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## Integration of imaging into clinical practice to assess the delivery and performance of macromolecular and nanotechnology-based oncology therapies

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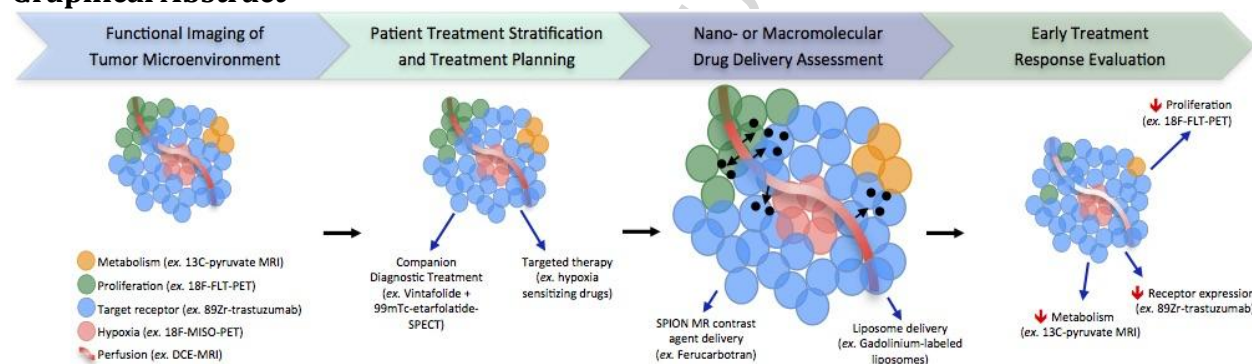
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### Graphical Abstract



### Abstract

Functional and molecular imaging has become increasingly used to evaluate interpatient and inpatient tumor heterogeneity. Imaging allows for assessment of microenvironment parameters including tumor hypoxia, perfusion and proliferation, as well as tumor metabolism and the intratumoral distribution of specific molecular markers. Imaging information may be used to stratify patients for targeted therapies, and to define patient populations that may benefit from alternative therapeutic approaches. It also provides a method for non-invasive monitoring of treatment response at earlier time-points than traditional cues, such as tumor shrinkage. Further, companion diagnostic imaging techniques are becoming progressively more important for development and clinical implementation of targeted therapies. Imaging-based companion diagnostics are likely to be essential for the validation and FDA approval of targeted nanotherapies and macromolecular medicines. This review describes recent clinical advances in the use of functional and molecular imaging to evaluate the tumor microenvironment. Additionally, this article focuses on image-based assessment of distribution and anti-tumor effect of nano- and macromolecular systems.

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