ALI MAXIMILIAN ERTÜRK (1 page CV summary)

Personal data, Born: *Sep. 1980*; *erturk@deeppiction.com; www.deeppiction.com*
Twitter: erturklab (~90K followers) **LinkedIn:** LinkedIn (~13,5K followers)
Art/hobby: *photography* (~37K followers & 3x exhibitions), *reading* (~65 books/annual)

Current positions

02/2022–current	**CEO**, founder, Deep Piction
07/2022–current	**W3 (Full) Professor**, LMU Munich, Germany
07/2019–current	**Director**, Institute for Tissue Engineering & Regenerative Medicine, Helmholtz Munich

Research focus

AI-based 3D models of human organs and mouse bodies for the new era of biomedical innovation

Education and training

2009–2014	Postdoctoral fellow at ***Genentech Inc.***, South San Francisco
2003–2009	Doctoral thesis at ***Max–Planck–Institute of Neurobiology,*** Munich
1998–2003	Bachelor of Science, ***Bilkent University***, Molecular Biology and Genetics, Ankara

Funding obtained in the last ~8 years, total **~22,5 million Euros**

- Total amount of funds: **~5 million Euros** (2014-2019 as group leader) + **~17,5 million** (since 2019 as director)

Invited talks (more than 100 since 2015)

- Including Nature conferences, Neuroscience meetings and Chan Zuckerberg Initiative. Gave a TEDx talk.

Honors & Awards

- 2023 CIFAR Multiscale Human Mapping Awardee
- 2021 Nomis Foundation Human Heart Atlas Award
- 2021 Scientific vision highlighted in Brandeins article
- 2020 Research highlighted by Focus Magazine
- 2020 Rolf Becker-Preis and Cure Alzheimer Award
- 2020 Scientific career profiled in Nature Methods
- 2020 ERC Consolidator Grant
- 2020 Media coverage by Reuters, NZZ, Telegram, Daily Mail, RTL, Focus, Sat1 and Süddeutsche Zeitung, Galileo
- 2019 Interviewed as one of the 7 scientists in "Brain gain in Germany..." by Focus Magazine
- 2017 Adjunct Professor at the Rochester University
- 2017 NIH R01 grant award
- 2017 Fritz Thyssen Stiftung Investigator Award
- 2016 Interviewed by New York Times & Wall Street
- 2014 Sofja Kovalevskaja Award (declined)
- 2014 DFG SyNergy Excellent cluster Investigator

Publications as PI/corresponding author

- Luo J....**Ertürk A.** Deep Learning Powered Imaging of Nanocarriers at single cell level (bioRxiv in top 0.8%)
- **Ertürk A.** Deep 3D Histology powered by tissue clearing, omics and AI. **Nature Methods**, ***in press***
- Rong Z....**Ertürk A.** SARS-CoV-2 Spike Protein Accumulation in the Skull relates to long COVID...(bioRxiv in top 0.004%)
- Kaltenecker A...**Ertürk A.** Virtual reality and deep learning for brain..., **Nature Methods**, Apr 2024, (**cover**)
- Kolobas I...**Ertürk A.** Multi-omics and 3D-imaging reveal bone heterogeneity...(bioRxiv in top 0.1%) **Cell**, Aug 2023
- Mai H...**Ertürk A.** Whole mouse body histology using IgGs. (biorxiv in top 0.05%) **Nature Biotech**, July 2023 (**cover**)
- Cai...**Ertürk A.** Whole-mouse clearing & imaging at the cellular level with vDISCO, **Nat. Protocols**, July 2023 (**cover**)
- Bhatia...**Ertürk A.** Spatial proteomics in optically cleared pre-clinical & clinical specimens, **Cell**, Dec. 2022 (**cover**)
- Mai...**Ertürk A.** Scalable tissue labeling and clearing of intact human organs. **Nat. Protocols**, July 2022
- Todorov M...**Ertürk A.** Machine learning analysis of whole mouse brain vasculature. **Nature Methods**, Apr. 2020
- Zhao S...**Ertürk A.** Cellular and Molecular Probing of Intact Human Organs. **Cell**, Feb. 2020 (video)
- Pan C...**Ertürk A.** Deep learning reveals cancer metastasis & therapeutic antibody... **Cell**, Dec. 2019 (**cover**) (video)
- Cai R...**Ertürk A.** Panoptic imaging of transparent mice reveals... **Nature Neuroscience**, Feb. 2019 (**cover**)
- Pan C...**Ertürk A.** Shrinkage-mediated imaging of entire organs by uDISCO. **Nature Methods**, Oct. 2016 (**cover**)

