

Rouhollah Habibey

PART I: GENERAL INFORMATION

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Homepage: www.habibey.com
Nationality: Iran

EDUCATION:

- 2012-2015 **Ph.D. Neuroscience and Brain Technologies**
Italian Institute of Technology (IIT), Genoa, Italy
Thesis: *Microchannel scaffolds for axonal biophysics, electrophysiology and focal microdissection; On-chip axonal degeneration model.*
Supervisor: Axel Blau
- 2002-2006 **M.Sc. Physiology**
Tehran University of Medical Sciences (TUMS) , Iran
Thesis: *Morphine dependence preconditions kidney against ischemia reperfusion injury; Nitric oxide-dependent signaling pathways.*
Supervisor: Hamidreza Pazoki-Toroudi
- 1998-2002 **B.Sc. Nursing**
Tehran University of Medical Sciences (TUMS) , Iran

WORK EXPERIENCE

- Mar 2020-Now **Postdoctoral scientist**
University of Bonn, Department of Ophthalmology, Bonn, Germany
In a Volkswagen Foundation project in Prof. Busskamp group I exploit microfluidics and optogenetics tools to engineer human stem cell derived neuronal circuits on high-density MEAs for modelling axonal degeneration and demyelination diseases (multiple sclerosis) *in vitro*.
- Mar 2018-Feb 2020 **Postdoctoral scientist**
TU Dresden, Centre for Regenerative Therapies Dresden (CRTD), Dresden, Germany
At CRTD and TU-Dresden in Prof. Busskamp group we combined advances in human derived induced pluripotent stem cells (hiPSCs) and optogenetics with bioengineering (microfluidics, multi-electrode array electrophysiology) and advanced optical tools (holographic light stimulation) to generate brain mimetic electrically active neuronal

networks. The final goal is to understand information processing in engineered neural circuits and model neurological disorders *in vitro*.

Jun 2017 – Oct 2017 **Postdoctoral scientist**

IUF-Leibniz Research Institute for Environmental Medicine, Düsseldorf, Germany

In an industry funded (Bayer Pharmaceuticals company) project at IUF we construct 3D brain-mimetic tissue for toxicology and basic neuroscience applications. Advanced 3D bioplotter is applied to print human induced pluripotent stem cells (hiPSCs) in desired 3D structures

Apr 2015 - May 2017 **Postdoctoral scientist**

Italian Institute of Technology (IIT), Genoa, Italy

European project "Graphivity" which aims at the development of a graphene-enhanced surface plasmon resonance imaging (SPRi) sensor for neuroscience applications. My responsibilities in this project is to combine SPRi sensor with microfluidic chips for localizing cells (neurons, cell lines and spheroid cultures) to the sensing electrodes and compare the functionality of SPRi sensors with classical multi electrode array (MEA) electrophysiology results.

Oct 2006 - Dec 2011 **Research fellow**

Tehran University of Medical Sciences (TUMS) , Iran

I collaborated on research projects regarding tissue tolerance against ischemia reperfusion injury on different organs (kidney, brain, skeletal muscle and skin). My major tasks included rodents' surgery and behavioral tests, biochemical analysis, data collection and interpretation, writing proposals and papers and training master and PhD students.

Oct 2007 - Dec 2011 **Researcher (part time)**

Nano Vichar Pharmaceutical Ltd, Tehran, Iran

Clinical trials on skin disease in collaboration with Center for Research and Training in Skin Diseases and Leprosy (CRTSDL), Tehran, Iran. In Nano Vichar I had different responsibilities from designing research proposals on skin diseases (acne vulgaris), alopecia areata and androgenetic alopecia, data collection and analysis, finalizing reports and publishing the results.

PART II: RESEARCH OVERVIEW

Since 2012 (postdoctoral and Ph.D. projects) I combined commercial multielectrode arrays (MEA) electrophysiology with lab-on-a-chip (LOC) approach to (1) engineer human iPSC derived neuronal networks or rodent primary neuronal networks on MEA substrates, (2) amplify the extracellular activity recorded from growing axons inside microchannels, (3) produce controlled damage on microchannel-confined axons using laser microdissection and study axonal morphology and electrophysiology over long periods.

2006 – 2012, I studied ischemia reperfusion injury on different organs; skin, kidney, brain, and skeletal muscle. These studies were mainly based on pharmacological manipulation of the signaling pathways involved in injury or protection of ischemic organ.

