HEALTHHELP®
A WNS COMPANY

2024 Positron Emission Tomography (PET) Brain

Diagnostic Imaging

PET-Brain-HH

Last Review Date: 10/28/2024
Previous Review Date: 08/29/2024
Guideline Initiated: 06/30/2019

HEALTHHELP®

A WNS COMPANY

Table of Contents

Positron Emission Tomography (PET) Brain

WARNING
Oncological PET is indicated for biopsy-proven known cancer or if cancer is highly suspected based on other diagnostic testing. The appropriateness of an ordered PET/computed tomography (CT) *depends on the radiopharmaceutical* to be used.

NCD 220.6.9
See also, **NCD 220.6.9**: FDG PET for Refractory Seizures at https://www.cms.gov/medicare-coverage-database/search.aspx *if applicable to individual's healthplan membership*.

NCD 220.6.13
See also, **NCD 220.6.13**: FDG PET for Dementia and Neurodegenerative Diseases at https://www.cms.gov/medicare-coverage-database/search.aspx *if applicable to individual's healthplan membership*.

NCD 220.6.17
See also, **NCD 220.6.17**: Positron Emission Tomography (FDG) for Oncologic Conditions at https://www.cms.gov/medicare-coverage-database/search.aspx *if applicable to individual's healthplan membership*.

Preamble: Pediatric Diagnostic Imaging

HealthHelp's clinical guidelines for the Diagnostic Imaging program, are intended to apply to both adults and pediatrics (21 years of age or younger), unless otherwise specified within the criteria.

PET Brain Guideline

(*__NOTE__: *PET Brain guideline is included in PET Central Nervous System guideline*)
Positron emission tomography (PET) of the brain is considered medically appropriate when the documentation demonstrates **ANY** of the following: (*__NOTE__: *Computed tomography (CT) of the*

*brain is acceptable if magnetic resonance imaging (MRI) of the brain is **contraindicated**. CT of the brain is **NOT** a substitute for MRI when PET request is to evaluate amyloid plaque before, during and after certain Alzheimer's medications (eg, Aduhelm, Lequmbi).*)

1. Cancer or brain tumor is known, brain MRI is non-diagnostic or indeterminate and **ANY** of the following:
    a. High-grade glioma differentiation
    b. Lymphoma of the brain, primary, for evaluation
    c. Meningioma evaluation
    d. Procedural guidance (eg, biopsy, intervention)
    e. Radiation necrosis differentiation from residual/recurrent tumor after treatment

    References: [11] [12] [4] [5]
2. Cognitive impairment or dementia is known and **ALL** the following:
    a. **ANY** of the following:
        i. Alzheimer's disease, dementia with Lewy body disease (DLB) and frontotemporal lobar degeneration (FTD), for condition differentiation
        ii. Beta amyloid plaque presence (in Alzheimer's disease) is suspected and study is needed to be considered for treatment with Aduhelm or Lequmbi (*__NOTE__: *MRI is **NOT** indicated for Leqembi*)
        iii. Early Alzheimer's disease detection
    b. Brain MRI is non-diagnostic or indeterminate and **ALL** of the following:
        i. Mini Mental Status Evaluation (MMSE) or Montreal Cognitive Assessment (MoCA) with results less than 26 **OR** neuropsychological test (eg, memory testing, mood and personality, motor speed and dexterity) showing **AT LEAST** mild cognitive impairment
        ii. Potential treatable causes (eg, anemia, medication side effects, inflammatory disease, vascular disease) are assessed and treated as appropriate.

    References: [2] [10] [9] [1] [8] [5]
3. Post treatment/procedural evaluation of progress after intervention, procedure, surgery or treatment.
    References: [5]
4. Prior PET brain imaging is non-diagnostic or indeterminate. (*__NOTE__: *One follow-up is appropriate to evaluate for changes since preceding imaging finding[s]. Further*

surveillance is appropriate when lesion is specified as "highly suspicious" or there is a change since last exam.)
References: [5]

5. Seizure is refractory, to determine candidacy for intervention.
References: [7] [6] [5]

L39521
See also, **LCD 39521**: **Positron Emission Tomography (PET) Scan for Inflammation and Infection** at https://www.cms.gov/medicare-coverage-database/search.aspx *if applicable to individual's healthplan membership*.

