BIOGRAPHICAL SKETCH

NAME: Ninkovic, Jovica

POSITION TITLE: Professor for CNS Regeneration and Plasticity, Independent Group Leader

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
University of Belgrade, Belgrade	BSc	29.12.2000	Molecular Biology and Physiology
University of Belgrade, Belgrade	MSc	15.01.2002	Molecular Genetics and Genetic Engineering
Technical University Munich	PhD	10.02.2006	Molecular Neurobiology

A. **Personal Statement**

I have a joint position of Professor of Anatomy and Cell Biology at the Department for Anatomy and Cell Biology of the Ludwig Maximilian University Munich and an independent group leader position at the Institute of Stem Cell Biology at the Helmholtz Center Munich. My research is centered on the investigation of cellular and molecular mechanisms defining the central nervous system plasticity in the healthy, diseased, and aging brain tissue with the focus on glial and stem cells. We utilize an evolutionary approach to study the central nervous system regeneration and aging in a comparative manner using the zebrafish and mouse brains as well as the human organoids as model system. We apply the cutting-edge single cell technologies that include both single cell transcriptomics, single cell live imaging, the cell type specific genetic fate mapping, prospective isolation of a specific glial cell types and viral vector-based manipulations of the target pathways to elucidate the evolutionary conserved mechanisms steering a specific glial reaction to the brain injury and aging, making my research at the leading edge of our current state of the art understanding of the central nervous system plasticity.

B. Positions, Scientific Appointments, and Honors

Positions and Employment

Since 04/2018 **W2 Anatomy Professor** – Regeneration and Plasticity of CNS, Institute of Cell Biology and Anatomy, Biomedical Center of LMU, Munich, Germany

Since 01/2013 **Research group leader** – Neurogenesis and Regeneration Group at Helmholtz Zentrum Munich; Institute of Stem Cell Research, Munich, Germany

01/2014 – 03/2020 **Deputy Director -** Institute of Stem Cell Research, Helmholtz Zentrum Munich, Munich, Germany

01/2008 – 01/ 2013 **Staff scientist** at Helmholtz Zentrum Munich; Institute of Stem Cell Research, Munich, Germany, in the lab of Prof. Magdalena Götz

12/2005 – 12/2007 **Postdoctoral scientist/fellow** at Helmholtz Zentrum Munich; Institute of Stem Cell Research, Munich, Germany, in the lab of Prof. Magdalena Götz

C. Contributions to Science

• During my PhD, I have developed essays to test adult neurogenesis and addiction related behaviours in zebrafish. This was the pioneering work to use the genetically trackable model system such as zebrafish for the behavioural studies. We use this technology for the genetic screens that revealed the surprisingly large overlap between the pathways controlling addiction in zebrafish and adult neurogenesis. This work is documented by following publications:

1. **Ninkovic J**, Tallafuss A, Leucht C, Topczewski J, Tannhäuser B, Solnica-Krezel L, Bally-Cuif L. **(2005)**: Inhibition of neurogenesis at the zebrafish midbrain-hindbrain boundary by the combined and dose-dependent activity of a new hairy/E(spl) gene pair. ***Development***. 2005 Jan;132(1):75-88. (IF: 6.2; Citations: 40).
2. **Ninkovic J**, Folchert A, Makhankov YV, Neuhauss SC, Sillaber I, Straehle U, Bally-Cuif L. **(2006)**: Genetic identification of AChE as a positive modulator of addiction to the psychostimulant D-amphetamine in zebrafish. ***J Neurobiol***. 2006 Apr;66(5):463-75. (IF:3.84; Citations: 76).
3. **Ninkovic J**, Bally-Cuif L. **(2006)**: The zebrafish as a model system for assessing the reinforcing properties of drugs of abuse. ***Methods***. 2006 Jul;39(3):262-74. (IF: 3.789; Citations: 166).
4. Webb KJ, Norton WH, Trümbach D, Meijer AH, **Ninkovic J**, Topp S, Heck D, Marr C, Wurst W, Theis FJ, Spaink HP, Bally-Cuif L. **(2009)**: Zebrafish reward mutants reveal novel transcripts mediating the behavioral effects of amphetamine. ***Genome Biol***. 2009;10(7):R81. doi: 10.1186/gb-2009-10-7-r81. (IF: 11.313; Citations: 53).

