Now open for applications: opnMe PostDoc grant program opn2TALENTS

3D image analysis using AI, XR, and spatial computing

How would you propose to employ spatial computing and artificial intelligence in analyzing 3D images of tissues and organs to characterize morphological and molecular alterations induced by diseases and medications?

Submit your [scientific proposal](#) for a chance to be selected to conduct your proposed research plan as part of your PostDoc project at the Development facilities of Boehringer Ingelheim in Biberach, Germany, one of the leading pharmaceutical companies worldwide. This opportunity is open for submissions through June 12, 2024, 11:59 pm PST.

What is the context of the opportunity that we are currently offering?

Conventional histopathology techniques, which diagnose structural and molecular changes by examining thin tissue sections under a microscope, have been widely used for over a century. However, the 2D images obtained from thin sections of tissues only provide a single plane of view and do not capture the 3D structure of the tissue, limiting its ability to represent the complex structures of tissues and organs. Consequently, crucial information about the spatial relationships between different cells, tissue structures and drug targets can be lost[1].

To address these limitations, 3D imaging techniques have been developed to visualize the entire 3D structure of tissues and organs. Confocal microscopy or light-sheet microscopy captures optical section images of the entire sample enabling a better understanding of the abnormalities caused by drug toxicity or diseases in 3D[2].

We envision that the integration of 3D imaging and AI into extended reality and spatial computing has the potential to revolutionize 3D histopathology image analysis[3]. Our lab has already established expertise in 3D histopathology, employing techniques such as light-sheet microscopy, laser scanning confocal microscopy and expansion microscopy to examine organs, cells, and subcellular organelles across scales ranging from millimeters to nanometers. We have also been using AI tools for digital image analysis of 2D images[4].

To expand our capabilities further, we aim, as part of this opnMe call, to develop AI-powered 3D image analysis utilizing extended reality and spatial computing. This approach will enable us to leverage the advantages of both AI and spatial computing to gain deeper insights into the complex 3D structures and spatial relationships within tissues and organs.

As a summary, how would you employ artificial intelligence, extended reality, and spatial computing to analyze 3D images of tissues and organs, with the aim of enhancing our understanding of morphological and molecular alterations induced by diseases and drug toxicity?

What potential solutions could be in scope?

We are inviting proposals that provide detailed plans for a well-structured project, which should be completed within a 3-year timeframe. The primary objective of the project is to develop a platform for 3D biomedical image analysis utilizing artificial intelligence, extended reality, and spatial computing. The platform should offer a user-friendly workflow through (semi)automated data processing and a collaborative workspace.

What potential solutions could be out of scope?

- Hardware (microscope, computer, headset) development
- Sample preparation method development
- 3D imaging method development
- Pathological diagnosis

What will be the reward to the winner?

As a winner of this call, you will have the unique opportunity to pursue your own submitted research project as a fully resourced PostDoc project under the guidance of mentors in the department of Nonclinical Drug Safety at Boehringer Ingelheim located in Biberach/Riss, Germany. You will obtain a position for up to 3 years* with Boehringer Ingelheim within a cross-functional, international team of world-class toxicologists, pathologists, digital image analysts, and AI scientists working on drug safety.

> You want to learn more about living in Biberach at the river Riss?
>
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At Boehringer Ingelheim, you will have access to a fully equipped laboratory in a state-of-the-art research facility including access to all relevant tools (e.g., Light-sheet microscope, laser scanning confocal microscope, high power computing system) and technologies. You will benefit from mentoring through our internal experts, have the chance to attend international conferences, and to publish your results in high-ranking journals. You will be part of the vibrant PostDoc community at Boehringer Ingelheim in Biberach with manifold opportunities for scientific, cross-functional exchanges for your personal development. You will have the opportunity to learn the process and challenges of drug discovery and development from the inside, including additional training and mentoring programs.

In addition, benefit from the rich packages for employee benefit. Our most important asset in achieving our global vision is our people. We prioritize your growth, investing in our people through mentoring, coaching, skill-building, leadership development, and academic support. Our infrastructure promotes wellness with sports groups, health counseling, onsite medical services, and regular check-ups. Achieve work-life balance with flexible work hours, remote working, childcare support, counseling, and convenient amenities. We ensure financial health with employer loans, private insurances, access to discounts, and a company pension scheme. Benefit also from our excellent and healthy on-site catering and the opportunity for take away meals. We offer relocation support and interim accommodation to make joining us easy.

What are the requirements to participate in this call?

- PhD or equivalent degree in Computer Science, Physics, Life Sciences, or related field.
- Strong background in developing AI algorithms for microscopy image analysis.
- Proficiency in computer programming languages.
- Knowledge of extended technologies in biomedical imaging.
- Practical experience in histopathology techniques.
- Extensive knowledge of fluorescence microscopy and familiarity with 3D imaging techniques (e.g., light-sheet microscopy).
- Strong problem-solving skills and ability to work independently, proactively, and collaboratively.
- Track record of independent research as exemplified through publications or patents.
- Very good oral communication and presentation skills as well as the ability to work in multidisciplinary teams in a matrix environment.
- Fluent language skills in English are mandatory, German language skills is a plus.

