

# Quantitative Mass Spectrometry Imaging: DISCOVER THE INTRICACIES OF MOLECULAR LANDSCAPES THROUGH QMSI



Aliri supports key decisions in drug development with next generation bioanalysis in the spatial context of the tissue. Our spatial imaging program allows us to localize and quantify a drug at the site of action and reveals the extent of a drug target's distribution.

## Gain Access to Unique Data Using QMSI: "Reach, stay, and act"

Being sure that a drug is reaching the site of action at the right concentration and has the right efficacy is key for a successful drug development program. Answering these questions at an early stage guarantees confirmation of efficacy as soon as possible in order to minimize the risk of failure and being able to pivot. One technology used today by the pharma industry to de-risk their molecules in development is quantitative mass spectrometry imaging. This spatial bioanalysis approach allows for detection of small molecules, metabolites, lipids, etc., without any labeling directly in the tissue microenvironment.

As the pioneer and leading CRO in spatial bioanalysis, Aliri offers a quantitative mass spectrometry imaging (QMSI) spatial platform that uses data analysis to conduct molecular distributions, and artificial intelligence to find patterns and make predictions. This advanced imaging technique allows you to visualize the molecule within tissues, and evaluates how prevalent the drug is within the histological region of interest or within the target coverage.

## Distribution and Quantification

We utilize the pillars of spatial bioanalysis and spatial biology to unravel the complexity of diseases, evaluate drug distribution, and understand the mechanism of action/efficacy. To see if your drug is present in the tumor and if it's reaching its target, it's critical to evaluate drug efficacy at the site of action. We analyze isolated organs, biopsies, and rodent whole bodies to see how a drug is accumulating and test for any adverse effects.

### STUDYING DRUG EFFICACY AT THE SITE OF ACTION GIVES US VALUABLE AND UNIQUE INSIGHTS INTO:



Drug bioavailability



On-tissue PK/PD



Drug biodistribution



Targeted tissue exposure



Monitoring the drug effects through readout biomarkers (metabolites, lipids, genes expression, proteins)

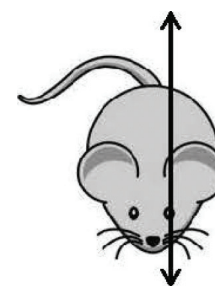
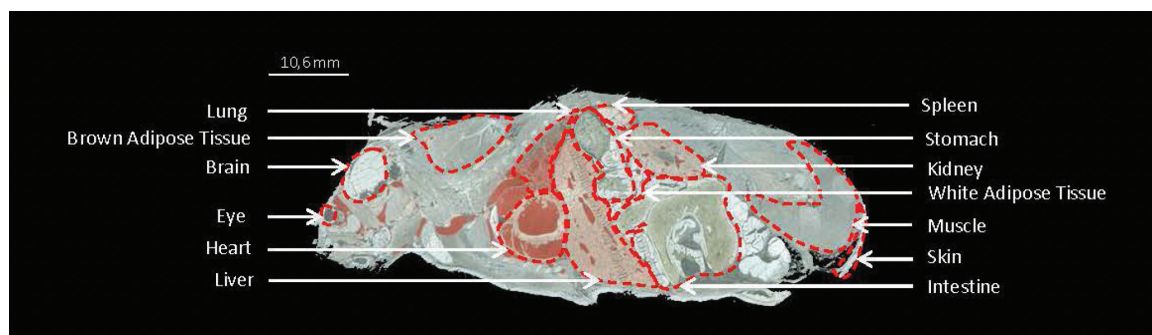
With our unique platform, we can measure how much of a drug is in the target area, analyze its signature, generate an image that shows what is happening in the tissue at the site of action, and provide this image to our client. Because this robust program doesn't require labeling, it has no application limits and can aid in many different therapeutic areas including oncology, dermatology, ophthalmology, respiratory diseases, central nervous system, and more.

## Instrumentation and Sample Analysis

Within our spatial imaging program, our team assesses samples of small molecules, metabolites, and lipids. For optimal results in small molecules, it is recommended to work with fresh frozen samples that have undergone immediate freezing and subsequent storage at a temperature of  $-80^{\circ}\text{C}$  in a freezer.