Average impact factor of all articles as PI > **46**

ALI MAXIMILIAN ERTÜRK (CV Appendix)

(1) Professional experience and positions

02/2022–current	CEO, Deep Piction
07/2022–current	W3 (Full) Professor, LMU Munich, Germany
07/2019–current	Director, Institute for Tissue Engineering & Regenerative Medicine, Helmholtz Munich
06/2017-05/2022	Adjunct Professor, Rochester University (New York)
06/2016-05/2019	Member of Helmholtz Alliance ICEMED
09/2014-current	Member of Graduate School of Systemic Neurosciences Munich
09/2014-current	Associate PI of DFG Excellent cluster of Munich SyNergy
07/2014-06/2019	Junior Group leader (Assistant Prof. level) Institute for Stroke and Dementia (LMU)
10/2009-01/2014	Postdoc at Genentech Inc., South San Francisco, (with Prof. Dr. Morgan Sheng, Vice President of Genentech Neuroscience)
07/2008-09/2009	Postdoc at Max-Planck Institute of Neurobiology (with Prof. Dr. Frank Bradke)
06/2003-09/2003	Visiting scientist, Harvard School of Medicine (with Med. Dr. Timothy Vartanian)
06/2002-09/2002	Visiting scientist, Yale School of Medicine (with Med. Dr. Hal Blumenfeld)

(2) Education

2003-2009	Doctoral thesis at *Max–Planck–Institute of Neurobiology* and *LMU Munich* (Supervisor: Prof. Dr. Frank Bradke, DZNE Bonn). Field: Spinal Cord Injury, In vivo imaging, spinal cord clearing (published 3 first author articles, and 1 review)
1998-2003	Bachelor of Science, *Bilkent University*, Molecular Biology and Genetics, Ankara (scored in 0.002% in Turkey's National University entry exam in ~1,800,000 students)
1994-1998	Science High School (graduated as the top student)

(3) Entrepreneurship

02/2022-current	CEO, co-founder, Deep Piction
2009/2014	Worked at Genentech Inc.

(4) Scientific Awards

- 2024 Falling Walls Life Science awardee
- 2023 CIFAR Multiscale Human Mapping Awardee (Generating Google Map of whole human body)
- 2021 Nomis Foundation Human Heart Atlas Award (Cellular and molecular maps of human heart)
- 2020 Rolf Becker-Preis 2020 (DeepMACT use to study cancer metastasis and drug targeting)
- 2020 Cure Alzheimer's Foundation researcher award (New ways to deliver drugs to cure AD)
- 2020 ERC Consolidator Grant (Role of skull marrow cells in brain diseases)
- 2017 NIH R01 grant award (Lymphatic/glymphatic system in whole mouse body)
- 2017 Fritz Thyssen Stiftung Investigator Award (Axon regeneration and degeneration in whole body)
- 2014 Sofja Kovalevskaja Award (declined) (Study of synaptic plasticity in traumatic brain injury)
- 2014 DFG SyNergy Excellent cluster Investigator (Mesoscale imaging Hub investigator)

(5) Funds raised in the last ~8 years

Ali Ertürk has raised ~10.5 million € in 3rd party funding in the last 8 years including 2 million € for ERC Consolidator Grant (2020) and 3.8 million € for Nomis Human Heart Atlas (2021)

- 2023-2028: CIFAR Multiscale Human Mapping (300.000 €)
- 2022-2025: Helmholtz AI Project (200.000 €)
- 2021-2026: Nomis Heart Atlas (3.800.000 €)
- 2021-2024: BMBF HIV drug development (400.000 €)
- 2020-2025: ERC – European Research Council Consolidator Grant (2.000.000 €)
- 2020-2022: Cure Alzheimer's Foundation, Research grant (210.000 €)
- 2019-2022: Associate PI of DFG Excellent cluster of Munich SyNergy II: (515.000 €)
- 2018-2023: R01, NIH, USA (700,000 €)

- 2018-2019: LMU Excellent seeding funds: (50.000 €)
- 2017-2020: Fritz Thyssen Stiftung, Germany: (250.000 €)
- 2016-2019: DFG Research Grant: (223.000 €)
- 2016-2019: Member of Helmholtz Alliance ICEMED: (200.000 €)
- 2016-2017: LMU Excellent seeding funds: (50.000 €)
- 2015-2016: LMU FöFoLe research grant: (55.000 €)
- 2015: DFG Instrument Grant: (200.000 €)
- 2014-2017: ERA-Net grant, Co-coordinator: (300,000 €)
- 2014: Graduate School of Systemic Neurosciences Munich: (35.000 €)
- 2014-2019: Associate PI of DFG Excellent cluster of Munich SyNergy: (1.050.000 €)