LCD 35391
See also, **LCD 35391**: Multiple Imaging in Oncology at https://www.cms.gov/medicare-coverage-database/search.aspx *if applicable to individual's healthplan membership*.

PET Brain Procedure Codes

Table 1. Brain Positron Emission Tomography (PET) Associated Procedure Codes

CODE	DESCRIPTION
78608	Brain imaging, positron emission tomography (PET); metabolic evaluation
78609	Brain imaging, positron emission tomography (PET); perfusion evaluation
78811	Positron emission tomography (PET) imaging; limited area (eg, chest, head/neck)
78812	Positron emission tomography (PET) imaging; skull base to mid-thigh
78813	Positron emission tomography (PET) imaging; whole body
78814	Positron emission tomography (PET) with concurrently acquired computed tomography (CT) for attenuation correction and anatomical localization imaging; limited area (eg, chest, head/neck)
78815	Positron emission tomography (PET) with concurrently acquired computed tomography (CT) for attenuation correction and anatomical localization imaging; skull base to mid-thigh
78816	Positron emission tomography (PET) with concurrently acquired computed tomography (CT) for attenuation correction and anatomical localization imaging; whole body

PET Brain Summary of Changes

PET Brain guideline had the following version changes from 2023 to 2024:

- Added the following to keep in line with current evidence:

  - "Prior PET brain imaging is non-diagnostic or indeterminate" indication
  - "Meningioma evaluation" under "Cancer or brain tumor is known"
- Mid-cycle update: added Pediatric Preamble

PET CNS Definitions

Alzheimer's disease is a degenerative brain disease of unknown cause that is the most common form of dementia, it usually starts in late middle age or in old age and results in progressive memory loss, impaired thinking, disorientation and changes in personality and mood.
Beta-amyloid plaque is a build-up or "clumping" of the beta-amyloid protein that occurs between neurons and disrupt cell function.
Chordoma is a rare, slow-growing bone cancer that can occur in the spine or skull base.
Dementia is a usually progressive condition marked by the development of multiple cognitive deficits, such as memory impairment, aphasia and the inability to plan and initiate complex behavior.
Glioma is a type of tumor that occurs in the brain and spinal cord.
Indeterminate findings are inconclusive or insufficient for treatment planning.
Initial staging refers to imaging that is performed **AFTER** the diagnosis of cancer is made, and generally before any treatment.
Ki-67, also known as Marker of Proliferation Ki-67 (MKI67), is a protein found in dividing cells that is used as a proliferation marker for human tumor cells.
Lewy body dementia (LBD) is a disease associated with abnormal deposits of a protein called alpha-synuclein in the brain. These deposits, called Lewy bodies, affect chemicals in the brain whose changes, in turn, can lead to problems with thinking, movement, behavior, and mood.
Lymphoma is a type of blood cancer that affects the immune system. Lymphoma occurs when abnormal white blood cells, called lymphocytes, grow in the lymphatic system.
Magnetic resonance imaging (MRI) is a non-invasive diagnostic technique that produces computerized images of internal body tissues and is based on nuclear magnetic resonance of atoms within the body induced by the application of radio waves.
Meningioma is a slow-growing, encapsulated, typically benign tumor arising from the meninges and often causes damage by pressing upon the brain and adjacent parts.
Meta-iodobenzylguanidine (MIBG) scan is a nuclear scan test that uses injected radioactive material (radioisotope) and a special scanner to locate or confirm the presence of pheochromocytoma and neuroblastoma, which are tumors of specific types of nervous tissue. An alternative name is adrenal medullary imaging.
Mini-Mental State Examination is a set of 11 questions that doctors and other healthcare professionals commonly use to check for cognitive impairment (problems with thinking, communication, understanding and memory).

