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Advanced Imaging Digest

Tracer on the horizon: Gallium 68-labeled fibroblast activation protein inhibitor PET imaging

Gallium 68 (68Ga)-labeled fibroblast activation protein inhibitor (FAPI) PET imaging, an up-and-coming tracer, is being studied in a variety of malignancies (e.g., pancreatic cancer, esophageal cancer, non–small cell lung cancer, head and neck cancer, and colon cancer).

Fibroblast activation protein (FAP) is overexpressed in cancer-associated fibroblasts, resulting in its use as a target for therapeutic agents. While 18F-fluorodeoxyglucose (18F-FDG) accumulates in areas of acute inflammation, FAP uptake is prototypical in areas of chronic inflammation where a fibrotic reaction has been followed by tissue remodeling. 68Ga-FAPI is independent from blood sugar levels, thereby needing no dietary preparation prior to imaging. Additionally, 68Ga-FAPI has a relatively short tumor uptake, at approximately 10 minutes after injection, which could also avoid the one-hour uptake rest time required before imaging with 18F-FDG. With these exciting parameters, 68Ga-FAPI PET could simplify the clinical workflow with shorter waiting and scan times compared with FDG-PET. The use of 68Ga-FAPI PET could also be expanded to patients with uncontrolled diabetes where standard FDG-PET may be non-diagnostic due to FDG redistribution. Initial literature notes a relatively short half-life of 68Ga-FAPI, which makes it impractical for institutions without a nuclear pharmacy; however, 18F-FAPI agents are in development to allow for more flexible scanning with a longer half-life.

Magellan Healthcare clinical leaders continually review imaging trends and needs in light of current medical concerns, available literature, and society and Centers for Disease Control and Prevention recommendations and guidelines. This document is a summary of our latest findings. Please consult references for detailed information.

Initial studies using 68Ga-FAPI tracers demonstrate the malignancies with the highest standardized uptake value (SUV) are lung, breast, and esophageal cancers; cholangiocarcinoma; and sarcomas. These malignancies currently face limitations with 18F-FDG PET/CT, which potentially opens indications for 68Ga-FAPI PET/CT in the future. 68Ga-FAPI PET has a significantly lower hepatic background for 68Ga-FAPI (SUV 1.7) than for 18F-FDG (SUV 2.8), which may be advantageous for liver metastasis detection. While 68Ga-FAPI PET/CT and 18F-FDG PET/CT have similar results in detecting primary tumors and metastasis in the lungs, 68Ga-FAPI is superior in detecting brain and bone metastases, potentially decreasing the need for a dedicated brain MRI during staging. For tumor entities known to perform poorly with 18F-FDG, such as hepatocellular carcinoma or pancreatic cancer, 68Ga-FAPI PET/CT may be considered complementary, demonstrating intermediate uptake. Since the radiotracer uptake is seen in areas of chronic inflammation where there has been a fibrotic reaction and resultant tissue remodeling, such as in myocardial infarctions, this tracer could play a complementary role to 18F-FDG in the future for cardiac diseases as well.

Conclusion

Multiple small studies and case reports document the potential utility of 68Ga-FAPI in various malignancies. Magellan Healthcare will continue to monitor the literature for larger multi-institutional studies and changes in the society guideline recommendations.

About the author

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