

# FDG PET-positive, MRI-negative Patients with Temporal Lobe Epilepsy: Etiology and Outcomes Compared to Patients with Hippocampal Sclerosis

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## RATIONALE

FDG PET hypometabolism is important for surgical planning in patients with temporal lobe epilepsy (TLE), but its significance remains unclear in patients who do not have evidence of Hippocampal Sclerosis (HS) on MRI. One group found that few such cases had HS on histopathological examination (1). Another series from our center, excluding patients with intracranial electrode monitoring, found that 62% of patients with negative MRI and a positive PET had HS on pathology (2). We have extended this study to examine etiology and surgical outcomes in a larger group of PET-positive, MRI-negative patients, including those who underwent intracranial electrode monitoring, and to compare features and historical outcomes in this group with those of patients who have HS apparent on MRI.

## METHODS

We queried the Thomas Jefferson University Surgical Epilepsy Database for patients who underwent anterior temporal lobectomy (ATL) from 1991-2009 and who had unilateral temporal PET hypometabolism with no epileptogenic lesion on MRI (PET+/MRI-). Patients with discordant EEG findings were excluded. We compared this group to the group of patients who underwent ATL and who had HS on MRI without discordant data. Surgical outcome was measured using a modification of the Engel scale.

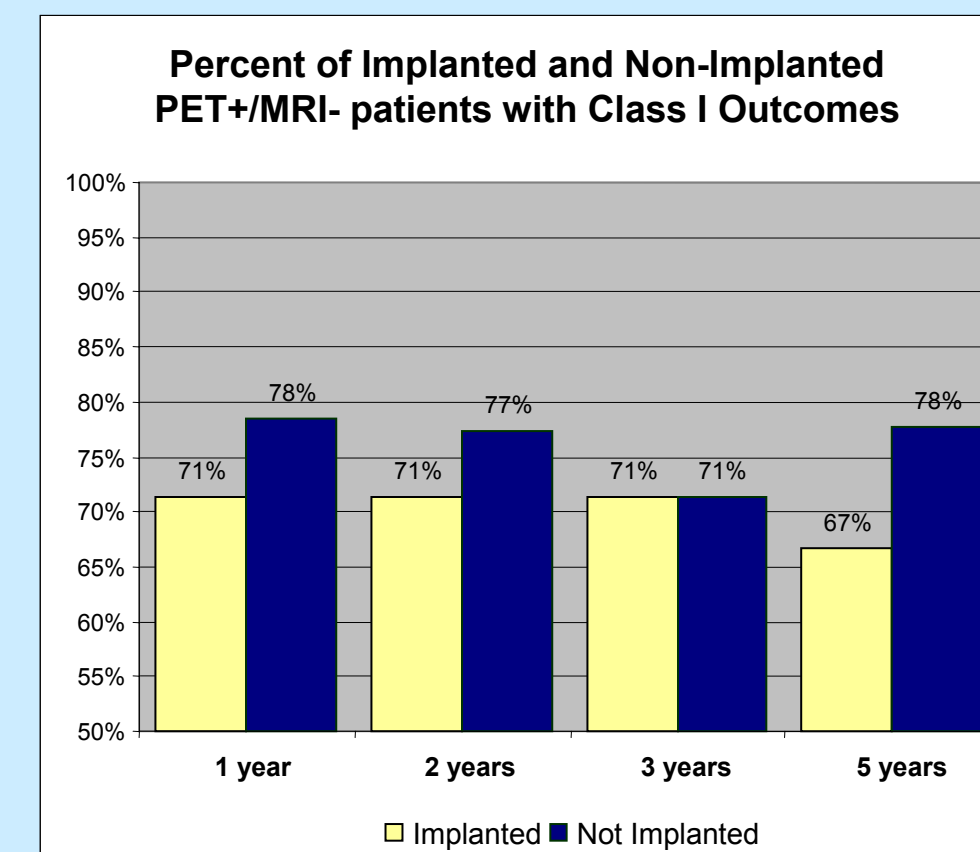
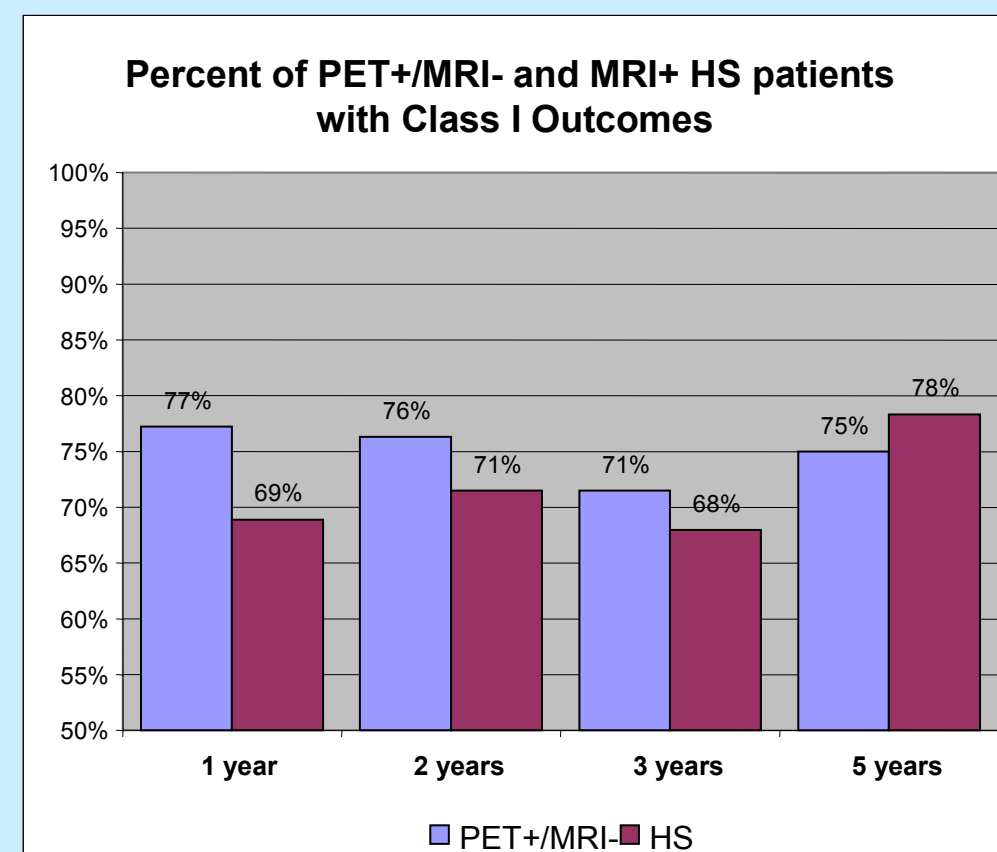
## RESULTS

