

# Evaluation of the therapeutic response by $^{99m}\text{Tc}$ -ECD-SPET in a female with non-organic depression, generalized anxiety and heterophobia

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## Abstract

This is the case of a 33 years old female patient who was diagnosed with depression and heterophobia, which progressed to generalized anxiety according to the International Statistical Classification of Diseases and Health Related Problems, 10<sup>th</sup> Revision (ICD-10), Version for 2010 diagnostic criteria. The clinical symptoms of the patient were significantly improved after effective treatment. The patient underwent before and after treatment  $^{99m}\text{Tc}$ -ethyl cysteinatate dimmer ( $^{99m}\text{Tc}$ -ECD) brain single-photon emission tomography (SPET). A great improvement in regional cerebral blood flow was found after treatment. *In conclusion*, this case highlights the value of brain perfusion SPET scan in providing objective imaging evidence of diagnosis and treatment evaluation in a patient with non-organic mental disorder.

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## Introduction

Abnormalities of regional cerebral blood flow have been found in many patients with non-organic mental disorders by brain single-photon emission tomography (SPET) studies [1-4]. Cerebral blood flow perfusion may be increased with improvement in clinical syndromes after appropriate treatment [5]. Brain perfusion imaging has the advantage of detection of cerebral blood flow abnormalities.

## Case report

A 33 years old female patient was diagnosed with a specific phobia according to the International Statistical Classification of Diseases and Health Related Problems, 10<sup>th</sup> Revision (ICD-10), Version for 2010 diagnostic criteria for mental and behavioral disorders [6]. She was introverted, sensitive, and hypochondriac during her early life. She suffered from heterophobia and depression as the result of a history of failed love 13 years ago, and the resultant symptoms gradually progressed to generalized anxiety. Four years ago, she began to suffer from heterosexual abstinence, coupled with intense feelings of guilt. Subsequently, when she saw a male, she experienced flushing in her face, tachyarrhythmia, chest tightness, and dizziness. She even attempted suicide. She scored 54 points on the Zung Self-Rating Anxiety Scale (Z-SAS) [7, 8].

The scan of brain CT of the patient was normal. Before treatment with various drugs, she underwent a  $^{99m}\text{Tc}$ -ethyl cysteinatate dimmer ( $^{99m}\text{Tc}$ -ECD) brain single photon emission tomography (SPET) scan, which showed hypoperfusion in the left frontal, bilateral temporal and parietal lobe (Fig. 1).

The patient then received a 9 months drug treatment with a gamma-aminobutyric acid (GABA) complex to promote nervous system health and energy metabolism and aspirin to improve cerebral microcirculation. He was also treated with alprazolam for anxiety and sertraline for her depression. After treatment, the clinical symptoms of the patient improved significantly. The patient now scored 28 points on the Self-Rating Anxiety Scale.

After treatment, the  $^{99m}\text{Tc}$  ECD brain SPET scan was repeated (Fig. 2) and showed smaller hypoperfused areas than before.

## Case Report

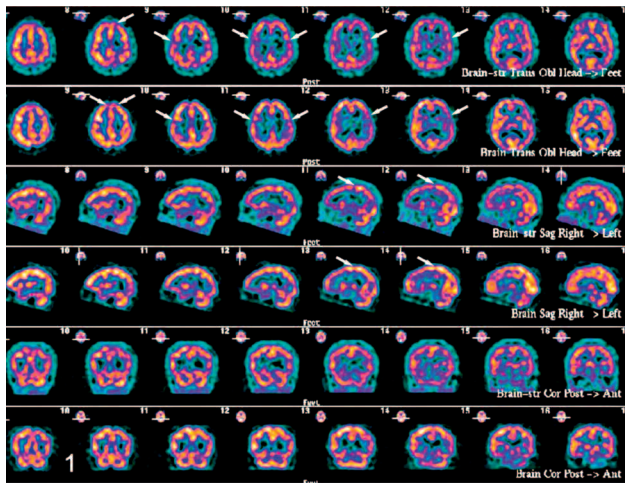
### Discussion

Perfusion imaging by  $^{99m}\text{Tc}$ -ECD SPET brain scan can detect changes in regional cerebral blood flow. Stressed brain perfusion stimulation or drugs can increase blood flow and show brain blood flow reserves.

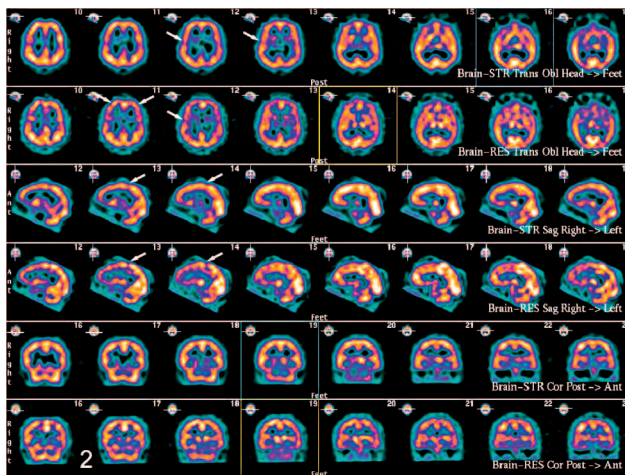
The circle of Willis, being a looped network of arteries of the brain, creates redundancies or collaterals in the cerebral circulation. If one part of the circle is blocked or narrowed, blood flow from other arteries may sufficiently preserve cerebral perfusion to avoid symptoms of ischemia.

Studies by brain SPET perfusion imaging have found cerebral blood perfusion abnormalities in many patients with non-organic mental disorders [3]. After appropriate treatment, some of these patients had improved clinical symptoms and brain perfusion [5].

We must note that we have also performed an adenosine stress test by injecting 0.8mg/kg of adenosine and performing a brain SPET scan as mentioned before in this paper, after



**Figure 1.** Before treatment, decreased radiotracer uptake regions were found in the  $^{99m}\text{Tc}$ -ECD-SPET scan in the frontal, temporal and parietal lobes (arrows).



**Figure 2.** In the after drug treatment,  $^{99m}\text{Tc}$ -ECD SPET scan the frontal, temporal and parietal lesions bilaterally showed much better uptake as compared with the uptake before treatment (arrows).

treatment. We are unable to present this scan for technical reasons. Our impression though was that the after treatment adenosine stress brain scan showed even better brain blood flow indicating sufficient blood flow reserves after drug treatment.

Adenosine infusion can cause vasodilation of cerebral arteries and can be used for the investigation of cerebrovascular perfusion capacity [9]. Cerebral blood flow has been reported to be increased after intracarotid adenosine administration in nonhuman primates [10, 11].

*In conclusion*, our study with  $^{99m}\text{Tc}$ -ECD SPET scan in a patient with non-organic depression, heterophobia and generalized anxiety showed multiple brain regions of decreased uptake of the radiopharmaceutical, which after treatment with a GABA-complex, aspirin, alprazolam and sertalone was very much improved.

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*The authors declare that they have no conflicts of interest.*

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