Radiology

1. MCG Criteria Used

Clinical Criteria: MCG Care Guidelines, 30th Edition

- Brain Positron Emission Tomography (PET) and PET-CT (MCG ORG: A-0096 AC, 30th Edition)

Applicable CPT / HCPCS Codes:

CPT / HCPCS Code	Description
78608	Brain positron emission tomography (PET) imaging; metabolic evaluation
78609	Brain positron emission tomography (PET) imaging; perfusion evaluation
78814	Positron emission tomography (PET) with concurrently acquired computed tomography (CT), limited area (e.g., brain)
A9552	Fluorodeoxyglucose F-18 FDG, diagnostic, per study dose (HCPCS radiopharmaceutical)
A9586, A9601, A9602	Florbetapir, florbetaben, and flutemetamol F-18 amyloid PET radiopharmaceuticals, per study dose (HCPCS)
A9598, A9609, Q9982, Q9983, S8085	Additional diagnostic PET radiopharmaceuticals and related imaging agents (HCPCS)

2. Statement of Rationale

Akido Labs uses the criteria in MCG Care Guidelines (30th Edition) to supplement the general Medicare criteria regarding diagnostic radiology services, specifically brain positron emission tomography (PET) and PET-CT for evaluation of suspected autoimmune encephalitis, dementia and mild cognitive impairment, and presurgical epilepsy imaging, where Medicare coverage criteria are not fully established or require additional clinical specificity. MCG criteria are used to ensure consistency in reviewing the conditions to be met for coverage of brain PET imaging and to determine when such imaging is medically necessary.

Brain PET is a high-cost advanced imaging study with focused, evidence-defined indications. In the Medicare Advantage population it is most relevant to the differential diagnosis of dementia, including the selection of candidates for emerging antiamyloid therapy, and to presurgical localization in focal epilepsy. Because Medicare maintains specific national coverage policy for certain PET applications, appropriate use criteria must work alongside those determinations. Absent consistent, evidence-based criteria, there is material risk of both inappropriate denial of medically necessary brain PET and inappropriate approval of imaging performed outside its supported indications.

Potential Clinical Harms:

Brain PET and PET-CT: Inappropriate denial of brain PET for suspected autoimmune encephalitis with limbic involvement and inconclusive or contraindicated MRI could delay diagnosis of a treatable inflammatory brain disorder, allowing progressive and potentially

irreversible neurologic injury. Inappropriate denial for the differential diagnosis of dementia could leave Alzheimer disease undistinguished from frontotemporal dementia or dementia with Lewy bodies when that distinction would change management, including eligibility for antiamyloid therapy. Inappropriate denial of presurgical PET in focal epilepsy could prevent accurate localization of the seizure focus, delaying or precluding potentially curative epilepsy surgery.

Clinical Benefits:

Brain PET and PET-CT: MCG criteria provide validated, indication-specific thresholds drawn from consensus and specialty society guidelines, published evidence, and Cochrane systematic reviews. For dementia and mild cognitive impairment, the criteria require that other clinical and imaging tests have been inconclusive and that results will impact the treatment plan (for example, when antiamyloid therapy is being considered), directly countering the harm of misclassified dementia and inappropriate therapy selection identified above. For suspected autoimmune encephalitis, the criteria require limbic symptoms and inconclusive, negative, or contraindicated MRI before PET, and for epilepsy they require a focal-epilepsy presurgical evaluation, ensuring PET is used where it changes management. By tying imaging to these specific clinical pathways, the criteria mitigate the harms of delayed diagnosis of treatable encephalitis, misclassified dementia, and unlocalized epilepsy.

Reduction of unwarranted variation and overutilization: MCG criteria reserve brain PET for presentations where less costly or less complex evaluation has been inconclusive and where the result will alter management, reducing non-indicated high-cost imaging. The clinical benefits of using MCG Care Guidelines are highly likely to outweigh any clinical harms, including delayed or decreased access to services. The criteria are unlikely to lead to inappropriate denials because they incorporate indications drawn directly from current specialty society and consensus guidelines and high-quality evidence. Use of these criteria ensures patients receive the most clinically appropriate imaging, and decreases inappropriate denials by applying a consistent, objective, evidence-based set of review criteria across the Medicare Advantage population.

3. Explanation of Supplementation

Basis for Use:

Original Medicare clinical criteria for brain PET are addressed in part by national coverage policy but are not fully established for every clinical indication, and require supplementation to ensure consistent medical necessity determinations. While Medicare statutes establish the general 'reasonable and necessary' standard and CMS maintains national coverage policy for certain PET applications, the available determinations do not specify the full set of clinical thresholds (e.g., the limbic-symptom and MRI criteria for suspected autoimmune encephalitis, the inconclusive-prior-testing and management-impact criteria for dementia, and the focal-epilepsy presurgical criteria) required to distinguish indicated from nonindicated brain PET across all presentations. Where a national or local coverage determination applies, MCG criteria are used to supplement and do not replace, modify, or supersede it.