Total amount of funds: ~22.5M €

(9) Patents

- Methods for large tissue labeling, clearing and imaging using antibodies,Inventors: H Mai, J Luo, **A. Ertürk**, (EP22199276) (2022)
- Robotic Micro-Biopsy System and Robotic Micro-Biopsy Method, Inventors: F Ozturk, M Todorov, H Bhatia, M Negwer, **A. Ertürk** (EP22205249) (2022)
- Enimask- 3D-printed personalized mask for whole day conformable wear and protection (patent filed), Inventors: F. Ozturk, **A. Ertürk** (2019)
- Whole-body labeling, clearing and imaging to study disease mechanisms (WO2018224289). Inventors: C. Pan, R. Cai, S. Zhao, A. Damas, **A. Ertürk** (2018)
- Use of microtubule stabilizing compounds for the treatment of lesions of CNS axons (WO/2006/094811), Inventors: F. Bradke, H Witte, **A. Ertürk** (2006)

(10A) Pioneering work in tissue clearing and 3D imaging

In 2007, Ali Ertürk began working on tissue clearing while he was a Ph.D. student with Frank Bradke. In collaboration with Hans Ulrich Dodt, he developed the first methods for clearing adult rodent organs in 2011, collectively called DISCO clearing (3D Imaging of Solvent Cleared Organs) (Ertürk et al., 2011, Nature Medicine, cover; Ertürk et al., 2012, Nature Pro., cover). Following the publication of DISCO clearing methods, many other labs began publishing papers in this newly formed field, including the CLARITY clearing work by the Karl Deisseroth lab at Stanford (Nature 2013), CUBIC clearing work by Hiroki Ueda at Riken (Cell, 2014), and iDISCO (Cell, 2014) and iDISCO+ (Cell, 2016) derivatives of DISCO clearing by the Marc Tessier-Lavigne lab at Rockefeller University. These tissue clearing methods quickly spread to hundreds of labs worldwide. They received tens of thousands of citations within a few years (e.g., >5000 citations only for the initial three papers from DISCO, CLARITY, and CUBIC methods). Ertürk's DISCO line of organic-solvent-based methods, in particular, contributed to this rapid expansion as they are easy to apply and provide the most substantial tissue-clearing effect. Due to the high demand for training in these methods, Ertürk's lab hosted annual workshops to train selected scientists (2015-2018) and later recorded detailed videos of the workshops in 2018 to meet all the demand (Tissue Clearing Workshop). The DISCO clearing methods attracted many academic labs and biotechnology companies. Some examples are listed in the next section.

(10B) Pioneering AI work in biomedicine to switch to *in silico* experiments

Ertürk's work has extensively incorporated the use of AI, especially in his development of deep learning methodologies for analyzing large amounts of biomedical data. He has implemented these technologies in his academic lab and biotechnology company, Deep Piction, which leverages AI to accelerate drug development and enhance clinical trial success rates[1].

In his research, Ertürk and his team have developed VesSAP (Nature Methods, 2020), a Vessel Segmentation & Analysis Pipeline that uses machine learning to characterize the entire vasculature in cleared tissues. In their DeepMACT work, his team developed the first method to identify both drugs and their targets at the single-cell level in whole mammalian bodies, in mouse (Cell, 2019). His team also developed algorithms to map hundreds of millions of cells in cleared human organs to generate the first 3D cellular maps of intact human organs (Cell, 2020). Furthermore, they developed methods to analyze 3D-proteomics data using deep learning in DISCO-MS technology (Cell, 2022). In this method, after imaging whole biological tissues in 3D without sectioning, the defined tissue regions are isolated and analyzed using Mass Spec. In the recent work,

his team developed DELiVR, to segment and analyze any cell type in the brain using deep learning, with a focus on cFOS+ neuronal activity (Kaltenecker...Ertürk, Nature Methods, 2024). Ertürk also published a perspective review on 3D tissue hitsology using tissue clearing, spatial omics and AI, substantiating his lead in this newly emerging field (Ertürk, Nature Methods, 2024).

(11) Examples of national and international cooperations

As the pioneer of whole organism and whole organ cell level imaging technologies, Ali Ertürk has established various collaborative projects with world leaders to co-develop new hybrid technologies and apply tissue clearing to address diverse biomedical questions.

