PROGRAM

49th Annual Meeting of the Society for Neuroscience

October 19–23, 2019

Chicago, IL

Visit us at booth #1309

Scientific program by Miltenyi Biotec

Neuroscience 2019

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MACS

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OPENING REMARKS

Dear SfN Attendees,

With great pleasure, we welcome you to Neuroscience 2019 in Chicago. Since the last meeting in San Diego, Miltenyi Biotec has witnessed the expansion of a great number of new and exciting technologies, which will no doubt contribute to numerous advances in the field of neuroscience.

This year in Miltenyi Biotec's Satellite Symposium, our guest speakers share their experiences on whole-brain imaging using light sheet microscopy and tissue clearing technology. In the poster session, our R&D experts present the data on single-cell sequencing of isolated neonatal and adult neurons, and show how different dissociation approaches can affect the results. Additionally, we will present data obtained by using the fully automated, multiparametric, cyclic immunofluorescent MACSima™ Imaging System. This data represents analysis of 96 markers on a single sample in order to discover novel markers in primary glioblastoma. Stop by booth #1309 to get to know the system, and to explore our other cutting-edge microscope technologies: experience fast 3D imaging with the UltraMicroscope II, and living-animal imaging with the TriM Scope II.

Visit booth #1309, and start to unravel brain's complexity.

Yours,
The Miltenyi Biotec Team

Highlights at Neuroscience 2019

Satellite Symposium

Understand nature's complexity with the UltraMicroscope II and the MACSima™ Imaging Platform

Tuesday, October 22, 2019
6:30–9:00 p.m.
Location: McCormick Place , N230b

Poster presentation
Find out about our latest product developments and applications.

Be the fastest to search through the brain's complexity
Go on a VR flight through a mouse's brain: be the fastest to find the hidden microscope and become the lucky winner of a Fitbit Charge HR™ wristband, a HP® Roar Mini Wireless Speaker, or a Sony® Wireless Speaker.

Booth #1309

Booth fun

Explore the infinite options of the MACSima™ Imaging Platform in a playful way. Share your experiences on any social media channel or fill in a survey and receive a free Happy Cell plush toy.

Booth #1309

SATELLITE SYMPOSIUM

Understand nature's complexity with the UltraMicroscope II and the MACSima™ Imaging Platform

Tuesday, October 22, 2019
6:30–9:00 p.m.
Location: McCormick Place , N230b

Agenda

Chair: **Byron Hartman**
Miltenyi Biotec, USA

06:30 p.m. **Welcome & reception**
Byron Hartman
Miltenyi Biotec, USA

06:40 p.m. **Mapping the mesoscale structural plasticity of the brain using iDISCO+ and ClearMap**
Nicolas Renier
Laboratory of Structural Plasticity,
ICM Brain and Spine Institute;
Inserm, Paris, France

07:15 p.m. **Aggression reward and relapse: from behavior to whole brain**
Sam A. Golden
Department of Biological Structure,
University of Washington, Seattle, WA

07:50 p.m. **Target discovery for CAR T cell therapy of glioblastoma multiforme using the novel MACSima™ Imaging Platform for multiparametric cyclic immunofluorescent analysis**
Andreas Bosio
Miltenyi Biotec, Germany

08:25 p.m. **Improving light sheet microscopy**
Thomas Pingel
LaVision BioTec – a Miltenyi Biotec Company, Germany

SYMPOSIUM SPEAKER

Nicolas Renier, Group Leader, Laboratory of Structural Plasticity ICM Brain and Spine Institute; Principal Investigator, Inserm, Paris, France

Mapping the mesoscale structural plasticity of the brain using iDISCO+ and ClearMap

Changes in the organization of adult neuronal connections or vasculature are difficult to study because of their rarity relative to the size of these networks. Single Plane Illumination ("light sheet") Microscopes (SPIM) combined with tissue optical clearing protocols will in the near future enable the migration of traditional histological pipelines from 2D sections to complete 3D reconstructions of intact organs. We developed two tools to facilitate the study of adult brain plasticity: iDISCO+, for whole-mount immunolabeling and high-performance optical clearing of any organ, and ClearMap, for the unsupervised mapping of neuronal activity in the brain. Here, I will present TubeMap, our recently developed module of ClearMap for the reconstruction of whole-brain annotated vascular networks. With TubeMap, terabyte-sized multichannel images can be segmented. We show here the application of this pipeline to the analysis of vascular plasticity in the brain, and for the reconstruction of brain-wide neuronal projections at single-neuron level. The combination of iDISCO+ and ClearMap may streamline the study of brain-wide changes to neuronal activity, morphology, and vascular topology.

