Imaging Strategies for Preclinical Biodistribution Studies

How to use optical and nuclear imaging to generate whole-body, 3Rs-aligned biodistribution data.



Key webinar takeaways

- **Preclinical imaging adds longitudinal context to biodistribution studies.**
  Whole-body imaging enables compounds, cells, viruses or bacteria to be monitored repeatedly in the same model, revealing how their distribution changes over time.
- **Longitudinal imaging can improve study power while reducing animal use.**
  Following each animal over multiple time points allows it to serve as its own control, helping to reduce inter-animal variability and the number of animals required.
- **The imaging strategy should be selected around the study objective.**
  Optical imaging supports rapid screening of multiple candidates or doses, while nuclear imaging provides greater sensitivity and quantitative information for detailed candidate characterization and translational development.
- **Labeling can alter the molecule being investigated.**
  Fluorophores, chelators and radionuclides may affect biological activity, pharmacokinetics or biodistribution. The conjugation method and label therefore need to be considered as part of the experimental design.
- **Optical imaging provides a flexible, high-throughput screening approach.**
  Rapid image acquisition and relatively low costs make optical imaging suitable for comparing compounds and concentrations, although tissue attenuation and autofluorescence limit sensitivity and make in vivo measurements semi-quantitative.
- **Nuclear imaging enables sensitive and quantitatively robust biodistribution assessment.**
  PET and SPECT can provide high-sensitivity 3D whole-body measurements with limited background, allows quantification of uptake in whole body, main organs and tumor.
- **Integrated in vivo and ex vivo analyses provide a more complete distribution profile.**
  Ex vivo imaging, macro-imaging or gamma counting can detect and localize signals that are obscured in whole-body images, strengthening interpretation of target uptake and off-target accumulation.

If you would like to learn more about optimizing candidates for radiopharmaceutical development, please contact our team:

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