Academic labs utilizing DISCO clearing only via Ertürk lab:

- **Prof. Matthias Mann**, merging clearing and proteomics technologies (MPI Biochemistry)
- **Prof. Maiken Needergard**, tissue clearing to study lymphatic/glymphatic system (Univ. Copenhagen, Denmark)
- **Dr. Julie Pannequin**, tissue clearing to study colorectal cancer (CNRS, France)
- **Prof. Bjoern Menze**, development of deep learning algorithms (ETH Zurich)
- **Prof. Mark H. Tuszynski**, stem cell grafts in SCI, and TBI (University of California San Diego, USA)
- **Prof. Susan Kaech**, Immune cell activation in whole body (Salk Instiute, San Diego, USA)
- **Prof. Hande Ozdinler**, imaging whole nervous system in ALS mouse (Northwestern University, Chicago)
- **Dr. Kiavash Movahedi**, imaging parasite infection in whole body (VIB, Belgium)
- **Prof. Aviv Regev**, merging clearing and transcriptomics technologies (MIT, Genentech, USA)
- **Prof. Sarah Teichmann**, single cell RNAseq on human embryos and tissues (MRC, UK)
- **Prof. Hendrik Dietz**, development of DNA Origami to deliver drugs to CNS (TU Munich)
- **Prof. Sten Linnarsson,** multiplex single molecule FISH in cleared tissue (Karalinska, Sweden)
- **Prof. Turgay Dalkara**, clearing applications on migraine models (Ankara, Turkey)
- **Prof. Dániel Kirschenbaum**, tissue clearing for immune cell tracking (USZ, Zurich)
- **Prof. Ozlem Yesil**, tissue clearing on organoids models (Ege University, Turkey)
- **Prof. Rüdiger Klein**, tissue clearing to study neuronal wiring in mouse embryos (MPI Neurobiology)
- **Prof. Vasilis Ntziachristos**, optoacoustic imaging of calvaria bone (Helmholtz Munich)
- **Prof. Hana Algül**, patient-driven cancer models studied using tissue clearing (TU Munich)
- **Prof. Irmela Jeremias**, leukemia cancer models in whole mouse body (LMU Munich)
- **Prof. Magdalena Götz**, tissue clearing to study stem cell integration in the brain (LMU Munich)
- **Prof. Martin Dichgans**, tissue clearing to study vascular dementia (LMU Munich)
- **Prof. Sebastian Kobold**, CAR-T cell targeting of solid tumors (LMU Munich)
- **Prof. Cristina Garcia Caceres,** vascular and neuronal changes in diabetic mice (Helmholtz Munich)
- **Prof. Dirk Busch**, CAR-T cell targeting in leukemia models (LMU Munich)
- **Prof. Fabian Theis**, developing AI algorithms of spatial-omics (Helmholtz Munich)

Biotechnology companies has been utilizing our DISCO clearing:

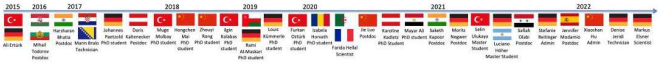
- **Roche**, tissue clearing applications in drug bio-distribution assessment studies
- **Denali Theraputics,** tissue clearing applications in CNS drug penetration studies
- **CSL Behring,** tissue clearing applications in circulating drug testing
- **Genentech,** tissue clearing applications in spatial-omics
- **BioNTech,** tissue clearing applications in mRNA therapeutics

(12) Team culture and education of young scientists

Ali Ertürk puts significant effort into forming a great lab atmosphere with a long-lasting team culture. By doing so, young scientists in his lab learn and practice how to establish a great team and culture for success. In his multi-cultural and multi-disciplinary team, there are several activities for establishing the lab culture and educating the next-generating scientists. Some of them are listed below:

- Ertürk lab has an audiobook library with more than 65 books on self-development and other topics. Link to Erturklab Audiobooks (please download the PDF to see the full-list of our Audiobooks).
- Ali Ertürk does regular workshops for his team on diverse topics, including presentation skills, conflict management, divergent thinking and brainstorming, how to apply for jobs, etc.
- Ertürk lab also supports coaching from external experts, including entrepreneurial thinking and scientific writing.

- Ertürk lab has a transparent hiring scheme as a team activity. Each position is identified based on the group's needs and brainstorming. After the job post, the top candidates are interviewed by the lab, and everyone is asked to comment on the candidate and vote for hiring. Ali Ertürk's vote counts as one like all others in the group. Here is an example candidate feedback form: https://forms.gle/iGxvW8NzZisYhJ2n7.
- Ertürk lab strongly cares about diversity and has scientists from more than 30 countries. The team consists of 19 nationalities, in 28 scientists (14 female and 14 male).



