# Master student thesis project

Topic: Impact of the enzymatic digestion on different tumor tissue samples for mass spectrometry imaging analysis

Brief description: Mass spectrometry imaging is a technique that allows the evaluation of molecules directly on tissue. This gives the opportunity to evaluate the distribution of a peptide/ protein, metabolite, glycan, or lipid on the tissue without requiring external labeling. Moreover, after processing, the samples can still be correlated with the histochemical characteristics. At the Institute of Pathology of the Technical University of Munich, we have been evaluating different tumor tissues with mass spectrometry imaging using state-of-the-art instrumentation and tackling some of the current bottlenecks of the diagnostic process.

One of the most relevant steps in tissue preparation for mass spectrometry analysis is enzymatic digestion. All steps need to be precisely controlled and experimental reproducibility needs to be controlled. However, different tumor tissues have different specificities: different cellular density, different tissue composition, and even different tissue origins. While keeping the same digestion period might be optimal for inter-tumor comparison, it might not be ideal for the overall evaluation of the tissue composition. As different molecules also require different digestion times and digestion temperatures. Therefore, we plan to carry out a systematic study to evaluate the impact of the digestion conditions directly on different types of tumor tissue.

During this project you will have the chance to gather a good understanding about mass spectrometry imaging, solid knowledge about proteomics, some insights into tumor pathology and develop new approaches for sample preparation.

Please note that these projects require availability for laboratory work (*in loco*) of at least 2 days a week.

If you are interested, send us an email introducing yourself and letting us know why you think this is a fitting project for you. If you have questions or would like further information about the projects, feel free to get in touch:

Dr. Juliana Gonçalves (juliana.goncalves@tum.de) or Dr. med. Dr. Kristina Schwamborn (kschwamborn@tum.de)

Technical University of Munich
Pathology Institute (*Klinikum Rechts der Isar*)
Trogerstr. 18, München

Find more about our research:

# B. Sc./ M. Sc. student thesis project

Topic: High resolution measurements of the proteomic content of tumor tissue samples

Brief description: Mass spectrometry imaging (MSI) is a technique that allows the evaluation of molecules directly on tissue. This gives the opportunity to further investigate tissue components and, by correlating it with histopathology, it is possible to gain further understanding about disease development. At the Institute of Pathology of the Technical University of Munich, we have been evaluating different tumor tissues with MSI utilizing state-of-the-art instrumentation and tackling some of the current bottlenecks of the diagnostic process. However, for certain tumor types we consider that higher resolution of the analysis is crucial for the understanding of the molecular interplay that leads to the development of certain tumor types. As we employ matrix-assisted laser desorption/ ionization (MALDI) as the ionization method of the molecules in the sample, defining the best resolution for the measurement also requires changes in the sample preparation procedure. A thorough test and evaluation of the procedures must be conducted to achieve the most accurate outcome. One of the steps of the sample preparation that will impact the most the measurement resolution is the matrix deposition. In MALDI, the application of a matrix is essential for the sample ionization. When depositing the matrix, crystals form on the surface of the sample. In turn the size of those crystals will impact the efficacy of the laser to ionize the molecules. Therefore, one of your main tasks would be to carry out a systematic study to evaluate the effect of the resolution and sample preparation on the characterization of the proteomic profile of the different tumor tissue samples.

During this project you will have the chance to gather a good understanding about mass spectrometry imaging, solid knowledge about proteomics, some insights into tumor pathology method development.

Please note that these projects require availability for laboratory work (*in loco*) of at least 2 days a week.

If you are interested, send us an email introducing yourself and letting us know why you think this is a fitting project for you. If you have questions or would like further information about the projects, feel free to get in touch:

Dr. Juliana Gonçalves (juliana.goncalves@tum.de) or Dr. med. Dr. Kristina Schwamborn (kschwamborn@tum.de)

Technical University of Munich
Pathology Institute (*Klinikum Rechts der Isar*)
Trogerstr. 18, München

Find more about our research: