non-academic partners using the infrastructure 2018-2020.**

Andreas Jönsen (Department of Rheumatology, Lund)
Gil Dan Rabinovici (UCSF, USA)
Dhamidhu Eratne (The University of Melbourne, Australia)

- 4. Does the infrastructure have a steering document accessible to the users? If yes, when was it last updated?²**

¹ If the infrastructure was first established in 2020, please include this information.

² Note that the Multipark leadership may ask to see this document with a very short notice.

6. Is the infrastructure charging user fees? If yes, state the amount and what is covered by the user fees.

Simoa (Quanterix) assays are different from conventional ELISA and only staff with a formal training in Simoa-based assays with Quanterix could use the platform. Multipark provides 50% salary support for a BMA with such training. The costs of Simoa kits are very high (e.g. one NfL kit costs around 17000 SEK) Therefore the users are currently funding all material used for the analyses, but not salary support.

7. List publications generated with the help of this infrastructure during the past 3 years (2018-2020). Do not include manuscripts in preparation and please give the full reference (i.e., complete author list, complete title, journal name with year, volume, pages)³.

Niklas Mattsson-Carlgrén, Lea T Grinberg, Adam Boxer, Rik Ossenkoppele, Magnus Jonsson, William Seeley, Alexander Ehrenberg, Salvatore Spina, Shorena Janelidze, Julio Rojas-Martinez, Howard Rosen, Renaud La Joie, Orit Lesman-Segev, Leonardo Iaccarino, Gwendlyn Kollmorgen, Peter Ljubenkov, Udo Eichenlaub, Maria Luisa Gorno-Tempini, Bruce Miller, Oskar Hansson, and Gil Dan Rabinovici. Cerebrospinal Fluid Biomarkers in Autopsy-Confirmed Alzheimer's Disease and Frontotemporal Lobar Degeneration. *Neurology*, under revisions.

Janelidze N, Palmqvist S, Smith R, Beach TG, Serrano G.E, Chai X, Proctor NK, Eichenlaub U, Zetterberg H, Blennow K, Reiman EM, Stomrud E, Dage JL, Hansson O. Plasma P-tau181 in Alzheimer's disease: relationship to other biomarkers, differential diagnosis, neuropathology and longitudinal progression to Alzheimer's dementia. *Nat Med*. 2020 Mar;26(3):379-386. doi: 10.1038/s41591-020-0755-1.

Palmqvist S, Janelidze S, Quiroz YT, Zetterberg H, Lopera F, Stomrud E, Su Y, Chen Y, Serrano GE, Leuzy A, Mattsson-Carlgrén N, Strandberg O, Smith R, Villegas A, Sepulveda-Falla D, Chai X, Proctor NK, Beach TG, Blennow K, Dage JL, Reiman EM, Hansson O. Discriminative Accuracy of Plasma Phospho-tau217 for Alzheimer Disease vs Other Neurodegenerative Disorders. *JAMA*. 2020 Aug 25;324(8):772-781. doi: 10.1001/jama.2020.12134.

Niklas Mattsson-Carlgrén, Shorena Janelidze, Sebastian Palmqvist, Nicholas Cullen, Anna L Svenningsson, Olof Strandberg, David Mengel, Dominic M Walsh, Erik Stomrud, Jeffrey L Dage, Oskar Hansson. Longitudinal plasma p-tau217 is increased in early stages of Alzheimer's disease. *Brain*. 2020 Dec 5;143(11):3234-3241. doi: 10.1093/brain/awaa286.

Cicognola C, Janelidze S, Hertze J, Zetterberg H, Blennow K, Mattsson-Carlgrén N, Hansson O. Plasma glial fibrillary acidic protein detects Alzheimer pathology and predicts future conversion to Alzheimer dementia in patients with mild cognitive impairment. *Alzheimers Res Ther*. 2021 Mar 27;13(1):68. doi: 10.1186/s13195-021-00804-9.

³ If the infrastructure was first established in 2020, please include this information here too.

Alexa Pichet Binette, Sebastian Palmqvist, Divya Bali, Gill Farrar, Christopher J. Buckley, David A. Wolk, Henrik Zetterberg, 7,8,9, Kaj Blennow, Shorena Janelidze, Oskar Hansson. Plasma phospho-tau and brief cognitive tests can predict conversion to Alzheimer dementia.

Annals neurology, under review.

Emil Ygland Rödström, Niklas Mattsson-Carlsson, Shorena Janelidze, Oskar Hansson, MD, Andreas Puschmann. Serum neurofilament light chain as a marker of progression in Parkinson's disease – long-term observation and implications of clinical subtypes.

Journal of Parkinson's Disease, under review.

Kristoffer A Zervides, Shorena Janelidze, Jessika Nystedt, Birgitta Gullstrand, Petra Nilsson, Pia C Sundgren-Maly, Anders A Bengtsson, Oskar Hansson, Andreas Jönsen. Plasma and Cerebrospinal Fluid Neurofilament Light Concentrations Reflect Neuronal Damage in Systemic Lupus Erythematosus. Manuscript in preparation.

Dhamidhu Eratne et al. Plasma neurofilament light chain protein is not increased in treatment-resistant schizophrenia and first-degree relatives.

Australian and New Zealand Journal of Psychiatry, under review.