Applicable Medicare References:

- Social Security Act Section 1862(a)(1): 'Reasonable and necessary' standard
- Medicare Benefit Policy Manual, Chapter 6: Hospital Services Covered Under Part B (CMS IOM Publication 100-02)
- Medicare Benefit Policy Manual, Chapter 14: Medical Devices (CMS IOM Publication 100-02)
- Medicare Benefit Policy Manual, Chapter 15: Covered Medical and Other Health Services (CMS IOM Publication 100-02)

- Medicare Benefit Policy Manual, Chapter 16: General Exclusions from Coverage (CMS IOM Publication 100-02)
- Medicare Program Integrity Manual, Chapter 6, Section 6.5: Medical Review of Inpatient Hospital Claims for Part A Payment (CMS IOM Publication 100-08)
- Code of Federal Regulations: 42 CFR 419.22; 42 CFR 422.101
- National Coverage Determinations: CMS maintains national coverage policy applicable to certain PET imaging applications; applicable NCDs and LCDs are followed first, and MCG criteria are used to supplement and do not replace them. For indications not fully addressed by an NCD or LCD, Original Medicare criteria are not fully established, requiring supplementation.
- Medicare Coverage Database: https://www.cms.gov/medicare-coverage-database/search.aspx

Within the above statutes and regulations, coverage criteria for specific brain PET indications are not fully established, and the use of MCG Care Guidelines is necessary to provide additional clinical specificity. Specifically, MCG criteria assist in determining:

- Medical necessity and appropriateness of brain PET for suspected autoimmune encephalitis with limbic involvement and inconclusive or contraindicated MRI;
- Medical necessity and appropriateness of brain PET for the differential diagnosis of dementia and mild cognitive impairment, including selection of candidates for antiamyloid therapy, when prior testing is inconclusive and results will impact management;
- Medical necessity and appropriateness of brain PET for presurgical evaluation of focal epilepsy;
- Appropriate clinical setting and expected course for this advanced imaging service.

The use of MCG Care Guidelines ensures consistency in reviewing the conditions to be met for coverage of brain PET imaging. Use of these criteria to supplement the coverage criteria noted above provides clinical benefits by helping ensure imaging services are not incorrectly denied when medically appropriate for a particular patient, nor incorrectly approved when not reasonable and necessary. The clinical benefits of using these criteria are highly likely to outweigh any clinical harms, including from inappropriate denials, because the criteria are unlikely to lead to inappropriate denials. The added criteria will provide numerous clinical benefits in helping ensure patients receive the appropriate level of care. In addition, use of the criteria may decrease inappropriate denials by creating a consistent set of evidence-based review criteria.

4. Summary of Clinical Evidence

Background

Brain Positron Emission Tomography (PET) and PET-CT (MCG ORG: A-0096 AC)

Brain PET and PET-CT are advanced functional imaging studies indicated for suspected autoimmune encephalitis with limbic involvement and inconclusive or contraindicated MRI, for the differential diagnosis of dementia and mild cognitive impairment (including selection of candidates for antiamyloid therapy) when prior testing is inconclusive and results will impact treatment, and for presurgical imaging in focal epilepsy. This MCG care guideline may overlap CMS guidance located in statutes and regulations; for Medicare Advantage beneficiaries, applicable NCDs, LCDs, and other regulations are followed first, and MCG criteria supplement but do not replace them.

Evidence Summary

Brain Positron Emission Tomography (PET) and PET-CT (MCG ORG: A-0096 AC)

The evidence for the clinical indications in this guideline includes 99 published peer-reviewed articles, 5 specialty society or other evidence-based guidelines, and 4 Cochrane systematic reviews. Key evidence includes:

- For suspected autoimmune encephalitis, a consensus-based diagnostic guideline supports brain PET when limbic symptoms are present and MRI is inconclusive, negative, or contraindicated; the guideline notes this indication demonstrates a net benefit of less than moderate certainty, and the criteria reflect this with specific prerequisite findings.
- For dementia and mild cognitive impairment, specialty society guidance supports PET to distinguish Alzheimer disease from other dementias (e.g., frontotemporal dementia, dementia with Lewy bodies) when other clinical and imaging tests are inconclusive and results will impact the treatment plan, including when antiamyloid therapy is being considered.
- For focal epilepsy requiring presurgical imaging, the criteria are supported by published evidence establishing PET as a tool for localizing the epileptogenic focus when surgery is contemplated.

Rationale (from MCG)

Use of this MCG care guideline helps the clinician identify patient-specific complex clinical factors that determine the medical necessity and appropriate use of brain PET imaging. The evidence-based clinical criteria assist the clinician in deciding when brain PET is appropriate for a specific neurologic indication, including the prerequisite that less complex evaluation has been inconclusive and that the result will impact management. Use of these evidence-based clinical criteria ensures patients receive the most appropriate care for their specific condition, reduces unnecessary risks, promotes recovery, and provides a standard that can reduce disparities in care. Appropriate use of the evidence-based clinical criteria ensures Medicare patients receive full access to Medicare benefits without risk of delay or decreased access. These guidelines supplement but do not replace, modify, or supersede existing Medicare regulations or applicable National Coverage Determinations (NCDs) or Local Coverage Determinations (LCDs).

