Medical Policy Manual

**Topic:** Single Photon Emission Computed Tomography (SPECT) for the Diagnosis of ADHD, Dementias and Other Psychiatric Conditions  
**Date of Origin:** March 2005

**Section:** Radiology  
**Last Reviewed Date:** June 2013

**Policy No:** 44  
**Effective Date:** September 1, 2013

**IMPORTANT REMINDER**

Medical Policies are developed to provide guidance for members and providers regarding coverage in accordance with contract terms. Benefit determinations are based in all cases on the applicable contract language. To the extent there may be any conflict between the Medical Policy and contract language, the contract language takes precedence.

PLEASE NOTE: Contracts exclude from coverage, among other things, services or procedures that are considered investigational or cosmetic. Providers may bill members for services or procedures that are considered investigational or cosmetic. Providers are encouraged to inform members before rendering such services that the members are likely to be financially responsible for the cost of these services.

**DESCRIPTION**

Single photon emission computed tomography (SPECT) is a nuclear imaging technique that is used to visualize functional information about body organs, including the brain. Brain imaging requires the use of radiopharmaceuticals that cross the blood-brain barrier. The radioactive isotope decay results in emission of gamma rays that are detected by a gamma camera which allows reconstruction of cross-sectional slices.

SPECT has been used to study regional cerebral blood flow or to determine dopamine and serotonin receptor availability in the brain. In addition, SPECT has been proposed as a tool to diagnose and estimate treatment response in attention deficit/hyperactivity disorder (ADHD), Alzheimer’s disease/dementias, and other psychiatric conditions, such as major depression.

**MEDICAL POLICY CRITERIA**

Single photon emission computed tomography (SPECT) is considered **investigational** for evaluation of ADHD, dementias, and all other psychiatric conditions.
SCIENTIFIC EVIDENCE

Evidence from randomized controlled trials (RCTs) is necessary in order to establish how SPECT may be used in the clinical setting to either diagnose or direct treatment of ADHD, dementias, or other psychiatric disorders.

Literature Appraisal

A significant number of published studies focused on investigating differences in regional cerebral perfusion in response to drug therapy and on serotonin and dopamine receptor and transporter activity.[1, 34] These studies are preliminary and have not added to the body of knowledge with respect to the following:

- Demonstration of technical feasibility, including assessment of reproducibility and precision
- An understanding of normal and abnormal values. There are no reports on sensitivity and specificity, or positive and negative predictive values compared to standard diagnostic methods.
- An understanding of the clinical utility of SPECT and how it may be used to benefit diagnosis and management of ADHD, dementias or other psychiatric conditions
- A reproducible, valid method of differentiating psychiatric disorders with overlapping and/or similar symptoms (e.g., ADHD and bipolar disorder)

No randomized controlled trials comparing SPECT to standard methods of evaluating ADHD, dementias or other psychiatric conditions have been published to date.

Clinical Practice Guidelines

American Academy of Neurology (AAN)

In 2006, the AAN in the practice parameters for the diagnosis of autism outlines, “For patients with suspected dementia, SPECT cannot be recommended for routine use in either initial or differential diagnosis as it has not demonstrated superiority to clinical criteria.”[35]

American Psychiatric Association (APA)

The APA offers a 2012 consensus report of the APA work group on neuroimaging markers of psychiatric disorders.[36] The report recommends the following steps for biomarker validation in psychiatric disorders:

1. There should be at least two independent studies that specify the biomarker’s sensitivity, specificity, and positive and negative predictive values;
2. Sensitivity and specificity should be no less than 80%; positive predictive value should approach 90%;
3. The studies should be well powered, conducted by investigators with expertise to conduct such studies, and the results published in peer-reviewed journals;
4. The studies should specify type of control subjects, including normal subjects and those with a dementing illness but not AD; and
5. Once a marker is accepted, follow-up data should be collected and disseminated to monitor its accuracy and diagnostic value.
According to this standard, the report concludes, “...the psychiatric imaging literature currently does not support the application of a diagnostic biomarker to positively establish the presence of any primary psychiatric disorder.”

American College of Radiology (ACR)

The 2012 ACR consensus guidelines on SPECT brain perfusion\(^{[37]}\) indicates SPECT studies can be utilized for evaluating patients with suspected dementia; however, SPECT has not been fully characterized for neuropsychiatric disorders.\(^{[35-40]}\)

Summary

The evidence is not sufficient to permit conclusions about the benefits of SPECT imaging in the diagnosis and treatment of ADHD, dementias and all other psychiatric conditions. There is no evidence from well-designed randomized controlled trials which demonstrate how SPECT may be used in the clinical setting to either diagnose or direct treatment of these conditions. In addition, no evidence-based clinical practice guideline recommends SPECT to diagnose or manage treatment of any psychiatric condition. Therefore, SPECT is considered investigational for evaluation of ADHD, dementias, and all other psychiatric conditions.

REFERENCES


CROSS REFERENCES

None

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