PART III: BIBLIOGRAPHY**Articles (Published):**

1. [Habibey R](#), Striebel J, Schmieder F, Czarske J, Busskamp V (2022). **Long-term morphological and functional dynamics of human stem cell-derived neuronal networks on high-density MEAs.** *Front Neurosci. Accepted.* doi: 10.3389/fnins.2022.951964
2. [Habibey R](#), Rojo Arias JE, Striebel J, Busskamp V (2022). **Microfluidics for Neuronal Cell and Circuit Engineering.** *Chem Rev.* doi: 10.1021/acs.chemrev.2c00212.
3. [Habibey R](#), Striebel J, Sharma K, Busskamp V (2022). **Optogenetic Control of Human Stem Cell-Derived Neuron.** *Methods Mol Biol.* 2501:339-360. doi: 10.1007/978-1-0716-2329-9_17.
4. Schmieder F*, [Habibey R*](#), Striebel J, Büttner L, Czarske J, Busskamp V (2022). **Tracking connectivity maps in human stem cell-derived neuronal networks by holographic optogenetics.** *Life Sci Alliance.* 5(7):e202101268. doi: 10.26508/lsa.202101268.
5. Latifi S, Mitchell S, [Habibey R](#), Hosseini F, Donzis E, Estrada-Sánchez AM, Nejad HR, Levine M, Golshani P, Carmichael ST (2020). **Neuronal Network Topology Indicates Distinct Recovery Processes after Stroke.** *Cereb Cortex* 30(12):6363-6375. doi: 10.1093/cercor/bhaa191.
6. [Habibey R](#), Sharma K, Swiersy A, Busskamp V (2020). **Optogenetics for neural transplant manipulation and functional analysis.** *Biochem Biophys Res Commun.* 527(2):343-349. doi: 10.1016/j.bbrc.2020.01.
7. Amani H, [Habibey R](#), Shokri F, Hajmiresmail SJ, Akhavan O, Mashaghi A, Pazoki-Toroudi H (2019). **Selenium nanoparticles for targeted stroke therapy through modulation of inflammatory and metabolic signaling.** *Sci Rep* 9(1):6044
8. Hasan M, Latifi S, Kahn CJF, Tamayol A, [Habibey R](#), Passeri E, Linder M, Arab-Tehrany E (2018). **The Positive Role of Curcumin-Loaded Salmon Nanoliposomes on the Culture of Primary Cortical Neurons.** *Mar Drugs.* 16(7): 218. doi: 10.3390/md16070218.
9. [Habibey R](#), Latifi S, Mousavi H, Pesce M, Arab-Tehrany E, Blau A (2017). **A multielectrode array microchannel platform reveals both transient and slow changes in axonal conduction velocity.** *Sci Rep, Aug 17; 7(1):8558.* Doi: 10.1038/s41598-017-09033-3.
10. Amani H*, [Habibey R*](#), Hajmiresmail SJ, Latifi S, Pazoki-Toroudi H, Akhavan O (2017). **Antioxidant nanomaterials in advanced diagnoses and treatments of ischemia reperfusion injuries.** *J Mater Chem B,* 5:9452-9476
11. Latifi S, Tamayol A, [Habibey R](#), Sabzevari R, Blau A, Khan C, Geny D, Blau A, Linder M, Arab-Tehrany E. (2016). **Natural lecithin promotes neural network complexity and activity.** *Sci Rep* 6:25777. DOI: 10.1038/srep25777
12. Wilk N, [Habibey R](#), Golabchi A, Latifi S, Ingebrandt S, Blau A (2016). **Selective comparison of gelling agents as neural cell culture matrices for long-term microelectrode array electrophysiology.** *Oilseeds & Fats, Crops and Lipids,* 23 (1).
13. [Habibey R](#), Golabchi A, Latifi S, Difato F, Blau A. (2015). **Microchannel device for selective laser dissection, long-term microelectrode array electrophysiology and imaging of confined axonal projections.** *Lab Chip,*15(24):4578-90.
14. Saalfrank D, Konduri A, Latifi S, [Habibey R](#), Golabchi A, Martiniuc A, Knoll A, Ingebrandt S, and Blau A. (2015). **An incubator-independent cell culture perfusion platform for continuous long-term electrophysiology and time-lapse imaging reveals fluctuations in neural network activity and local architecture over months.** *R. Soc. open sci.* 2 (6), 150031.