Related CMS Coverage Guidance (as cited in MCG 30th Edition):

- Code of Federal Regulations (CFR): 42 CFR 419.22; 42 CFR 422.101
- CMS IOM Publication 100-02, Medicare Benefit Policy Manual: Chapter 6 (Hospital Services Under Part B); Chapter 14 (Medical Devices); Chapter 15 (Covered Medical and Other Health Services); Chapter 16 (General Exclusions from Coverage)
- CMS IOM Publication 100-08, Medicare Program Integrity Manual, Chapter 6, Section 6.5
- National Coverage Determinations: Applicable CMS national coverage policy for PET imaging; followed first, with MCG criteria used to supplement
- Medicare Coverage Determinations: Medicare Coverage Database: https://www.cms.gov/medicare-coverage-database/search.aspx

References with Citation Summary -- Brain Positron Emission Tomography (PET) and PET-CT (MCG ORG: A-0096 AC, 30th Edition)

1. Arbizu J, et al. SNMMI procedure standard/EANM practice guideline for brain [18F]FDG PET imaging, version 2.0. Journal of Nuclear Medicine 2025;66(Suppl 2):S45-S60. DOI: 10.2967/jnumed.124.268754. (Reaffirmed 2025 Jul)
2. Singhal T, Alavi A, Kim CK. Brain: positron emission tomography tracers beyond [18F]fluorodeoxyglucose. PET Clinics 2014;9(3):267-276. DOI: 10.1016/j.cpet.2014.03.009.
3. Lameka K, Farwell MD, Ichise M. Positron emission tomography. Handbook of Clinical Neurology 2016;135:209-227. DOI: 10.1016/B978-0-444- 53485-9.00011-8.
4. The Royal College Of Radiologists, Royal College Of Physicians Of London, Royal College Of Physicians And Surgeons Of Glasgow, Royal College Of Physicians Of Edinburgh, British Nuclear Medicine Society, Administration Of Radioactive Substances Advisory Committee. Evidencebased

indications for the use of PET-CT in the United Kingdom 2016. Clinical Radiology 2016;71(7):e171-e188. DOI: 10.1016/j.crad.2016.05.001.

5. Miletich RS. Positron emission tomography and single-photon emission computed tomography in neurology. Continuum : Lifelong Learning in Neurology 2016;22(5, Neuroimaging):1636-1654. DOI: 10.1212/CON.0000000000000389. and PET-CT (A-0096)
6. Galovic M, Koepp M. Advances of molecular imaging in epilepsy. Current Neurology and Neuroscience Reports 2016;16(6):58. DOI: 10.1007/s11910-016-0660-7.
7. Kirsch M, Wannez S, Thibaut A, Laureys S, Brichant JF, Bonhomme V. Positron emission tomography: basic principles, new applications, and studies under anesthesia. International Anesthesiology Clinics 2016;54(1):109-128. DOI: 10.1097/AIA.0000000000000090.
8. Heurling K, et al. Quantitative positron emission tomography in brain research. Brain Research 2017;1670:220-234. DOI: 10.1016/j.brainres.2017.06.022.
9. Sadaghiani MS, Sheikhbahaei S, Rowe SP, Pomper MG, Solnes LB. Cellular and molecular imaging with SPECT and PET in brain tumors. Radiologic Clinics of North America 2021;59(3):363-375. DOI: 10.1016/j.rcl.2021.01.005.
10. Galldiks N, Law I, Pope WB, Arbizu J, Langen KJ. The use of amino acid PET and conventional MRI for monitoring of brain tumor therapy. NeuroImage. Clinical 2017;13:386-394. DOI: 10.1016/j.nicl.2016.12.020.
11. Herholz K. Brain tumors: an update on clinical PET research in gliomas. Seminars in Nuclear Medicine 2017;47(1):5-17. DOI: 10.1053/j.semnuclmed.2016.09.004.
12. Moghbel M, Newberg A, Alavi A. Positron emission tomography: ligand imaging. Handbook of Clinical Neurology 2016;135:229-240. DOI: 10.1016/B978-0-444-53485-9.00012-X.
13. Anand K, Sabbagh M. Amyloid imaging: poised for integration into medical practice. Neurotherapeutics 2017;14(1):54-61. DOI: 10.1007/s13311- 016-0474-y.
14. Martinez G, Vernooij RW, Fuentes Padilla P, Zamora J, Flicker L, Bonfill Cosp X. 18F PET with florbetaben for the early diagnosis of Alzheimer's disease dementia and other dementias in people with mild cognitive impairment (MCI). Cochrane Database of Systematic Reviews 2017, Issue 11. Art. No.: CD012883. DOI: 10.1002/14651858.CD012883.
15. Martinez G, Vernooij RW, Fuentes Padilla P, Zamora J, Bonfill Cosp X, Flicker L. 18F PET with florbetapir for the early diagnosis of Alzheimer's disease dementia and other dementias in people with mild cognitive impairment (MCI). Cochrane Database of Systematic Reviews 2017, Issue 11. Art. No.: CD012216. DOI: 10.1002/14651858.CD012216.pub2.
16. Martinez G, Vernooij RW, Fuentes Padilla P, Zamora J, Flicker L, Bonfill Cosp X. 18F PET with flutemetamol for the early diagnosis of Alzheimer's disease dementia and other dementias in people with mild cognitive impairment (MCI). Cochrane Database of Systematic Reviews 2017, Issue 11. Art. No.: CD012884. DOI: 10.1002/14651858.CD012884.
17. Payoux P, Salabert AS. New PET markers for the diagnosis of dementia. Current Opinion in Neurology 2017;30(6):608-616. DOI: 10.1097/WCO.0000000000000489.
18. Barthel H, Sabri O. Clinical use and utility of amyloid imaging. Journal of Nuclear Medicine 2017;58(11):1711-1717. DOI: 10.2967/jnumed.116.185017.
19. Chiaravalloti A, Danieli R, Lacanfora A, Palumbo B, Caltagirone C, Schillaci O. Usefulness of 18F Florbetaben in diagnosis of Alzheimer's disease and other types of dementia. Current Alzheimer Research 2017;14(2):154-160.
20. Sparks P, Lawrence T, Hinze S. Neuroimaging in the diagnosis of chronic traumatic encephalopathy: a systematic review. Clinical Journal of Sport Medicine 2020;30(Suppl 1):S1-S10. DOI: 10.1097/JSM.0000000000000541.
21. Shetty T, Raince A, Manning E, Tsiouris AJ. Imaging in chronic traumatic encephalopathy and traumatic brain injury. Sports Health 2016;8(1):26- 36. DOI: 10.1177/1941738115588745.
22. Wintermark M, Sanelli PC, Anzai Y, Tsiouris AJ, Whitlow CT, American College of Radiology Head Injury Institute. Imaging evidence and recommendations for traumatic brain injury: advanced neuro- and neurovascular imaging techniques. AJNR. American Journal of Neuroradiology 2015;36(2):E1-E11. DOI: 10.3174/ajnr.A4181.
23. Raji CA, Henderson TA. PET and single-photon emission computed tomography in brain concussion. Neuroimaging Clinics of North America 2018;28(1):67-82. DOI: 10.1016/j.nic.2017.09.003.

