

SPET brain scan with ^{99m}Tc -ECD and CT, MRI in traumatic brain injury with chronic symptoms

To the Editor: Supporting the Editorial of P. Grammaticos et al, in *Hell J Nucl Med* 2007; 10 (2): 74-76 we would like to note the importance of single photon emission tomography (SPET) as a diagnostic tool of nuclear medicine, often better than other anatomical modalities. Anatomical imaging methods, especially computerized tomography (CT) and magnetic resonance imaging (MRI) are helpful in the diagnosis of acute traumatic brain injuries (ATBI) [1]; however they are not as efficient as SPET for the diagnosis of traumatic brain injury with chronic symptoms (TBICS) [2, 3]. We have compared brain perfusion SPET and CT or MRI findings in 92 patients with a history of traumatic brain injury with chronic symptoms (THICS) followed up for more than a year. Sixty-two of our patients had a history of a mild brain disease (Group A) while the remaining 30 cases had a history of moderate to severe brain disease (Group B). The age of our patients ranged between 19-66 y, with mean age 40.55 ± 11.96 y. The mean post-traumatic period was 1.22 ± 0.43 y. In order to compare sensitivity between two of the imaging modalities, we considered possible brain locations of patients' symptoms as follows: For personality disorders the frontal lobes [4]; for dizziness and vertigo the temporal lobes [5]; for disequilibrium, the cerebellum [6].

These patients presented with various neurological signs and symptoms especially due to hypofrontality and hypotemporalism. Brain perfusion SPET with technetium ^{99m}Tc -ethyl cysteinate dimer (^{99m}Tc -ECD) and CT or MRI were obtained in all patients with a maximal interval of one month between the two last procedures. The brain was divided into ten areas including five regions in each hemisphere.

Our findings showed that brain perfusion SPET revealed more lesions than CT and/or MRI (50% vs. 42.3%) out of a total of 920 brain regions, $P < 0.05$ (Table 1). In both groups (A, B) more abnormal findings were seen in the SPET scan vs the CT scan and/or MRI imaging. In 63 patients with both MRI and CT tests, 22 (34.9%) and 27(42.85%) cases demonstrated abnormal findings in CT and MRI respectively. The SPET showed a significantly higher number of perfusion abnormalities in patients with personality disorders, dizziness and vertigo and also disequilibrium compared with anatomical imaging in patients with these symptoms ($P < 0.05$; Table 2).

According to the present study, in a significant percentage of patients with ATBI, additional information could be provided by SPET, and this may result in changes in their clinical management. Also, SPET brain perfusion imaging in patients with ATBI especially when having symptoms of hypofrontality and hypotemporalism, is more sensitive than anatomical imaging in diagnosing TBICS.

Table 1. Comparison between proportional frequencies of abnormal findings on anatomical imaging and SPET.

Region		SPET	Anatomical imaging	P value
Frontal	right	15(16.3%)	7(7.6%)	<0.001
	left	11(11.9%)	6(6.5%)	<0.001
Temporal	right	15(16.3%)	10(9.2%)	<0.001
	left	21(22.8%)	10(9.2%)	<0.001
Parietal	right	14(15.2%)	12(13%)	<0.001
	left	17(18.4%)	11(11.9%)	<0.001
Occipital	right	8(8.6%)	2(2.1%)	<0.001
	left	5(5.4%)	4(4.3%)	<0.001
Cerebellum	right	7(7.6%)	5(5.4%)	<0.001
	left	3(3.2%)	1(1.08%)	<0.001

Table 2. Comparison of abnormal findings in patients with personality disorders, vertigo and dizziness and disequilibrium, using SPET versus anatomical imaging modalities.

Symptoms	Number of patients	Associated region	SPET	Anatomical imaging	P value
Personality disorders	57(61.9%)	Frontal lobe	22(38%)	13(22%)	<0.001
Vertigo and dizziness	51(55.4%)	Temporal lobe	29(56%)	21(41%)	<0.001
disequilibrium	17(18.4%)	Cerebellum	7(41%)	5(25%)	0.001

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