There were 46 PET+/MRI- patients (of whom 38 had 2-year surgical outcome available) and 144 HS patients. Gender, surgical side and family history did not differ significantly between groups. Mean age at first seizure was higher in PET+/MRI- patients (19±13 vs. 14±13 years, Student's t test, p=0.029). Febrile convulsions were less frequent in PET+/MRI- patients, though this was not statistically significant (14/44 vs. 63/143, p=0.1648).

Summary of Demographic Data							
	PET+/MRI-	HS	p value†		PET+/MRI-	HS	
Total number of subjects	46	144					
Gender				Handedness			
	Men	19	64		0.735	Right	39
	Women	27	80		Left	122	
Age of onset (mean in years)				Family history of Epilepsy			
	Minimum	1.25	0		0.844	Positive	11
	Maximum	50	64			Negative	29
Seizure lateralization				History of Febrile Convulsions			
	Right	20	76		0.311	Nonresponders	6
	Left	26	68			Positive	14
					Negative	63	
					Nonresponders	80	
				Number of subjects who underwent intracranial monitoring			
					0.811	7	39

\*Student's t-test, two-tailed

†Fisher's exact test, two-tailed unless otherwise noted



Class I outcome percentages for the PET+/MRI- patients at 1, 2, 3 and 5 years post-surgery were 77%, 76%, 71% and 75%, while in the HS patients these numbers were 69%, 71%, 68% and 78%, respectively. A subcategory of 7 PET+/MRI- patients who had undergone intracranial monitoring was compared to 39 PET+/MRI- patients who went directly to ATL. Class I outcomes did not differ significantly (71%, 71%, 71%, 67% for those implanted, 78%, 77%, 71%, 78% for non-implanted patients at 1, 2, 3 and 5 years follow up, respectively).

Histopathologic HS was found in 21 out of 42 PET+/MRI- patients (50%); 17 had other pathologies and 4 were normal.

Histopathology		
	PET+/MRI- patients	HS patients
Normal pathology	4/42 (10%)	11/133 (8%)
Hippocampal Sclerosis & Heterotopia & Cortical dysplasia & Gliosis & Other pathology	21/42 (50%)	94/133 (71%)
	1	6
	0	2
	0	8
	3 <sup>A</sup>	3 <sup>C</sup>
Other pathologies:	17/42 (40%)	28/133 (21%)
Gliosis	15	21
Heterotopia & gliosis	1	2
Gliosis & other pathology	0	1 <sup>D</sup>
Other pathology	1 <sup>C</sup>	4 <sup>B</sup>

A – Two patient's reports available for review: (1) corporea amyloacea and reactive gliosis, (2) corporea amyloacea and hyalinized blood vessels  
 B – Two patient's reports available for review: (1) reactive gliosis with hemosiderin deposition, (2) chronic leptomenigeal and perivascular inflammation  
 C – pathology reports not available for review  
 D – patient's pathology report did not have clearly evident hippocampal tissue available, surrounding tissue demonstrated subpial gliosis and neuronal satellitosis

## CONCLUSIONS

PET-positive, MRI-negative TLE patients in our study had disease onset at a later age, and half had pathologic evidence of HS despite a normal MRI. Outcomes in these patients after ATL are as good as those in patients with MRI-positive HS whether or not they undergo intracranial monitoring, suggesting that implantation of these patients may be unnecessary in some cases.

## REFERENCES

- Carne R.P. et al. MRI-negative PET-positive temporal lobe epilepsy: A distinct surgically remediable syndrome. Brain. 2004;127:2276-85.
- Mintzer, S., Skidmore, C.T., Glosner, D., Sperling, M.R.. Etiology and outcome after temporal lobectomy in MRI-negative, PET-positive temporal lobe epilepsy. Neurology 66 March 2006 (Suppl 2), A89.