24. Graus F, et al. A clinical approach to diagnosis of autoimmune encephalitis. Lancet Neurology 2016;15(4):391-404. DOI: 10.1016/S1474- 4422(15)00401-9.
25. Sanvito F, et al. Autoimmune encephalitis: what the radiologist needs to know. Neuroradiology 2024;66(5):653-675. DOI: 10.1007/s00234-024- 03318-x.
26. Kosek S, et al. Regional Metabolic Abnormalities in Autoimmune Encephalitis: A Meta-analysis of 498 Cases With Brain FDG PET. Clinical Nuclear Medicine 2025;50(3):208-213. DOI: 10.1097/RLU.0000000000005574.
27. Bien CG. Limbic encephalitis. Handbook of Clinical Neurology 2022;187:467-487. DOI: 10.1016/B978-0-12-823493-8.00024-9.
28. Ishii K. PET approaches for diagnosis of dementia. AJNR. American Journal of Neuroradiology 2014;35(11):2030-2038. DOI: 10.3174/ajnr.A3695.
29. Khosravi M, Newberg A, Alavi A. Cognitive impairment and dementias. Seminars in Nuclear Medicine 2018;48(6):498-512. DOI: 10.1053/j.semnuclmed.2018.07.005.
30. Shivamurthy VK, Tahari AK, Marcus C, Subramaniam RM. Brain FDG PET and the diagnosis of dementia. American Journal of Roentgenology 2015;204(1):W76-W85. DOI: 10.2214/AJR.13.12363.
31. Nestor PJ, et al. Clinical utility of FDG-PET for the differential diagnosis among the main forms of dementia. European Journal of Nuclear Medicine and Molecular Imaging 2018;45(9):1509-1525. DOI: 10.1007/s00259-018-4035-y.
32. Pontecorvo MJ, et al. Effectiveness of Florbetapir PET imaging in changing patient management. Dementia and Geriatric Cognitive Disorders 2017;44(3-4):129-143. DOI: 10.1159/000478007. and PET-CT (A-0096)
33. Hort J, et al. EFNS guidelines for the diagnosis and management of Alzheimer's disease. European Journal of Neurology 2010;17(10):1236-1248. DOI: 10.1111/j.1468-1331.2010.03040.x. (Reaffirmed 2025 Jun)
34. Atri A. Imaging of neurodegenerative cognitive and behavioral disorders: practical considerations for dementia clinical practice. Handbook of Clinical Neurology 2016;136:971-984. DOI: 10.1016/B978-0-444-53486-6.00050-8.
35. Ismail Z, et al. Recommendations of the 5th Canadian Consensus Conference on the diagnosis and treatment of dementia. Alzheimer's & Dementia 2020;16(8):1182-1195. DOI: 10.1002/alz.12105.
36. Nobili F, et al. European Association of Nuclear Medicine and European Academy of Neurology recommendations for the use of brain 18 Ffluorodeoxyglucose positron emission tomography in neurodegenerative cognitive impairment and dementia: Delphi consensus. European Journal of Neurology 2018;25(10):1201-1217. DOI: 10.1111/ene.13728.
37. Frey KA, et al. ACR-ASNR practice parameter for brain PET/CT imaging dementia. Clinical Nuclear Medicine 2016;41(2):118-125. DOI: 10.1097/RLU.0000000000001037.
38. Bonifacio G, Zamboni G. Brain imaging in dementia. Postgraduate Medical Journal 2016;92(1088):333-340. DOI: 10.1136/postgradmedj-2015- 133759.
39. Eisenmenger LB, et al. Advances in PET imaging of degenerative, cerebrovascular, and traumatic causes of dementia. Seminars in Nuclear Medicine 2016;46(1):57-87. DOI: 10.1053/j.semnuclmed.2015.09.003.
40. Rabinovici GD, et al. Updated appropriate use criteria for amyloid and tau PET: A report from the Alzheimer's Association and Society for Nuclear Medicine and Molecular Imaging Workgroup. Alzheimer's & Dementia 2025;21(1):e14338. DOI: 10.1002/alz.14338. (Reaffirmed 2025 Jul 01)
41. Cohen AD, Klunk WE. Early detection of Alzheimer's disease using PiB and FDG PET. Neurobiology of Disease 2014;72 Pt A:117-122. DOI: 10.1016/j.nbd.2014.05.001.
42. Laforce R, Bensaidane MR. Amyloid imaging for dementia in Canada. Canadian Medical Association Journal 2016;188(8):598-602. DOI: 10.1503/cmaj.150663.
43. Laforce R, Rosa-Neto P, Soucy JP, Rabinovici GD, Dubois B, Gauthier S. Canadian consensus guidelines on use of amyloid imaging in Canada: update and future directions from the Specialized Task Force on Amyloid imaging in Canada. Canadian Journal of Neurological Sciences 2016;43(4):503-512. DOI: 10.1017/cjn.2015.401.
44. Smailagic N, Vacante M, Hyde C, Martin S, Ukoumunne O, Sachpekidis C. 18F-FDG PET for the early diagnosis of Alzheimer's disease dementia and other dementias in people with mild cognitive impairment (MCI). Cochrane Database of Systematic Reviews 2015, Issue 1. Art. No.: CD010632. DOI: 10.1002/14651858.CD010632.pub2.

