3'-Deoxy-3'-[^{18}F]fluoro-1-β-D-xylofuranosyl-adenine

[^{18}F]FXA

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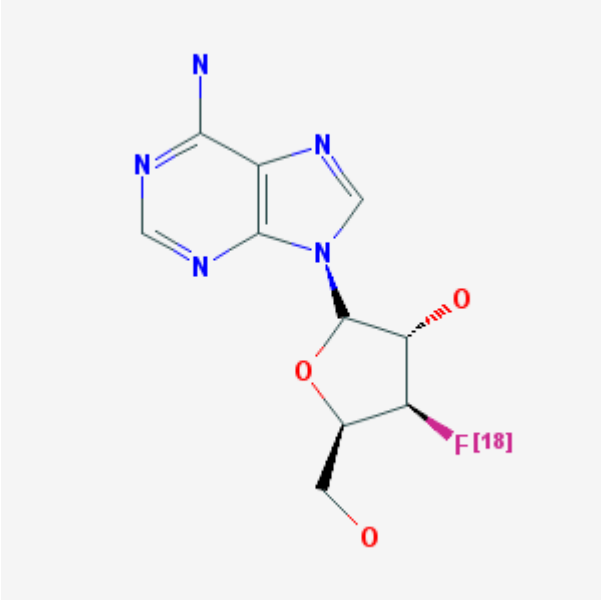
Chemical name:	3'-Deoxy-3'-[^{18}F]fluoro-1-β-D-xylofuranosyl-adenine
Abbreviated name:	[^{18}F]FXA
Synonym:	
Agent Category:	Compound
Target:	Unknown
Target Category:	Non-catabolized trapping inside cells
Method of detection:	PET
Source of signal:	^{18}F
Activation:	No
Studies:	• Rodents



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Background

[PubMed]

Adenylates are important in cellular metabolism and functions (1). Adenosine is converted intracellularly to adenosine triphosphate (ATP), which is an important source

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of energy as well as a regulator of cellular functions. Adenosine stimulates the acetylcholine-sensitive K^+ current in the heart. Many fluorinated analogs of adenosine nucleoside have been investigated as potential antitumor and antiviral agents (2-5). 3'-Deoxy-3'-fluoro-9-β-D-xylofuranosyl-adenine (FXA) was found to have antiviral activity (3, 6). [^{18}F]FXA has been synthesized and studied in tumor-bearing mice with positron emission tomography (PET) imaging. [^{18}F]FXA was not visualized in the tumor but in the heart (7).

Synthesis

[PubMed]

Alauddin et al. (7) synthesized [^{18}F]FXA by reaction of the respective triflate (*N*3,2',5'-trimethoxytrityl-3'-trifluoromethanesulfonyl-9-β-D-arabinofuranosyl-adenine with tetrabutylammonium [^{18}F]fluoride, followed by acid hydrolysis to remove the methoxytrityl protecting groups. The desired product, [^{18}F]FXA, was purified with high-performance liquid chromatography with a radiochemical yield of 30%–35% (decay-corrected) and a radiochemical purity >99%. The average specific activity for [^{18}F]FXA was >74 GBq/μmol (2,000 mCi/μmol) at the end of the synthesis. Total synthesis time was 90–95 min from the end of bombardment.

In Vitro Studies: Testing in Cells and Tissues

[PubMed]

No publication is currently available.

Animal Studies

Rodents

[PubMed]

Alauddin et al. (7) performed biodistribution studies of [^{18}F]FXA in nude mice (n = 5) bearing an HT-29 tumor in the left flank and a herpes simplex virus thymidine kinase (HSV-tk)–transduced HT-29 tumor in the right flank. [^{18}F]FXA cleared rapidly from the blood within 20 min after injection with a plasma half-life of ~8 min. The heart had the highest accumulation at 120 min (the only time point studied) with 8.4% injected dose (ID)/g, followed by the liver (6.9% ID/g) and kidney (6.4% ID/g). The accumulation in the two tumors was 0.67% ID/g in the wild-type tumor and 0.49% ID/g in the HSV-tk–transduced tumor, which suggests that [^{18}F]FXA is not a substrate for HSV-tk gene. Radioactivity levels in the blood and muscle were 1.03% ID/g and 2.43% ID/g, respectively. The heart/blood ratio was 8.15. The tumor/blood ratio was <1, which suggests that [^{18}F]FXA is not suitable for tumor imaging. PET images were obtained at 30, 60, and 120 min after injection. The heart exhibited the highest radioactivity, followed by the liver and kidney. Neither tumor was clearly visualized. No significant differences in

images were observed at the three time points. No blocking experiment was performed. The authors suggested that further studies are necessary to understand the mechanism of heart accumulation.

Other Non-Primate Mammals

[PubMed]

No publication is currently available.

Non-Human Primates

[PubMed]

No publication is currently available.

Human Studies

[PubMed]

No publication is currently available.

NIH Support

CA72896

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