### Step 1: Tissue Sectioning

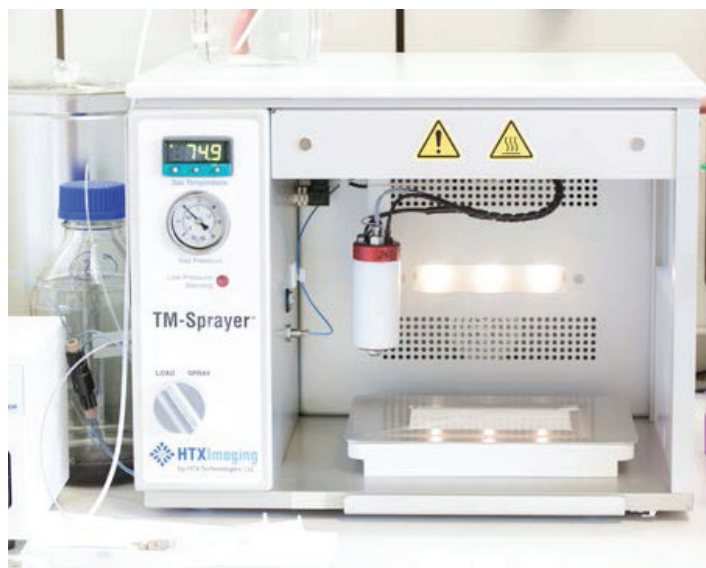
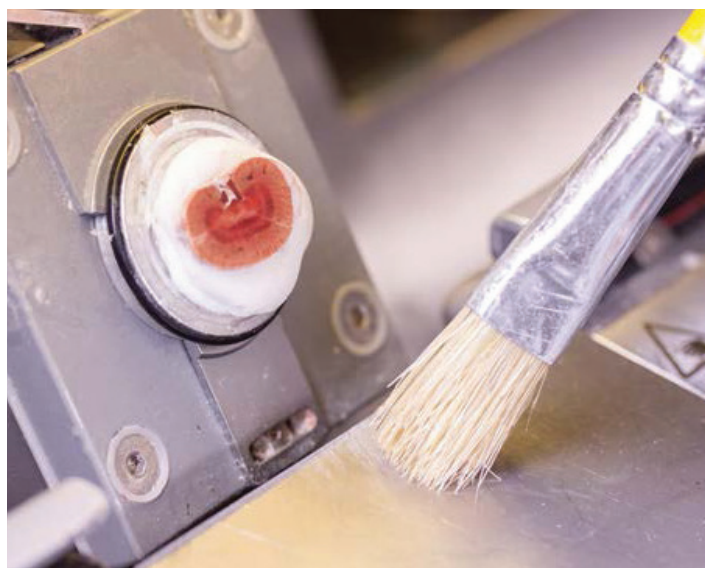
Our histology team is able to section samples from the needle core biopsy to the rodent whole body. Samples are sectioned with cryostats in the selected section plan to visualize the histological region of interest. Sections of  $5\text{-}12\mu\text{m}$  are deposited on glass slide for molecular analysis and morphological investigation. When working on mouse whole body, it is common to select the left eye section plan because most organs are present within the sample, including lung, brain, heart, eye, lung, liver, stomach, kidney, spleen, intestines, etc.



SECTION 1

### Step 2: MALDI matrix deposition

Matrix Assisted Laser Desorption Ionization (MALDI) is the most common source of ionization used to detect the molecules by QMSI. The matrix, a small organic molecule, is sprayed at the surface of the tissue sections with a dedicated sprayer. The method is developed and optimized to obtain the best sensitivity. Several MALDI matrices can be evaluated and tested.



## Step 3: MSI acquisition

Then we move into MSI experiment phase where the slide with the tissue section is introduced into the mass spectrometer. Our scientists develop analytical methods to obtain the highest sensitivity. The region of acquisition is selected and the instrument is desorbing and ionizing the molecules thanks to a laser shoot. For each laser shoot position, a spectrum with the detected molecules is registered.

It is important to note that Aliri has developed a unique expertise in QMSI that allows our team to analyze several hundreds of samples per project and to compare them. Indeed some specific quality control and normalization approaches have been developed over the years to guarantee the robustness of the data.

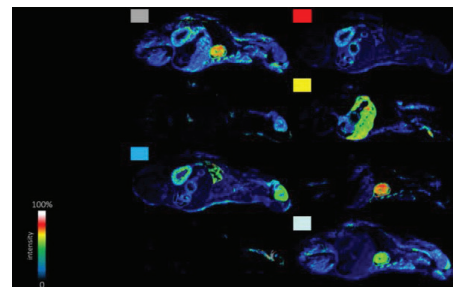
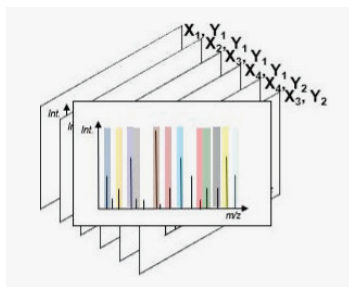


## Step 4: Staining and immunostaining

After the QMSI acquisition, the tissue section or the adjacent one can be stained to visualize the morphology or some specific molecules like the target (enzyme, receptor, etc.).

## Step 5: Molecular distribution and quantification

Finally, utilizing our own data science and software development team, we combine all data to build an image that showcases molecule localization. Our Multimaging™ software allows us to combine all data and generate the biodistribution of the molecules of interest from the QMSI dataset. Several approaches are possible: biodistribution (drug and/or related metabolites), quantification per histological region, statistical analysis, target exposure scoring, PK profile per histological region, etc.



## Conclusion

Our high expertise in this area sets us apart from other CROs in bio/pharma industries and positions us as a leader in spatial bioanalysis and biology services. Our seasoned scientists and industry experts are here to offer one-on-one support throughout your drug development process, all the way from discovery to development, and through clinical Phases I-III. With quick discovery and industry-low lead times for method development, our team can help advance your molecule with speed and agility.

[Contact us](#) to learn more.



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