- Ertürk lab makes an annual anonymous team survey to get the feedback of each member to improve the lab culture: https://forms.gle/87HSRrwAQBCdzmyE7. Survey results shared and discussed with the team for improvements.
- Since 2015, 6 students have obtained their Ph.D. from Ertürk lab. They all published high-impact first-author papers and found a position for their next career level. Examples include:
  - Ruiyao Cai (Ph.D. in 2020), currently a postdoc at Stanford University with Prof. Dr. Marc Tessier-Lavigne
  - Chenchen Pan (Ph.D. in 2020), Assistant Proffesor in China
  - Shan Zhao (Ph.D. in 2021), currently a postdoc at UZH Zurich with Prof. Dr. Bernd Bodenmiller

(13) Invited presentations (selected ones from more than 120 since 2015)

- 2023 CAS and SIAT (Shenzen, China, in person)
- 2022 SFN San Diego (California, in person)
- 2022 SALK Institute (California, in person)
- 2022 Denali Therapeutics invited speaker (S. San Francisco)
- 2022 Genentech invited speaker (S. San Francisco)
- 2022 BioNTech CIMT meeting (Mainz)
- 2022 Ulm University invited speaker (Ulm)
- 2022 DKFZ (Zoom Talk)
- 2021 NIH, invited speaker (Zoom Talk)
- 2021 UCSD, invited speaker (Zoom Talk)
- 2021 EMBL Conference, invited speaker (Zoom Talk)
- 2021 ENDO 2021 (Zoom Talk)
- 2021 CÚRAM, Science Foundation Ireland Centre for Research in Medical Devices (Zoom Talk)
- 2021 Genentech Inc, postdoc program (Zoom Talk)
- 2020 Light-sheet microscopy meeting (Zoom Talk)
- 2020 Human Cell Atlas (HCA) (Zoom Talk)
- 2020 Roche TMo Lecture Series (Zoom Talk)
- 2020 Society of Neuroscientists of Africa (Zoom Talk)
- 2020 Nature Conference "Neuroimmune crosstalk in health and disease" Lisbon, Portugal 9-11th December
- 2020 Speaker at Imaging meeting at Karolinska Institute (Sweden)
- 2020 Light-Sheet Workshop, Munich
- 2019 Anatomischen Gesellschaft in Würzburg
- 2019 Next-Generation Genomics, by Nature editors, New York
- 2018 Chan Zuckerberg Biohub, by Stephen Quake, Beyond the Cell Atlas, San Francisco
- 2018 The Federation of European Neuroscience Societies (FENS) Berlin, chair and speaker
- 2018 1st International Conference Engineering Biomedical Breakthroughs Helmholtz Munich, Venice
- 2018 Dutch Society of Stem Cell Research, Utrecht
- 2018 MoBi, keynote speaker, Göttingen
- 2018 Speaker in Tissue Clearing Symposium, SFN, San Diego
- 2018 Princess Maxima Center opening, by Hans Clevers, Utrecht
- 2018 Helmholtz Pioneer Campus 1st symposium, Venice
- 2018 Copenhagen, Speaker in Brain Waste Clearing Symposium

- 2018 Gordon Research Conference for Salivary Glands & Exocrine Biology (declined)
- 2017 IZB Innovations- und Gründerzentrum Biotechnologie, Martinsried
- 2017 Tissue clearing workshop, Göttingen
- 2017 LARC Meeting-Neuroscience Network, Lille, France
- 2017 BioCARE, Lund, Sweden
- 2017 German-French workshop, Paris, France
- 2017 University of Copenhagen, Denmark
- 2017 University of Helsinki, Finland
- 2017 Webinar, Abcam, USA
- 2017 ICEMED meeting, University of Leipzig
- 2017 Institute for Diabetes and Obesity retreat, Helmholtz, Munich
- 2017 CNSAflame meeting, Bordeaux, France
- 2017 Connecting U Symposium, Utrecht, Netherlands
- 2016 QBiC meeting, Osaka, Japan
- 2016 Invited special lecture, RIKEN and University of Tokyo, Tokyo, Japan
- 2016 Helmholtz Research Network Meeting, Special Guest, Munich, Germany
- 2016 Nature Webinar, Novel Technology webinar, podcast with live Q&As, worldwide
- 2016 Genentech Inc., Seminar on Novel Imaging Technologies, S. San Francisco, USA
- 2016 Leibniz Institute on Aging, Invited Guest Seminar, Germany
- 2015 SFN, Minisymposium, Novel technologies, Chicago, USA
- 2015 Istanbul, Electron Microscopy Meeting, Turkey
- 2015 European Neuroscience Institute, Tissue clearing workshop, special guest, Goettingen, Germany