What information should be included in your answer submission?

Please use our PostDoc grant application template to provide a 4–5-page non-confidential proposal (available for download on the following site). Please complement with your CV, publication list, and recommendation letters.

If confidential data exists that would strengthen the proposal, please indicate that information is available to share under a Confidential Disclosure Agreement (CDA). If we find the non-confidential concept proposal sufficiently interesting, we will execute a CDA for confidential discussions.

What are the individual steps and timelines of the overall program?

Step 1   Please complete your application including a project proposal by June 12, 2024, 11:59 pm PST at the very latest. A full application package consists of your CV including references and a publication list. In addition, please submit

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the scientific project proposal based on our template (available for download from the following [site](#)). Please note that we will be unable to accept applications without a research proposal addressing our scientific question.

Step 2   We plan to finalize the review of all applications within four weeks by July 12, 2024.

Step 3   All final candidates will be invited for an opn2TALENTS interview week that will take place from September 2 – 13, 2024. Even as we plan to give enough time for the finalists to prepare for their travel plans, we suggest that you block this time frame in your calendars already now. Please expect that you will be invited for only one day during this time frame. Depending on your location, please reserve more than one day for travel. All final candidates have the chance to present and discuss their research proposal at an internal meeting. Please prepare a PowerPoint version of your project proposal and be prepared for an in-depth scientific discussion of your ideas and approaches. Please also be prepared for additional interviews with members of the scientific team and our human resources department. Please address any questions you may have during this week as well.

Step 4   Beginning of October 2024, we plan to announce the final winner of the opn2TALENTS PostDoc grant.

Step 5   December 1, 2024, represents the earliest start date to work on your project at our Research and Development site in Biberach, Germany.

How to apply?

- Check the outline of the opn2TALENTS grant opportunity "[3D image analysis using AI, XR, and spatial computing](#)" on opnMe.
- Alternatively, you may click the "Get Application Template" banner.
- Follow the instructions to upload your submission document (requires login or registration).
- The upload allows you to attach additional application files such as your CV, publication list, and references. Please note that the maximum file size is 15MB per file.
- You will be able to access your final submitted collaboration proposal in your personal dashboard and follow its review status.
- Please also visit the [FAQ section](#) on opnMe.com to learn more about our opn2TALENTS program.

What else is important to Boehringer Ingelheim?

- Our purpose is to transform lives for generations. Therefore, we developed three key principles for our PostDoc program which are determining our plans and actions: Drive cutting-edge science, new concepts and technologies; enrich Boehringer Ingelheim's innovation ecosystem with highly motivated, young fellows, who will help to build on science to develop new medicines; and train the next generation of leading scientists.

- Our campus community culture is great for sharing ideas and makes it easy to access technologies, meet experts, and approach leaders of all levels. There's a great spirit of freedom, fluidity, and fierce collaboration.

- Interactions are sound and informal. It's not particularly hierarchical, more team-based with a start-up attitude. We are always keen to help and speak up, open to positive change and new ideas that support our mission to improve lives.

- Our Speak-Up policy is an important part of our Code of Conduct. Only in this way we can continuously develop and improve as a company.

- Diversity, Equity, and Inclusion (DEI) is an integral part of Boehringer Ingelheim's identity; a key element of our culture and contributes to our 'Sustainable Development – For Generations'.

- Our core values of empathy, respect, passion, and trust nurture a diverse, collaborative, open and inclusive environment which is key to innovation, value creation and sustainable growth. With the inclusion of various experiences, backgrounds, and characteristics, Boehringer Ingelheim creates an openness to different approaches, solutions, and perspectives, all contributing to create "Value through Innovation".

*Please note: The offered position initially covers a duration of 24 months with an option for extension by another 12 months.

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References

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2. Fischer R. S., Wu Y., Kanchanawong P., Shroff H., Waterman C. M. Microscopy in 3D: a biologist's toolbox *Trends Cell Biol*. **2011**, 21(12):682-91. DOI: 10.1016/j.tcb.2011.09.008, PubMed.

3. Liu J. T., Chow S. S., Colling R., Downes M. R., Farré X., Humphrey P., Janowczyk A., Mirtti T., Verrill C., Zlobec I., True L. D. Engineering the future of 3D pathology *J Pathol Clin Res*. **2024**, 10(1):e347. DOI: 10.1002/cjp2.347, PubMed.

4. Moxley-Wyles B., Colling R., Verrill C. Artificial intelligence in pathology: an overview *Diagn Histopathol*. **2020**, 26:513−20. DOI 10.1016/j.mpdhp.2020.08.004.