45. Walhovd KB, et al. Combining MR imaging, positron-emission tomography, and CSF biomarkers in the diagnosis and prognosis of Alzheimer disease. AJNR. American Journal of Neuroradiology 2010;31(2):347-354. DOI: 10.3174/ajnr.A1809.
46. Karow DS, et al. Relative capability of MR imaging and FDG PET to depict changes associated with prodromal and early Alzheimer disease. Radiology 2010;256(3):932-942. DOI: 10.1148/radiol.10091402.
47. Jack CR, et al. Revised criteria for diagnosis and staging of Alzheimer's disease: Alzheimer's Association Workgroup. Alzheimer's & Dementia 2024;20(8):5143-5169. DOI: 10.1002/alz.13859.
48. Ossenkoppele R, et al. Discriminative accuracy of [18F]flortaucipir positron emission tomography for Alzheimer disease vs other neurodegenerative disorders. Journal of the American Medical Association 2018;320(11):1151-1162. DOI: 10.1001/jama.2018.12917.
49. Ossenkoppele R, et al. Accuracy of tau positron emission tomography as a prognostic marker in preclinical and prodromal Alzheimer disease: a head-to-head comparison against amyloid positron emission tomography and magnetic resonance imaging. JAMA Neurology 2021;78(8):961-971. DOI: 10.1001/jamaneurol.2021.1858.
50. Muller EG, Edwin TH, Strand BH, Stokke C, Revheim ME, Knapskog AB. Is amyloid burden measured by 18F-flutemetamol PET associated with progression in clinical Alzheimer's disease? Journal of Alzheimer's Disease: JAD 2022;85(1):197-205. DOI: 10.3233/JAD-215046.
51. Fink HA, et al. Diagnosis and Treatment of Clinical Alzheimer's-Type Dementia. Comparative Effectiveness Review #223. AHRQ Pub. No. 20- EHC003 [Internet] Agency for Healthcare Quality and Research Effective Health Care Program. 2020 Apr Accessed at: https://www.effectivehealthcare.ahrq.gov/. [accessed 2025 Sep 03] DOI: 10.23970/AHRQEPCCER223.
52. Traub-Weidinger T, et al. EANM practice guidelines for an appropriate use of PET and SPECT for patients with epilepsy. European Journal of Nuclear Medicine and Molecular Imaging 2024;51(7):1891-1908. DOI: 10.1007/s00259-024-06656-3.
53. ACR-ACNM-SNMMI-SPR Practice Parameter for the Performance of Single-Photon Emission Brain Perfusion Imaging (Including SPECT and SPECT/CT). Resolution 19 [Internet] American College of Radiology (ACR). 2021 Accessed at: https://www.acr.org/. [created 2007; accessed 2024 Sep 18]
54. Lee RK, et al. Seizures and Epilepsy. ACR Appropriateness Criteria [Internet] American College of Radiology (ACR). 2019 Accessed at: https://www.acr.org. [created 1996; accessed 2024 Oct 01]
55. Mountz JM, Patterson CM, Tamber MS. Pediatric epilepsy: neurology, functional imaging, and neurosurgery. Seminars in Nuclear Medicine 2017;47(2):170-187. DOI: 10.1053/j.semnuclmed.2016.10.003.
56. Passaro EA. Neuroimaging in adults and children with epilepsy. Continuum : Lifelong Learning in Neurology 2023;29(1):104-155. DOI: 10.1212/CON.0000000000001242.
57. Sriwastwa A, Trout AT, Mahoney BW, Wang LL, Scheler JL. Nuclear medicine imaging in epilepsy. Radiographics 2025;45(1):e240062. DOI: 10.1148/rg.240062. and PET-CT (A-0096)
58. Jones AL, Cascino GD. Evidence on use of neuroimaging for surgical treatment of temporal lobe epilepsy: a systematic review. JAMA Neurology 2016;73(4):464-470. DOI: 10.1001/jamaneurol.2015.4996.
59. Duncan JS, Winston GP, Koepp MJ, Ourselin S. Brain imaging in the assessment for epilepsy surgery. Lancet Neurology 2016;15(4):420-433. DOI: 10.1016/S1474-4422(15)00383-X.
60. Cendes F, Theodore WH, Brinkmann BH, Sulc V, Cascino GD. Neuroimaging of epilepsy. Handbook of Clinical Neurology 2016;136:985-1014. DOI: 10.1016/B978-0-444-53486-6.00051-X.
61. Burneo JG, Poon R, Kellett S, Snead OC. The utility of positron emission tomography in epilepsy. Canadian Journal of Neurological Sciences 2015;42(6):360-71. DOI: 10.1017/cjn.2015.279.
62. Iwasaki M, Jin K, Nakasato N, Tominaga T. Non-invasive evaluation for epilepsy surgery. Neurologia Medico-Chirurgica 2016;56(10):632-640. DOI: 10.2176/nmc.ra.2016-0186.
63. Courtney MR, et al. Association of localizing 18F-FDG-PET hypometabolism and outcome following epilepsy surgery: systematic review and meta-analysis. Neurology 2024;102(9):e209304. DOI: 10.1212/WNL.0000000000209304.
64. Flaus A, Guedj E, Horowitz T, Semah F, Verger A, Hammers A. Brain PET imaging in the presurgical evaluation of drug-resistant focal epilepsy. PET Clinics 2025;20(1):57-66. DOI: 10.1016/j.cpet.2024.09.008.

