

# Normalización global y local en SPM

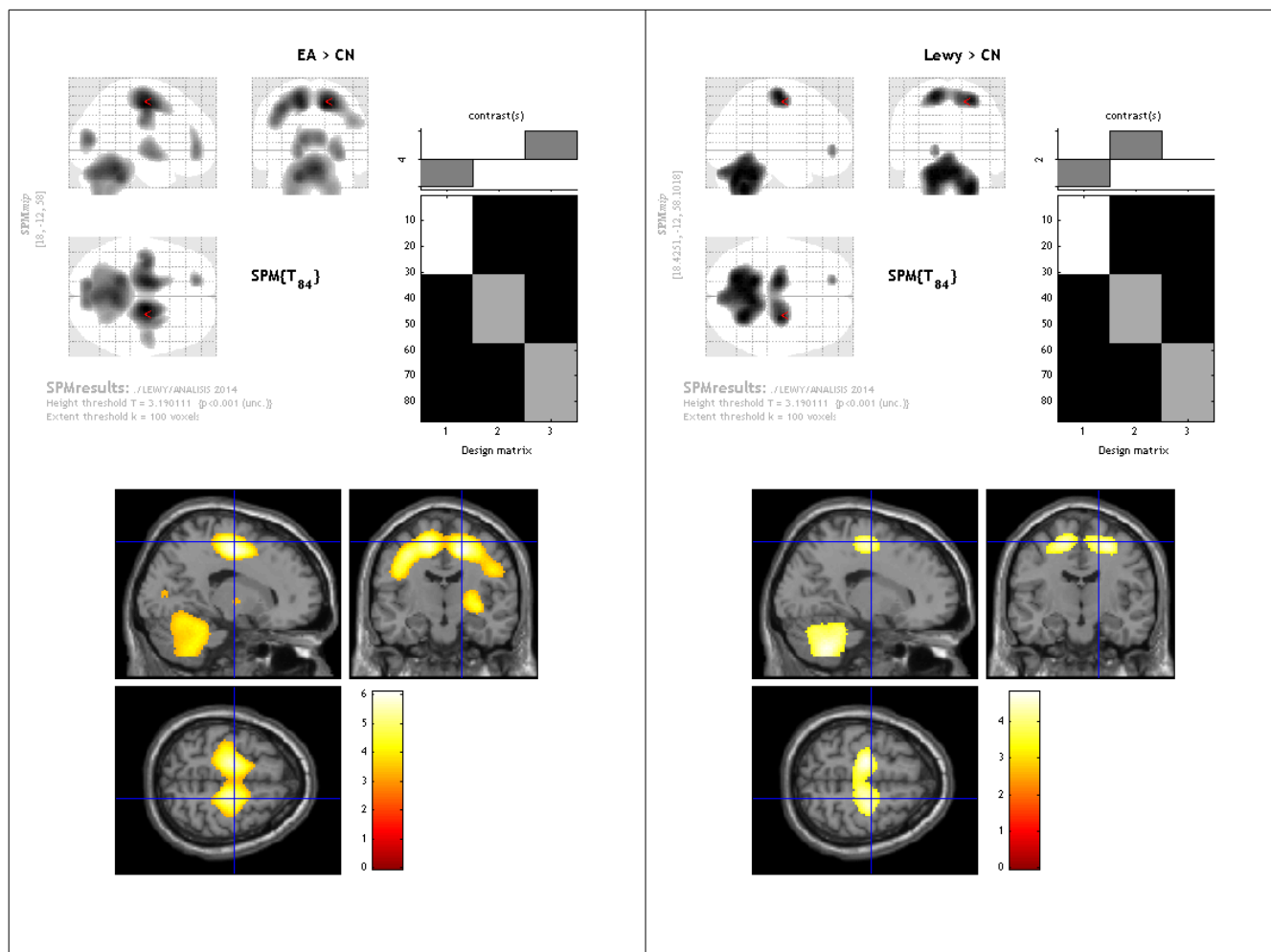
Rodolfo Ferrando, Alvaro Gómez

Basado en:

Yakushev, Igor, Alexander Hammers, Andreas Fellgiebel, Irene Schmidtman, Armin Scheurich, Hans-Georg Buchholz, Jürgen Peters, Peter Bartenstein, Klaus Lieb, and Mathias Schreckenberger. "SPM-based count normalization provides excellent discrimination of mild Alzheimer's disease and amnesic mild cognitive impairment from healthy aging." *Neuroimage* 44, no. 1 (2009): 43-50.