15. Zare Mehrjerdi F, Aboutaleb N, Pazoki-Toroudi H, Soleimani M, Ajami M, Khaksari M, Safari F, [Habibey R](#) (2015). **The Protective Effect of Remote Renal Preconditioning Against Hippocampal Ischemia Reperfusion Injury: Role of KATP Channels.** *J. Mol. Neurosci.* 57(4):554-60.
16. [Habibey R](#), Golabchi A, Blau A. (2014). **Microchannel scaffolds for neural signal acquisition and analysis.** *Springer Series on Computational Neuroscience* . 13:47-64.
17. Zare Mehrjerdi F, Aboutaleb N, [Habibey R](#), Ajami M, Soleimani M, Arabian M, Niknazar S, Hossein Davoodi S, Pazoki-Toroudi H. (2013). **Increased phosphorylation of mTOR is involved in remote ischemic preconditioning of hippocampus in mice.** *Brain Res.* 1526: 94-101.
18. Moghtadaei M, [Habibey R](#), Ajami M, Soleimani M, Ebrahimi SA, Pazoki H (2012). **Skeletal muscle post-conditioning by diazoxide, anti-oxidative and anti-apoptotic mechanisms.** *Mol Biol Rep.* 39(12):11093-103.
19. Farahini H, [Habibey R](#), Ajami M, Davoodi SH, Azad N, Soleimani M, et al. (2012). **Late anti-apoptotic effect of KATP channel opening in skeletal muscle.** *Clin Exp Pharmacol Physiol* 39 (11): 909-916.
20. Pazoki-Toroudi H, Babakoohi S, Nilforoushzadeh MA, Nassiri-Kashani M, Shizarpour M, Ajami M, [Habibey R](#), Sadr B, Rashighi-Firoozabadi M, Firooz A. (2012). **Therapeutic effects of minoxidil high extra combination therapy in patients with androgenetic alopecia.** *Skinmed* 10(5): 276-82.
21. Ajami M, Davoodi SH, [Habibey R](#), Namazi N, Soleimani M, Pazoki-Toroudi H. (2012). **Effect of DHA+EPA on oxidative stress and apoptosis induced by ischemia-reperfusion in rat kidneys.** *Fundam Clin Pharmacol.* 27(6): 593-602.
22. Ajami M, Egtesadi S, [Habibey R](#), Mirzay Razaz J, Peyrovi H, Zarrindast M, Pazoki-Toroudi H. (2012). **Effect of short and long-term treatment with DHA + EPA on scopolamine induced amnesia.** *Iranian Journal of Pharmaceutical Research.* 11 (2): 533-540.
23. Ajami M, Egtesadi S, Razaz JM, Kalantari N, [Habibey R](#), Nilforoushzadeh MA, Zarrindast M, Pazoki-Toroudi H. (2011). **Expression of Bcl-2 and Bax after hippocampal ischemia in DHA + EPA treated rats.** *Neurol Sci.* 32(5): 811-8.
24. [Habibey R](#), Ajami M, Hesami A, Ebrahimi SA, Pazoki Toroudi H. (2010). **Nitric Oxide and renal protection in morphine dependent rats.** *Free Radic Biol Med.* 49(6):1109-18.
25. Pazoki-Toroudi H, Ajami M, [Habibey R](#). (2010). **Pre-medication and renal pre-conditioning: a role for alprazolam, atropine, morphine and promethazine.** *Fundam Clin Pharmacol.* 24(2):189-98.
26. Ajami M, Egtesadi S, Pazoki-Toroudi H, [Habibey R](#), Ebrahimi S. (2010). **Effect of crocus sativus on gentamicin induced nephrotoxicity.** *Biol Res.* 43: 83-90.
27. Pazoki Toroudi H, Ajami M, Babakoohi SH, Khaki L, [Habibey R](#), Firooz A. (2010). **Effects of diphencyprone on expression of Bcl2 protein in patients with alopecia areata.** *Immunopharmacol Immunotoxicol.* 32(3):422-5.
28. Pazoki-Toroudi H, Nassiri-Kashani M, Tabatabaie H, Ajami M, [Habibey R](#), Shizarpour M, Babakoohi S, Rahshenas M, Firooz A. (2010). **Combination of azelaic acid 5% and erythromycin 2% in the treatment of acne vulgaris.** *J Dermatolog Treat.* 21(3):212-6.
29. Pazoki-Toroudi H, Ajami M, [Habibey R](#), Hajiaboli E, Firooz A. (2009). **The effect of enalapril on skin flap viability is independent of angiotensin II AT1 receptors.** *Ann Plast Surg.* 62(6):699-702.

30. Habibey R, Ajami M, Hesami A, Pazoki-Toroudi H. (2008). **The mechanism of preventive effect of captopril on renal ischemia reperfusion injury is independent of ATP dependent potassium channels.** *Iran Biomed J.* 12(4):241-5.
31. Habibey R, Pazoki-Toroudi H. (2008). **Morphine dependence protects rat kidney against ischaemia-reperfusion injury.** *Clin Exp Pharmacol Physiol.* 35(10):1209-14.