65. Ergun EL, Saygi S, Yalnizoglu D, Oguz KK, Erbas B. SPECT-PET in epilepsy and clinical approach in evaluation. Seminars in Nuclear Medicine 2016;46(4):294-307. DOI: 10.1053/j.semnuclmed.2016.01.003.
66. Cankurtaran CZ, et al. Multimodal presurgical evaluation of medically refractory focal epilepsy in adults: an update for Radiologists. American Journal of Roentgenology 2022;219(3):488-500. DOI: 10.2214/AJR.22.27588.
67. Pardoe H, Kuzniecky R. Advanced imaging techniques in the diagnosis of nonlesional epilepsy: MRI, MRS, PET, and SPECT. Epilepsy Currents 2014;14(3):121-4. DOI: 10.5698/1535-7597-14.3.121.
68. Chandra PS, et al. Role of concordance between ictal-subtracted SPECT and PET in predicting long-term outcomes after epilepsy surgery. Epilepsy Research 2014;108(10):1782-9. DOI: 10.1016/j.eplepsyres.2014.09.024.
69. Perissinotti A, et al. Clinical role of subtraction ictal SPECT coregistered to MR imaging and (18)F-FDG PET in pediatric epilepsy. Journal of Nuclear Medicine 2014;55(7):1099-105. DOI: 10.2967/jnumed.113.136432.
70. Haginoya K, et al. The usefulness of subtraction ictal SPECT and ictal near-infrared spectroscopic topography in patients with West syndrome. Brain and Development 2013;35(10):887-93. DOI: 10.1016/j.braindev.2013.08.011.
71. Jin P, Wu D, Li X, Ren L, Wang Y. Towards precision medicine in epilepsy surgery. Annals of Translational Medicine 2016;4(2):24. DOI: 10.3978/j.issn.2305-5839.2015.12.65.
72. Juhasz C, John F. Utility of MRI, PET, and ictal SPECT in presurgical evaluation of non-lesional pediatric epilepsy. Seizure 2020;77:15-28. DOI: 10.1016/j.seizure.2019.05.008.
73. Chen T, Guo L. The role of SISCOM in preoperative evaluation for patients with epilepsy surgery: A meta-analysis. Seizure 2016;41:43-50. DOI: 10.1016/j.seizure.2016.06.024.
74. Lascano AM, et al. Yield of MRI, high-density electric source imaging (HD-ESI), SPECT and PET in epilepsy surgery candidates. Clinical Neurophysiology 2016;127(1):150-5. DOI: 10.1016/j.clinph.2015.03.025.
75. Theodore WH. Presurgical focus localization in epilepsy: PET and SPECT. Seminars in Nuclear Medicine 2017;47(1):44-53. DOI: 10.1053/j.semnuclmed.2016.09.008.
76. Johnson EL. Seizures and epilepsy. Medical Clinics of North America 2019;103(2):309-324. DOI: 10.1016/j.mcna.2018.10.002.
77. Thijs RD, Surges R, O'Brien TJ, Sander JW. Epilepsy in adults. Lancet 2019;393(10172):689-701. DOI: 10.1016/S0140-6736(18)32596-0.
78. Ponisio MR, et al. The Role of SPECT and PET in Epilepsy. American Journal of Roentgenology 2021;216(3):759-768. DOI: 10.2214/AJR.20.23336.
79. Rathore C, Radhakrishnan K. Concept of epilepsy surgery and presurgical evaluation. Epileptic Disorders 2015;17(1):19-31. DOI: 10.1684/epd.2014.0720.
80. Kwan P, et al. Definition of drug resistant epilepsy: consensus proposal by the ad hoc Task Force of the ILAE Commission on Therapeutic Strategies. Epilepsia 2010;51(6):1069-1077. DOI: 10.1111/j.1528-1167.2009.02397.x. (Reaffirmed 2025 Jul)
81. Trofimova A, et al. Seizures - Child. ACR Appropriateness Criteria [Internet] American College of Radiology (ACR). 2020 Accessed at: https://www.acr.org. [accessed 2024 Oct 01]
82. Bauman K, Devinsky O, Liu AA. Temporal lobe surgery and memory: Lessons, risks, and opportunities. Epilepsy and Behavior 2019;101(Pt A):106596. DOI: 10.1016/j.yebeh.2019.106596.
83. Law I, et al. Joint EANM/EANO/RANO practice guidelines/SNMMI procedure standards for imaging of gliomas using PET with radiolabelled amino acids and [18F]FDG: version 1.0. European Journal of Nuclear Medicine and Molecular Imaging 2019;46(3):540-557. DOI: 10.1007/s00259-018- 4207-9.
84. Piccardo A, et al. Joint EANM/SIOPE/RAPNO practice guidelines/SNMMI procedure standards for imaging of paediatric gliomas using PET with radiolabelled amino acids and [18F]FDG: version 1.0. European Journal of Nuclear Medicine and Molecular Imaging 2022;49(11):3852-3869. DOI: 10.1007/s00259-022-05817-6.
85. Hu LS, et al. Advanced imaging in the diagnosis and response assessment of high-grade glioma: AJR expert panel narrative review. American Journal of Roentgenology 2025;224(1):e2330612. DOI: 10.2214/AJR.23.30612. and PET-CT (A-0096)