Montreal Cognitive Assessment (MoCA) is a brief test of cognitive function, taking 10 minutes to administer. It assesses short-term memory, visuospatial function, executive function, attention, concentration and working memory, language, and orientation.
Necrosis is localized death of living tissue.
Neuroblastoma is a cancer that develops from immature nerve cells found in several areas of the body. Neuroblastoma most commonly arises in and around the adrenal glands, which have similar origins to nerve cells and sit atop the kidneys.
Neurofibromatosis is a rare genetic disorder that causes benign tumors to grow on nerves and other parts of the body. There are three types of neurofibromatosis: neurofibromatosis 1 (NF1), neurofibromatosis 2 (NF2) and schwannomatosis.
Non-diagnostic is a result that does not lead to a confirmed diagnosis.
Paraganglioma is a type of neuroendocrine tumor that forms near certain blood vessels and nerves outside of the adrenal glands.
Pediatric approximate ages are defined by the US Department of Health (USDH), the Food and Drug Administration (FDA), and the American Academy of Pediatrics (AAP) as the following:

- Infancy, between birth and 2 years of age
- Childhood, from 2 to 12 years of age
- Adolescence, from 12 to 21 years of age, further defined by the AAP into:
    1. Early (ages 11–14 years)
    2. Middle (ages 15–17 years),
    3. Late (ages 18–21 years)
    4. Older ages may be appropriate for children with special healthcare needs.

Pheochromocytoma is a small vascular tumor of the adrenal medulla, causing irregular secretions of epinephrine and norepinephrine, leading to attacks of raised blood pressure, palpitations and headaches.
Positron emission tomography (PET) scan is a procedure in which a small amount of radioactive glucose (sugar) is injected into a vein, and a scanner is used to make detailed, computerized pictures of areas inside the body where the glucose is taken up. It is a medical imaging test that shows the metabolic or biochemical function of organs and tissues.
Refractory is resistance to treatment or cure.
Restaging includes scans that are either needed during active treatment (subsequent treatment strategy) to determine response to treatment, within 6 months after the end of treatment, or when there is clinical concern for recurrence (eg, new imaging, new signs, rising labs/tumor markers or symptoms relative to type of cancer and entire clinical picture). Recurrence is not required to be biopsy proven.

Seizure is a sudden, uncontrolled electrical disturbance in the brain. It can cause changes in behavior, movements or feelings, and in levels of consciousness.
Staging in cancer is the process of determining how much cancer is within the body (tumor size) and if it has metastasized (spread).

PET Brain References

[1] (2023). ADUHELM® (aducanumab-avwa) injection package insert. *U.S. Food and Drug Administration (FDA)*. Retrieved: April 2024. https://www.accessdata.fda.gov/drugsatfda_docs/label/2023/761178s007lbl.pdf
[2] Chetelat, G., Arbizu, J., . . . Drzezga, A. (2020). Amyloid-PET and 18F-FDG-PET in the diagnostic investigation of Alzheimer's disease and other dementias. *The Lancet Neurology, 19*(11), 951-962.
[3] Dave, A., Hansen, N., . . . Johnson, C. (2020). FDG-PET Imaging of Dementia and Neurodegenerative Disease. *Seminars in Ultrasound, CT and MRI, 41*(6), 562-571.
[4] Drake, L.R., Hillmer, A.T. & Cai, Z. (2020). Approaches to PET Imaging of Glioblastoma. *Molecules, 25*(3), 568.
[5] Guedj, E., Varrone, A., . . . Morbelli, S. (2022). EANM procedure guidelines for brain PET imaging using [18F]FDG, version 3. *European Journal of Nuclear Medicine and Molecular Imaging, 49*(8), 632-651.
[6] Kini, L.G., Thaker, A.A., . . . Davis, K.A. (2021). Quantitative [18]FDG PET asymmetry features predict long-term seizure recurrence in refractory epilepsy. *Epilepsy & Behavior, 116*, 107714.
[7] Lee, R.K., Burns, J., . . . Corey, A.S. (2020). ACR Appropriateness Criteria Seizures and Epilepsy *Journal of the American College of Radiology, 17*(5S), S293-S304.
[8] (2023). LEQEMBI® (lecanemab-irmb) injection package insert. *U.S. Food and Drug Administration (FDA)*. Retrieved: April 2024. https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=761269
[9] Minoshima, S., Cross, D., . . . Drzezga, A. (2022). 18F-FDG PET Imaging in Neurodegenerative Dementing Disorders: Insights into Subtype Classification, Emerging Disease Categories, and Mixed Dementia with Copathologies. *Journal of Nuclear Medicine, 63*(Supplement 1), 2S-12S.
[10] Moonis, G., Subramaniam, R.M., . . . Corey, A.S.(2020). ACR Appropriateness Criteria Dementia *Journal of the American College of Radiology, 17*(5S), S100-S112.
[11] Verger, A., Kas, A., . . . Guedj, E. (2022). PET Imaging in Neuro-Oncology: An Update and Overview of a Rapidly Growing Area. *Cancers, 14*(5), 1103.
[12] Zhang-Yin, J.T., Girard, A. & Bertaux, M. (2022). What Does PET Imaging Bring to Neuro-Oncology in 2022? A Review. *Cancers, 14*(4), 879.

