

Mass Spectrometry Imaging: TOP 8 BENEFITS IN ONCOLOGY DRUG DISCOVERY AND DEVELOPMENT



A large part of preclinical research and early-phase drug development strives to determine the drug's biological distribution and its metabolites to establish the pharmacokinetic-pharmacodynamic (PK-PD) relationship and potential toxicity.

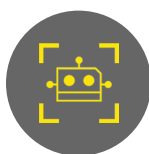
Mass spectrometry imaging (MSI) offers a precise and detailed look into each of these elements and can be an invaluable tool for improving the body of scientific evidence available to justify drug advancement into human trials. MSI is beneficial in early development and murine models across many therapeutic areas, and is especially suited to oncology due to the availability of tissue.

With Mass Spectrometry Imaging, you can:



1. Speed up and optimize the drug discovery process.

When multiple drug candidates are available for development, MSI can help identify the best candidate by providing profiles for each possibility in terms of absorption, distribution and metabolism. This can help companies strategically and quickly eliminate less-promising candidates by confirming which ones reach the site of action and which ones don't.



2. Visualize drug distribution in tissue and tissue sub-compartment.

Imagine having a precise picture of drug disposition at the target-tissue level of where a drug ends up in tissue or an organ, and in what concentration. MSI offers that visualization early on in development, which allows intelligent, proactive adjustments to formulation and drug characteristics to optimize targeting capabilities.



3. Analyze samples for thousands of compounds at once.

MSI uses a large quantity of section-by-section imaging data to create a rapid, robust picture of the molecular environment in a tissue sample. It is one of the few technologies that can distinguish between a parent compound and its metabolites. MSI can search for more than a low limit of metabolites, can be done quickly (minutes to hours), and requires no prior knowledge of the sample's probable molecular makeup. For these reasons, MSI can actually replace radiochemistry and immunohistochemistry tests and offer more thorough and more accurate information.



4. Eliminate sensitivity and chemical alteration concerns.

MSI is label-free, meaning it doesn't require any macromolecular dyes. This eliminates concerns about sensitivity problems caused by labels that may alter chemicals in the sample, improving accuracy and certainty that what appears in the results is actually present in the sample at that concentration.



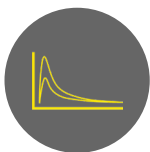
5. Know whether efficacy is possible based on distribution.

MSI can reveal what quantity of the drug reaches the target cells. What is the distribution like in surrounding tissue versus the target cells or organ of interest? Is it enough to potentially result in a therapeutic effect? Should drug potency be adjusted to increase the concentration of the drug in the target tissue or cells? MSI can offer insight into all of these common questions.



6. Locate and identify specific metabolites to better understand potential toxicity.

In addition to knowing where the drug goes and in what quantities, identifying and locating its metabolites – and their own concentration in tissues and key organs—can help determine whether the drug will have a high risk of toxicity. Understanding how the body processes the drug and whether certain metabolites accumulate offers valuable knowledge about a drug's potential safety profile and monitoring needs.



7. Quantify the direct target and improve understanding of pharmacokinetics (PK) and pharmacodynamics (PD).

By showing where the drug goes and what the body does to it, MSI can offer relevant data regarding PK interaction studies, concentration, and clearance over time and in different circumstances. MSI also showcases the distribution of drug metabolism, improving understanding about the drug's mechanism of action and likely therapeutic and nontherapeutic effects.



8. Save money and provide a competitive development edge.

MSI can help avoid costly clinical development efforts for drugs that don't have the safety, metabolic, or distribution characteristics needed to make a successful therapeutic. When applied early in drug development, it can offer valuable insight to help fine-tune formulation, anticipate clinical monitoring needs, advance the understanding of a drug's mechanism of action, and justify advancement to later-phase studies. The robust scientific information offered by MSI provides a level of detail and precision typically not achieved through preclinical or early-phase trials relying on standard chemistry tests alone.

Learn more about how mass spectrometry imaging could revolutionize your drug development process.

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