86. Nabors LB, et al. Central Nervous System Cancers. NCCN Clinical Practice Guidelines in Oncology [Internet] National Comprehensive Cancer Network (NCCN). v. 1.2025; 2025 Jun 03 Accessed at: https://www.nccn.org/guidelines/. [accessed 2025 Jun 04]
87. Gajjar A, et al. Pediatric Central Nervous System Cancers. NCCN Clinical Practice Guideline in Oncology [Internet] National Comprehensive Cancer Network (NCCN). v. 2.2025; 2025 Jan 17 Accessed at: http://www.nccn.org/professionals/physician_gls/f_guidelines.asp. [accessed 2025 Jan 17]
88. Ivanidze J, et al. Brain Tumors. ACR Appropriateness Criteria [Internet] American College of Radiology (ACR). 2024 Accessed at: https://www.acr.org. [created 2024; accessed 2024 Nov 01]
89. Nihashi T, Dahabreh IJ, Terasawa T. Diagnostic accuracy of PET for recurrent glioma diagnosis: a meta-analysis. AJNR. American Journal of Neuroradiology 2013;34(5):944-950, S1-S11. DOI: 10.3174/ajnr.A3324.
90. Zhao C, Zhang Y, Wang J. A meta-analysis on the diagnostic performance of (18)F-FDG and (11)C-methionine PET for differentiating brain tumors. AJNR. American Journal of Neuroradiology 2014;35(6):1058-1065. DOI: 10.3174/ajnr.A3718.
91. Katsanos AH, Alexiou GA, Fotopoulos AD, Jabbour P, Kyritsis AP, Sioka C. Performance of 18F-FDG, 11C-methionine, and 18F-FET PET for glioma grading: a meta-analysis. Clinical Nuclear Medicine 2019;44(11):864-869. DOI: 10.1097/RLU.0000000000002654.
92. Galldiks N, et al. Challenges, limitations, and pitfalls of PET and advanced MRI in patients with brain tumors: A report of the PET/RANO group. Neuro-Oncology 2024;26(7):1181-1194. DOI: 10.1093/neuonc/noae049.
93. Johnson DR, Glenn CA, Javan R, Olson JJ. Congress of Neurological Surgeons systematic review and evidence-based guidelines update on the role of imaging in the management of progressive glioblastoma in adults. Journal of Neuro-Oncology 2022;158(2):139-165. DOI: 10.1007/s11060- 021-03853-0.
94. Dunet V, Pomoni A, Hottinger A, Nicod-Lalonde M, Prior JO. Performance of 18F-FET versus 18F-FDG-PET for the diagnosis and grading of brain tumors: systematic review and meta-analysis. Neuro-Oncology 2016;18(3):426-434. DOI: 10.1093/neuonc/nov148.
95. Galldiks N, Lohmann P, Fink GR, Langen KJ. Amino acid PET in neurooncology. Journal of Nuclear Medicine 2023;64(5):693-700. DOI: 10.2967/jnumed.122.264859.
96. Yamaguchi S, et al. Determination of brain tumor recurrence using 11 C-methionine positron emission tomography after radiotherapy. Cancer Science 2021;112(10):4246-4256. DOI: 10.1111/cas.15001.
97. Suchorska B, et al. Biological tumor volume in 18FET-PET before radiochemotherapy correlates with survival in GBM. Neurology 2015;84(7):710- 719. DOI: 10.1212/WNL.0000000000001262.
98. Galldiks N, et al. Response assessment of bevacizumab in patients with recurrent malignant glioma using [18F]Fluoroethyl-L-tyrosine PET in comparison to MRI. European Journal of Nuclear Medicine and Molecular Imaging 2013;40(1):22-33. DOI: 10.1007/s00259-012-2251-4.
99. Heiss WD. Positron emission tomography imaging in gliomas: applications in clinical diagnosis, for assessment of prognosis and of treatment effects, and for detection of recurrences. European Journal of Neurology 2017;24(10):1255-e70. DOI: 10.1111/ene.13385.
100. Juhasz C, Bosnyak E. PET and SPECT studies in children with hemispheric low-grade gliomas. Child's Nervous System 2016;32(10):1823-1832. DOI: 10.1007/s00381-016-3125-z.
101. Li Z, Yu Y, Zhang H, Xu G, Chen L. A meta-analysis comparing 18F-FLT PET with 18F-FDG PET for assessment of brain tumor recurrence. Nuclear Medicine Communications 2015;36(7):695-701. DOI: 10.1097/MNM.0000000000000302.
102. Yu J, et al. Accuracy of 18F-FDOPA positron emission tomography and 18F-FET positron emission tomography for differentiating radiation necrosis from brain tumor recurrence. World Neurosurgery 2018;114:e1211-e1224. DOI: 10.1016/j.wneu.2018.03.179.
103. Kits A, Martin H, Sanchez-Crespo A, Delgado AF. Diagnostic accuracy of 11C-methionine PET in detecting neuropathologically confirmed recurrent brain tumor after radiation therapy. Annals of Nuclear Medicine 2018;32(2):132-141. DOI: 10.1007/s12149-017-1227-7.
104. Purandare NC, et al. Common malignant brain tumors: can 18F-FDG PET/CT aid in differentiation? Nuclear Medicine Communications 2017;38(12):1109-1116. DOI: 10.1097/MNM.0000000000000753.