- 1) **Buscar las regiones en los pacientes que son significativamente más activas que el grupo de control normal. Todos los estudios se normalizan con GCM**

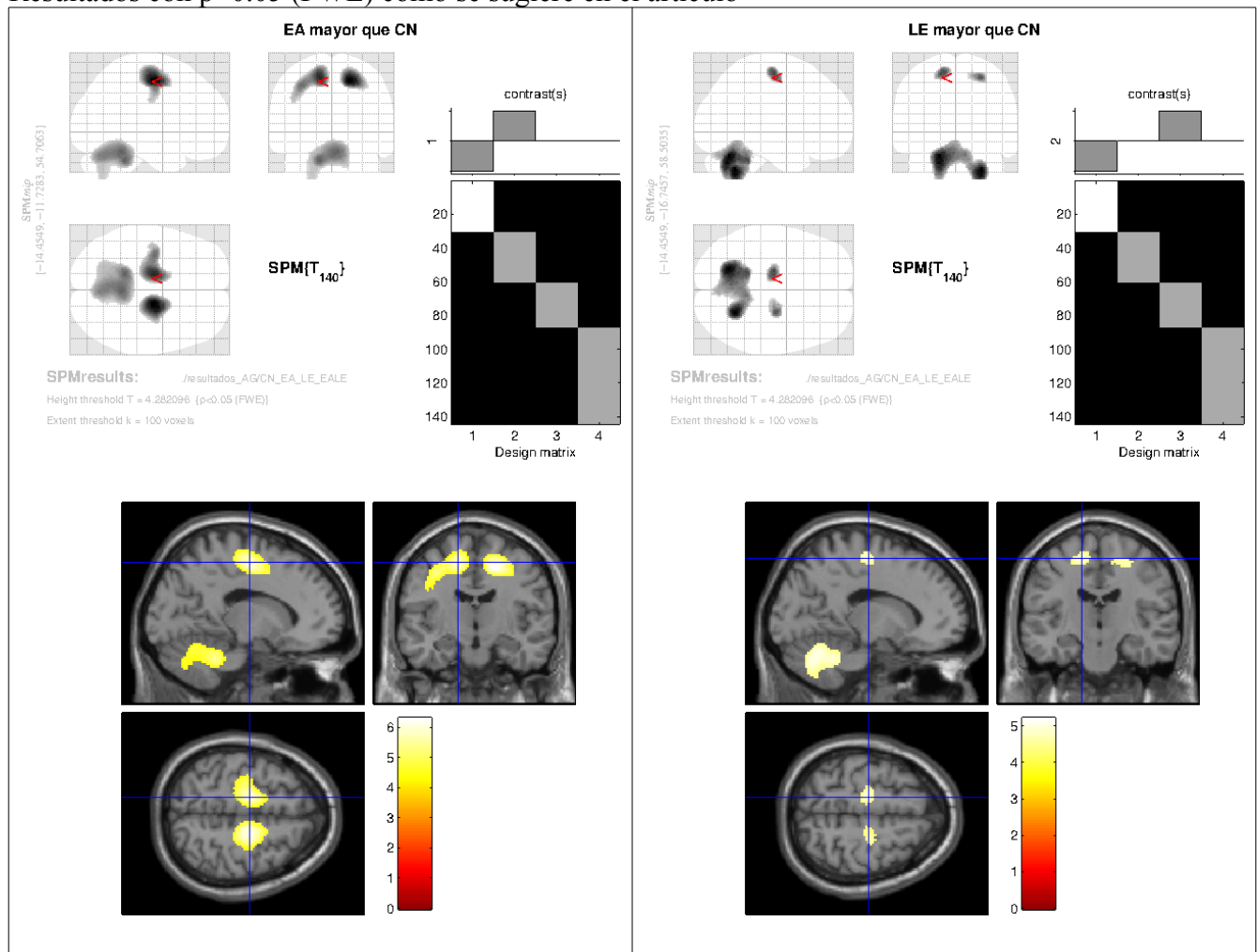
Resultados con  $p=0.001$  (uncorrected) (Figuras de RF)



