

Brain Research: Correlation of sample morphology and gene expression

High accuracy single neuron excision for reliable gene expression analysis

Parkinson's disease is a common progressive neurodegenerative disorder. It is connected with cell death of dopamine-releasing neurons in the substantia nigra. Differences in gene expression patterns between individual dopamine-releasing neurons of disease affected and healthy individuals allow defining target genes for therapies. For gene expression analysis, single cell resolution is crucial, as investigating the whole tissue is meaningless. Analyzing mixtures of dopamine-releasing neurons and all other brain cells distorts the result.

Leica's laser microdissection (LMD) method allows to specifically isolate and analyze individual dopaminergic neurons from post mortem tissues of Parkinson's disease patients. With it, misinterpretations due to the examination of inhomogeneous cell populations can be excluded.



Typical fields of research

- Alzheimer's disease
- Developmental biology
- Aging
- Mutation analysis of tumor tissue
- Other diseases

References

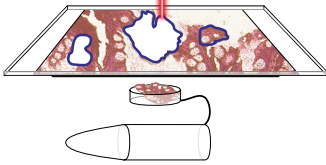
- Castelli et al., *Neuroscience*, 2016
- Schlaudraff et al., *Neurobiology of Aging*, 2014, 35 (10)
- Bandyopadhyay et al., *JoVE*, 2014, 83
- Gründemann et al., *NAR*, 2008, 36 (7)
- Ramirez et al., *Nature Genetics*, 2006, 38

Gene expression analysis workflow with single cell precision



Sample preparation

Cryo-sectioning with a cryostat and preparation of sections on special LMD slide.



Fixation and staining

Fixation and staining of tissue for microscopy and LMD application. Can be automated with a stainer.



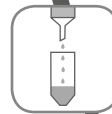
Visualization and ROI definition

Automatic generation of sample overview. The regions of interest (ROI), can be identified and marked automatically or easily manual.



Laser microdissection

The ROIs will be automatically dissected and collected via gravity into standard, cost-effective consumables such as PCR tubes or 8-strip tubes (e.g. Leica LMD7).



Extraction of RNA

Preparation for downstream analysis can be obtained by commercially available RNA extraction kits (e.g. QIAGEN) or without RNA extraction by simple cell lysis.



Gene expression analysis

Gene expression analysis is classically done via qPCR. Technologies such as Microarrays or next generation sequencing (NGS) are applicable as well.



DEMO AND DETAILS

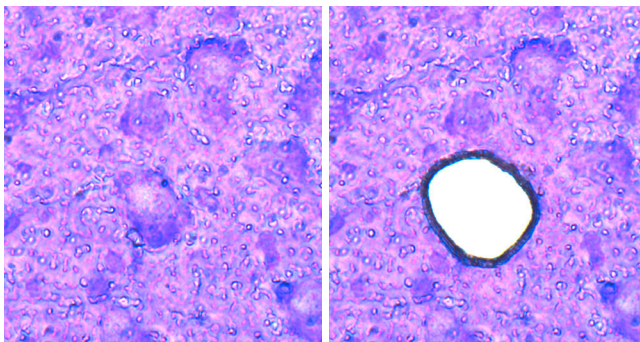


Collect pure material via gravity:
LMD by Leica Microsystems



Leica provides: Contamination free single cell cutting

When single cell excision precision is necessary, Leica laser microdissection is the method of choice. You can cut individual cells with ease under visual control. Contact free excision helps prevent contaminations e.g. with RNases.



Mouse brain cryo-section before and after laser microdissection. Cresyl violet staining.

Leica Microsystems CMS GmbH | Ernst-Leitz-Strasse 17-37 | D-35578 Wetzlar (Germany)
Tel. +49 (0) 6441 29-0 | F +49 (0) 6441 29-2599

www.leica-microsystems.com/lmd-geneexpression