Abstracts and Conference Proceedings:

1. Schmieder F, Habibey R, Busskamp V, Büttner L, Czarske JW. **Investigation of in vitro human iPSC-derived neuronal networks using holographic stimulation**, Proc. SPIE 11227, Optogenetics and Optical Manipulation 2020, 112270D (9 March 2020); <https://doi.org/10.1117/12.2546288>
2. Habibey R and Blau A. **Modular and patterned 3D cortical networks on microelectrode arrays as a brain-on-a-chip model.** Proceedings of the Society for Neuroscience (SFN) on November 12-16, San Diego, CA, 2016. [Poster]
3. Habibey R, Mousavi H, Pesce M, Nanni M, Blau A. **Non-invasive long-term recording of microchannel-confined axonal activity.** Front. Neurosci. Conference Abstract: MEA Meeting 2016 | 10th International Meeting on Substrate-Integrated Electrode Arrays. doi: 10.3389/conf.fnins.2016.93.00047 [Poster]
4. Habibey R, Golabchi A, Difato F, Konduri A, Nanni M, Succol F, Blau A. **Oriented cortical network accessible for recording from whole modules and connections on polydimethylsiloxane (PDMS) scaffolds.** Proceedings of the 9th international Meeting on Substrate-Integrated Micro Electrode Arrays, A. Stett and G. Zeck (Eds.), NMI, p. 316-317, 2014. [Poster]
5. Habibey R, Golabchi A, Nanni M, Difato F, and Blau A. **The pattern of activity in injured and non-injured axons after selected axonal microdissection in microchannels.** Proceedings of the Society for Neuroscience (SFN) on November 15-19, Washington, DC, 2014. [Poster]
6. Habibey R, Golabchi A, Difato F, Nanni M, Succol F, and Blau A. **Long-term monitoring of action potential propagation in axons growing inside microtunnels.** Proceedings of the 9th Federation of European Neuroscience Societies (FENS) on July 5-9, Milan, 2014. [Poster]
7. Habibey R, Golabchi A, Difato F, Nanni M, Succol F, and Blau A. **Molding microchannel and brain implant scaffolds from microstructured double layer photo resin master casts Concepts and examples.** Proceedings of the International Congress on Neurotechnology, Electronics and Informatics on September 18-20, Algarve, Portugal, 2013. [Oral presentation]
8. Habibey R, Golabchi A, Cerino M, Difato F, Nanni M, Succol F, and Blau A. **Design and fabrication of microchannel and cell culture scaffolds for neural guidance and enhanced optical accessibility of neural networks in vitro.** Proceedings of the 8th International Meeting on Substrate-Integrated Microelectrode Arrays, A. Stett and G. Zeck (Eds.), NMI, p. 350-351, 2012. [Poster]

- EXPERIMENTAL SKILLS**
- Primary and iPSC neural cell culture (2D and 3D), and spheroid cultures
 - Microfluidics and perfusion platforms for neural cell culture
 - Microfluidics (design, fabrication and validation)
 - Cleanroom (soft lithography & photolithography)
 - Electrophysiology (standard and high-density multi-electrode arrays)
 - Optogenetics
 - Optical tools (laser microdissection, holographic stimulation)
 - Calcium imaging (*in vitro*)
 - Wetlab

- SOFTWARE SKILLS**
- E-CAD: Autodesk, Expert (Silvaco), CleWin, KLayout
 - Programming: MATLAB, python, Labview
 - Image analysis: ImageJ
 - Statistical analysis: SPSS, OriginLab, GraphPad Prism
 - Database design: Access, Endnote, Mendeley
 - Neural signal analysis: Neuroexplorer and Plexon Offline Sorter

- LANGUAGE SKILLS**
- Azerbaijani: Mother tongue
 - Persian (Farsi): National language
 - English: Fluent
 - German: Intermediate (B1)
 - Italian: Basic

WORKSHOPS

- June 2014 Neuroscaffolds, Genova, Italy
"Tissue engineering for nervous system repair and regeneration"
- April 2014 Tecnobionet, Genova, Italy
"The future of research and clinical applications in neuroscience"
- Oct 2013 Tecnobionet, Genova, Italy
"Tissue repair: from tissue engineering to regenerative medicine"
- Sept 2013 ISN/FENS, Kolymbari, Crete, Greece
"Local protein synthesis in axons and dendrites"
- Aug 2013 AACIMP VIII, Kyiv Polytechnic Institute, Ukraine
"Neuroscience stream"
- July 2012 EC-NAMASEN Marie Curie Network, Reutlingen, Germany
"Neurotechnologies for neuroelectronic hybrids and neuroprosthetics"
- June 2012 "6th Summer School of Neuroengineering ", Genoa, Italy

AWARDS AND HONORS:

- 2011 Ranked 1st among the applicants for a Ph.D. scholarship, doctoral school on 'Humanoid and Life Technologies', XXVII cycle, University of Genoa & IIT, Italy

2002 Ranked 4th in the Physiology M.Sc. entrance exam among approximately 10,000 students, Iran.

References:

Prof. Dr. Volker Busskamp

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