Sam A. Golden, Assistant Professor, Department of Biological Structure, University of Washington, Seattle, WA

Aggression reward and relapse: from behavior to whole brain

Aggression is an ethologically complex behavior with equally complex underlying mechanisms. I will present data on one form of aggression, appetitive or rewarding aggression, and the behavioral-, cellular- and system-level mechanisms guiding it. I will briefly present how appetitive aggression is modeled in mice, and extend aggression motivation to compulsive aggression-seeking and relapse. I will then briefly highlight recent advances in computer vision and machine learning for automated scoring of aggressive behavior, the role of specific cell types in controlling aggression reward, and close with preliminary data on the whole brain aggression reward functional connectome using light sheet fluorescent microscopy (LSFM).

Andreas Bosio, Head of Molecular Technologies
& Stem Cell Therapy, Miltenyi Biotec, Germany

Thomas Pingel, Director Sales & Marketing
LaVision BioTec – a Miltenyi Biotec Company, Germany

Target discovery for CAR T cell therapy of glioblastoma multiforme using the novel MACSima™ Imaging Platform for multiparametric cyclic immunofluorescent analysis

Glioblastoma multiforme (GBM) is a highly malignant, incurable type of brain tumor which has been subclassified into several distinct subtypes using a multitude of analysis methods. The recent success in treating hematological malignancies with CAR T cells has raised hopes that the same principle might also be instrumental for GBM.
In order to find new targets for a potential CAR T cell treatment, we have used the newly developed cyclic immunofluorescence MACSima™ Platform to enable fully automated, high-content fluorescence imaging. A selection of markers identified through flow cytometric analysis of cell surface expression on primary glioblastoma derived xenografts was used for characterization of eight primary glioblastoma samples. Our analysis showed a high heterogeneity of protein expression in glioblastoma, and enabled the classification of diverse tumors. The new imaging platform also allowed a selective detection of tumor cells and subsequent segmentation, clustering, and correlation analysis of tumor-related markers for their potential use in immunotherapy.

Improving light sheet microscopy

The basic requirements for light sheet microscopes are as simple as for any other microscope, i.e., samples should be imaged with the best possible resolution. However, light sheet microscopy makes very specific demands on the optics and the recording speed, as most of the samples taken with the light sheet microscopes are quite large and cleared. This in turn requires objective lenses to withstand organic solvents. Since the samples in light sheet microscopy are usually much larger than usual, high-resolution objectives with low magnification are necessary to shorten the image acquisition time. The requirements for the light sheet are also very complex, as this must be as thin as possible and at the same time very homogeneous. The optical components initially used quickly reach their limits, since they were not developed specifically for light sheet microscopy. Miltenyi Biotec has therefore developed a new series of objectives and optical components that have been specially developed for light sheet microscopy. In this presentation, new objective lenses and optics, as well as the techniques for generating a homogeneous and thin light sheet, will be presented.

POSTER PRESENTATIONS

Automated adult and neonatal mouse brain dissociation and magnetic isolation of neurons increases efficiency and sensitivity for single-cell RNA sequencing and gene expression profiling

Presentation #639.14, poster board #A14
Wednesday, October 23, 2019
9:00–10:00 a.m.
McCormick Place Hall A
Session title: Neuronal Differentiation

Presenter: Sandy Reiß

Characterization and classification of glioblastoma multiforme using a novel multiparametric immunofluorescence analysis system – the MACSima™ Imaging Platform

Presentation #659.06, poster board #G39
Wednesday, October 23, 2019
9:00–10:00 a.m.
McCormick Place Hall A
Session title: Brain Injury and Trauma II

Presenter: Andreas Bosio

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