• During my post-doc, I was first to address the contribution of new neurons to the pre-existing neuronal networks during the animal aging, revealing a strikingly low addition of new neurons (Ninkovic et al., 2007). In addition, we were first to prospectively isolate, analyse transcriptome of adult neural stem cells and fate-map their progeny in vivo (Beckervordersandforth et al., 2010). This work is documented by following publications:

1. Beckervordersandforth R*, Tripathi P*, **Ninkovic J***, Bayam E, Lepier A, Stempfhuber B, Kirchhoff F, Hirrlinger J, Haslinger A, Lie DC, Beckers J, Yoder B, Irmler M, Götz M. **(2010)**: In vivo fate mapping and expression analysis reveals molecular hallmarks of prospectively isolated adult neural stem cells. ***Cell Stem Cell.*** 2010 Dec 3;7(6):744-58. doi: 10.1016/j.stem.2010.11.017. (IF: 24.55; Citations: 128). Highlighted by F1000.
2. **Ninkovic J**, Mori T, Götz M. **(2007)**: Distinct modes of neuron addition in adult mouse neurogenesis. ***J Neurosci.*** 2007 Oct 3;27(40):10906-11. (IF: 7.35; Citations: 144).

• As a senior scientist, I deciphered the molecular logic of the fate commitment and roadblocks in the adult neurogenesis, as highlighted by following publication:

1. **Ninkovic J**, Pinto L, Petricca S, Lepier A, Sun J, Rieger MA, Schroeder T, Cvekl A, Favor J, Götz M. **(2010)**: The transcription factor Pax6 regulates survival of dopaminergic olfactory bulb neurons via crystallin αA. ***Neuron***. 2010 Nov 18;68(4):682-94. doi: 10.1016/j.neuron.2010.09.030. (IF: 16.84; Citations: 49).
2. **Ninkovic J**, Steiner-Mezzadri A, Jawerka M, Akinci U, Masserdotti G, Petricca S, Fischer J, von Holst A, Beckers J, Lie CD, Petrik D, Miller E, Tang J, Wu J, Lefebvre V, Demmers J, Eisch A, Metzger D, Crabtree G, Irmler M, Poot R, Götz M. **(2013)**: The BAF complex interacts with Pax6 in adult neural progenitors to establish a neurogenic cross-regulatory transcriptional network. ***Cell Stem Cell.*** 2013 Oct 3;13(4):403-18. doi: 10.1016/j.stem.2013.07.002. (IF: 24.55; Citations: 111). Featured article by Cell Stem Cell. Highlighted by F1000.
3. Brill MS*, **Ninkovic J***, Winpenny E*, Hodge RD, Ozen I, Yang R, Lepier A, Gascón S, Erdelyi F, Szabo G, Parras C, Guillemot F, Frotscher M, Berninger B, Hevner RF, Raineteau O, Götz M. **(2009)**: Adult generation of glutamatergic olfactory bulb interneurons. ***Nat Neurosci.*** 2009 Dec;12(12):1524-33. doi: 10.1038/nn.2416. (IF: 17.15; Citations: 171).

• In my research group, I set up tools to follow fate commitment in the adult vertebrate brain using multi-colour clonal analysis in mouse (Calzolari et al., 2015; Bast et al., 2018) and live in vivo imaging in zebrafish (Barbosa et al., 2015; Barbosa et al., 2016) and follow their changes during healthy aging and after brain injuries. We were the first to address the behaviour of adult neural stem cells at the single cell level, aging induced changes in their behaviour and the implications these changes have for the neuronal repair. This work is documented by following publications:

1. Baumgart EV, Barbosa JS, Bally-Cuif L, Götz M, **Ninkovic J. (2012)**: Stab wound injury of the zebrafish telencephalon: a model for comparative analysis of reactive gliosis. ***Glia.*** 2012 Mar;60(3):343-57. doi: 10.1002/glia.22269. (IF: 5.51; Citations).