Disclaimer section

Purpose

The purpose of the HealthHelp's clinical guidelines is to assist healthcare professionals in selecting the medical service that may be appropriate and supported by evidence to safely improve outcomes. Medical information is constantly evolving, and HealthHelp reserves the right to review and update these clinical guidelines periodically. HealthHelp reserves the right to include in these guidelines the clinical indications as appropriate for the organization's program objectives. Therefore the guidelines are not a list of all the clinical indications for a stated procedure, and associated Procedure Code Tables may not represent all codes available for that state procedure or that are managed by a specific client-organization.

Clinician Review

These clinical guidelines neither preempt clinical judgment of trained professionals nor advise anyone on how to practice medicine. Healthcare professionals using these clinical guidelines are responsible for all clinical decisions based on their assessment. All Clinical Reviewers are instructed to apply clinical indications based on individual patient assessment and documentation, within the scope of their clinical license.

Payment

The use of these clinical guidelines does not provide authorization, certification, explanation of benefits, or guarantee of payment; nor do the guidelines substitute for, or constitute, medical advice. Federal and State law, as well as member benefit contract language (including definitions and specific contract provisions/exclusions) take precedence over clinical guidelines and must be considered first when determining eligibility for coverage. All final determinations on coverage and payment are the responsibility of the health plan. Nothing contained within this document can be interpreted to mean otherwise.

Registered Trademarks (®/™) and Copyright (©)

National and Local Coverage Determination (NCD and LCD)

NOTICE
To ensure appropriate review occurs to the most current NCD and/or LCD, always defer to https://www.cms.gov/medicare-coverage-database/search.aspx.

Background

National Coverage Determinations (NCD) and Local Coverage Determinations (LCD) are payment policy documents outlined by the Centers for Medicare and Medicaid Services (CMS) and the government's delegated Medicare Audit Contractors (MACs) that operate regionally in jurisdictions.
CMS introduced variation between different jurisdictions/Medicare Audit Contractors (MACs) and their associated covered code lists with the transition to ICD 10. The variation resulted in jurisdictions independently defining how codes are applied for exclusions, limitations, groupings, ranges, etc. for the medical necessity indications outlined in the NCD and LCD. Due to this variation, there is an inconsistent use/application of codes and coverage determinations across the United States between the different MACs.
In addition, **WITHOUT** notice, CMS can change the codes that indicate medical necessity and the format of the coverage determinations/associated documents (eg, Articles). This is an additional challenge for organizations to keep up with ongoing, unplanned changes in covered codes and medical necessity indications.

Medical Necessity Codes

Due to the variation in code application between jurisdictions/MACs and that updates can happen without notification, HealthHelp is not able to guarantee full accuracy of the codes listed for any Coverage Determination, and advises that prior to use, the associated Coverage Determination Articles are reviewed to ensure applicability to HealthHelp's programs and any associated NCDs and LCDs.

For Internal Use Only:

11248 11249 11253 11282 11325 11328 11333 11349 11350 11351 11352 11354 11355 11356 11358 11359 11360 11361 11362 11365 11366 11367 11368 11369 11370 11374 11375 11394 11395 11396 11565