105. Morbelli S, et al. EANM practice guideline/SNMMI procedure standard for dopaminergic imaging in Parkinsonian syndromes 1.0. European Journal of Nuclear Medicine and Molecular Imaging 2020;47(8):1885-1912. DOI: 10.1007/s00259-020-04817-8.
106. Frisoni GB, et al. European intersocietal recommendations for the biomarker-based diagnosis of neurocognitive disorders. Lancet Neurology 2024;23(3):302-312. DOI: 10.1016/S1474-4422(23)00447-7.
107. Tian M, et al. International consensus on clinical use of presynaptic dopaminergic positron emission tomography imaging in parkinsonism. European Journal of Nuclear Medicine and Molecular Imaging 2024;51(2):434-442. DOI: 10.1007/s00259-023-06403-0.
108. Arena JE, Stoessl AJ. Optimizing diagnosis in Parkinson's disease: Radionuclide imaging. Parkinsonism and Related Disorders 2016;22 Suppl 1:S47-S51. DOI: 10.1016/j.parkreldis.2015.09.029.
109. Kalia LV, Lang AE. Parkinson's disease. Lancet 2015;386(9996):896-912. DOI: 10.1016/S0140-6736(14)61393-3.
110. Keir G, Roytman M, Mashriqi F, Shahsavarani S, Franceschi AM. Atypical Parkinsonian syndromes: structural, functional, and molecular imaging features. AJNR. American Journal of Neuroradiology 2024;45(12):1865-1877. DOI: 10.3174/ajnr.A8313. and PET-CT (A-0096)
111. Postuma RB, et al. MDS clinical diagnostic criteria for Parkinson's disease. Movement Disorders 2015;30(12):1591-601. DOI: 10.1002/mds.26424.
112. Peralta C, et al. Pragmatic approach on neuroimaging techniques for the differential diagnosis of Parkinsonisms. Movement Disorders Clinical Practice 2022;9(1):6-19. DOI: 10.1002/mdc3.13354.
113. Walker Z, et al. Clinical utility of FDG PET in Parkinson's disease and atypical parkinsonism associated with dementia. European Journal of Nuclear Medicine and Molecular Imaging 2018;45(9):1534-1545. DOI: 10.1007/s00259-018-4031-2.
114. Harvey HB, et al. Movement Disorders and Neurodegenerative Diseases. ACR Appropriateness Criteria [Internet] American College of Radiology (ACR). 2019 Accessed at: https://www.acr.org. [created 1996; accessed 2024 Sep 27]
115. Hoglinger GU, et al. Clinical diagnosis of progressive supranuclear palsy: The movement disorder society criteria. Movement Disorders 2017;32(6):853-864. DOI: 10.1002/mds.26987.
116. Centers for Medicare and Medicaid Services. "Hospital services excluded from payment under the hospital outpatient prospective payment system." 42 CFR 419.22 Washington, DC 2023 Jul [accessed 2025 Jul 22] Accessed at: https://www.ecfr.gov/.
117. Centers for Medicare and Medicaid Services. "Requirements relating to basic benefits." 42 CFR 422.101 Washington, DC 2025 Jun 03 [accessed 2025 Jul 23] Accessed at: https://www.ecfr.gov/.
118. Centers for Medicare and Medicaid Services. Medicare Benefit Policy Manual. Chapter 14 - Medical Devices Rev. 198 [Internet] Centers for Medicare and Medicaid Services. 2014 Nov 06 Accessed at: https://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/. [accessed 2025 Sep 09]
119. Centers for Medicare and Medicaid Services. Medicare Benefit Policy Manual. Chapter 15 - Covered Medical and Other Health Services Rev. 13108 [Internet] Centers for Medicare and Medicaid Services. 2025 Apr 11 Accessed at: https://www.cms.gov/manuals/. [accessed 2025 Sep 09]
120. Centers for Medicare and Medicaid Services. Medicare Benefit Policy Manual. Chapter 16 - General Exclusions From Coverage Rev. 198 [Internet] Centers for Medicare and Medicaid Services. 2014 Nov 06 Accessed at: https://www.cms.gov/Regulations-andGuidance/Guidance/Manuals/. [accessed 2025 Sep 09]
121. Medicare Coverage Database. [Internet] Centers for Medicare and Medicaid Services. Accessed at: https://www.cms.gov/medicare-coveragedatabase/search.aspx? Updated 2025 [accessed 2025 Oct 23]

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