Workshop title: **Advanced Imaging of Biological Samples**

Place: Institute of Human Genetics PAS, Poland

Duration: 11- 15 September 2023

Abstract:

During the Workshops organized by the Institute of Human Genetics PAS, participants will have the opportunity to learn about principles of advanced biological sample molecular imaging using **both confocal microscopes and cutting-edge spatial transcriptomics approach**.

All participants will have the opportunity to participate in the hands-on workshop including cell seeding techniques, fixation, and staining procedures using both specific antibodies as well as organelle-specific fluorescent dyes (e.g. cytoskeleton/lipid droplets). In addition to the sample preparation, the participant will learn the principles of defining a molecular target in the aspect of immunofluorescence analysis as well as designing and optimizing the immunofluorescence procedure and the appropriate selection of antibodies and fluorochromes. During the workshop, each participant will have the opportunity to work with the microscope and learn about modern imaging techniques, such as Lightening super-resolution and Tau-sense technology. Moreover, atomic force microscopy (AFM) techniques will be introduced. As an integral part of the course, the quantitative and qualitative analysis of microscopic images using ImageJ and Gwyddion software will be introduced. In addition, participants are encouraged to bring their own samples.

Spatial transcriptomics is a new field that combines molecular biology and histology. In recent years, techniques have been developed that enable in situ gene expression profiling thereby measuring the abundance of mRNA molecules in cells and tissues while preserving information about their spatial localization. The workshop will familiarize participants with the basic concepts, the main protocol for optimizing and analyzing gene expression from selected tissue, and the methodology for securing the tissue under study before the actual experiment begins. The workshop will also offer hands-on exercises enabling the entire process - from tissue permeabilization to analysis of the final experimental data. Given the rapid development of the field, this workshop will serve as an encouragement and support to start transcriptomic research. The workshop aim to help people get into the field, plan experiments, play around with data analysis and think about the future potential of this powerful technology.