2. Calzolari F, Michel J, Baumgart EV, Theis F, Götz M*, **Ninkovic J.* (2015)**: Fast clonal expansion and limited neural stem cell self-renewal in the adult subependymal zone. ***Nat Neurosci.*** 2015 Apr;18(4):490-2. doi: 10.1038/nn.3963. (IF: 17.15; Citations: 94).
3. Barbosa JS, Sanchez-Gonzalez R, Di Giaimo R, Baumgart EV, Theis FJ, Götz M, **Ninkovic J**. **(2015)**: Neurodevelopment. Live imaging of adult neural stem cell behavior in the intact and injured zebrafish brain. ***Science***. 2015 May 15;348(6236):789-93. doi: 10.1126/science.aaa2729. (IF: 35.26; Citations: 73). Highlighted at F1000.
4. Bast L, Calzolari F, Strasser M, Hasenauer J, Theis F, **Ninkovic J***, Marr C*. **(2018)**: Increasing Neural Stem Cell Division Asymmetry and Quiescence Are Predicted to Contribute to the Age- Related Decline in Neurogenesis. ***Cell Rep.*** 25, 3231-3240 e3238. (IF: 8.032; Citations: 6).
5. Zambusi A, Pelin Burhan Ö, Di Giaimo R, Schmid B, **Ninkovic J. (2020)**: Granulins Regulate Aging Kinetics in the Adult Zebrafish Telencephalon. ***Cells***. Feb 3;9(2). pii: E350. doi: 10.3390/cells9020350. (IF:4.829; Citations: 15).

- Moreover, my lab identified Cxcr3 and Tlr2 signalling pathways that are important for the scar formation in zebrafish. The inhibition of these pathways improved the functional recovery in both injured zebrafish and mouse central nervous system (Sanchez-Gonzales, 2022). This is the first demonstration that signalling pathways identified in the regeneration competent species can been successfully used to improve the functional regeneration in mammals. Moreover, we identify the Aryl-hydrocarbon signalling to couple the glial scar formation with activation of neural stem cells and their capacity to successfully repair brain after injury (di Giaimo et al., 2019). The role of this pathway was also confirmed in the injured mouse cortex, further supporting our evolutionary, comparative analysis as versatile approach to understand changes in glial biology during the aging or after injury.

1. Di Giaimo R, Durovic T, Barquin, P, Kociaj A, Lepko T, Aschenbroich S, Breunig CT, Irmler M, Cernilogar F, Schotta G, Barbosa J, Trumbach D, Baumgart EV, Neuner AM, Beckers J, Wurst W, Stricker SH, **Ninkovic J. (2018)**: The Aryl Hydrocarbon Receptor Pathway Defines the Time Frame for Restorative Neurogenesis. ***Cell Rep.*** 25, 3241-3251 e3245. (IF: 8.032; Citations: 2).
2. Sanchez-Gonzalez, R.; Koupourtidou, C.; Lepko, T.; Zambusi, A.; Novoselc, K.T.; Durovic, T.; Aschenbroich, S.; Schwarz, V.; Breunig, C.T.; Straka, H, et al., **Ninkovic J. (2022)**: Innate Immune Pathways Promote Oligodendrocyte Progenitor Cell Recruitment to the Injury Site in Adult Zebrafish Brain. Cells 2022, 11, 520. https://doi.org/10.3390/cells11030520. (IF: 6.6; Citations: 0).

For a complete list of my publications, please see here:
https://www.ncbi.nlm.nih.gov/myncbi/1xww3zonnjiUwz/bibliography/public/