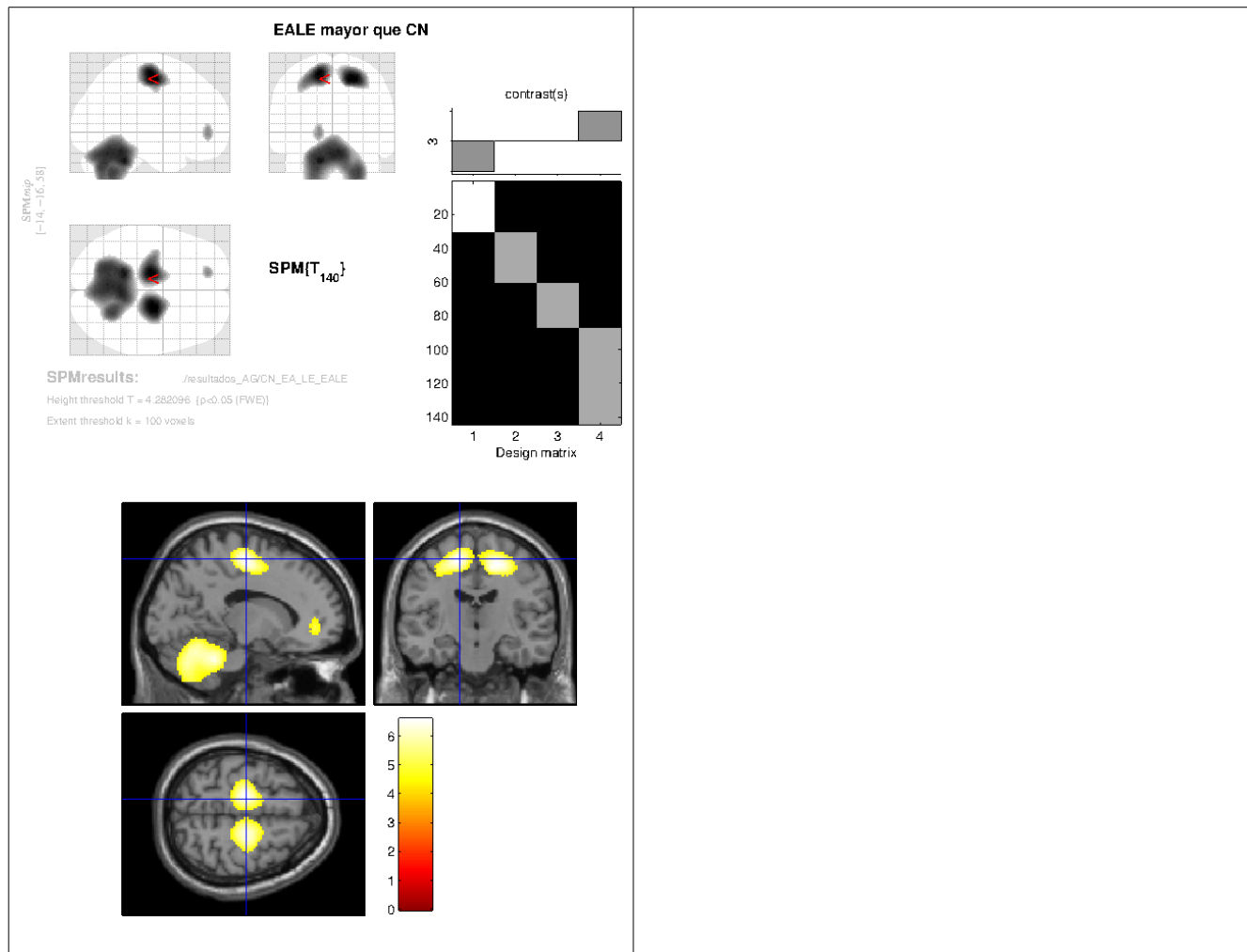
Seteos para el análisis:

- Thresholding mask: relative (valor por defecto 0.8)
- Explicit masking (brainmask.nii de SPM)
- Global calculation: Grand mean (GCM)
- Global normalisation, Over all grand mean scaling: No
- Normalisation: proportional

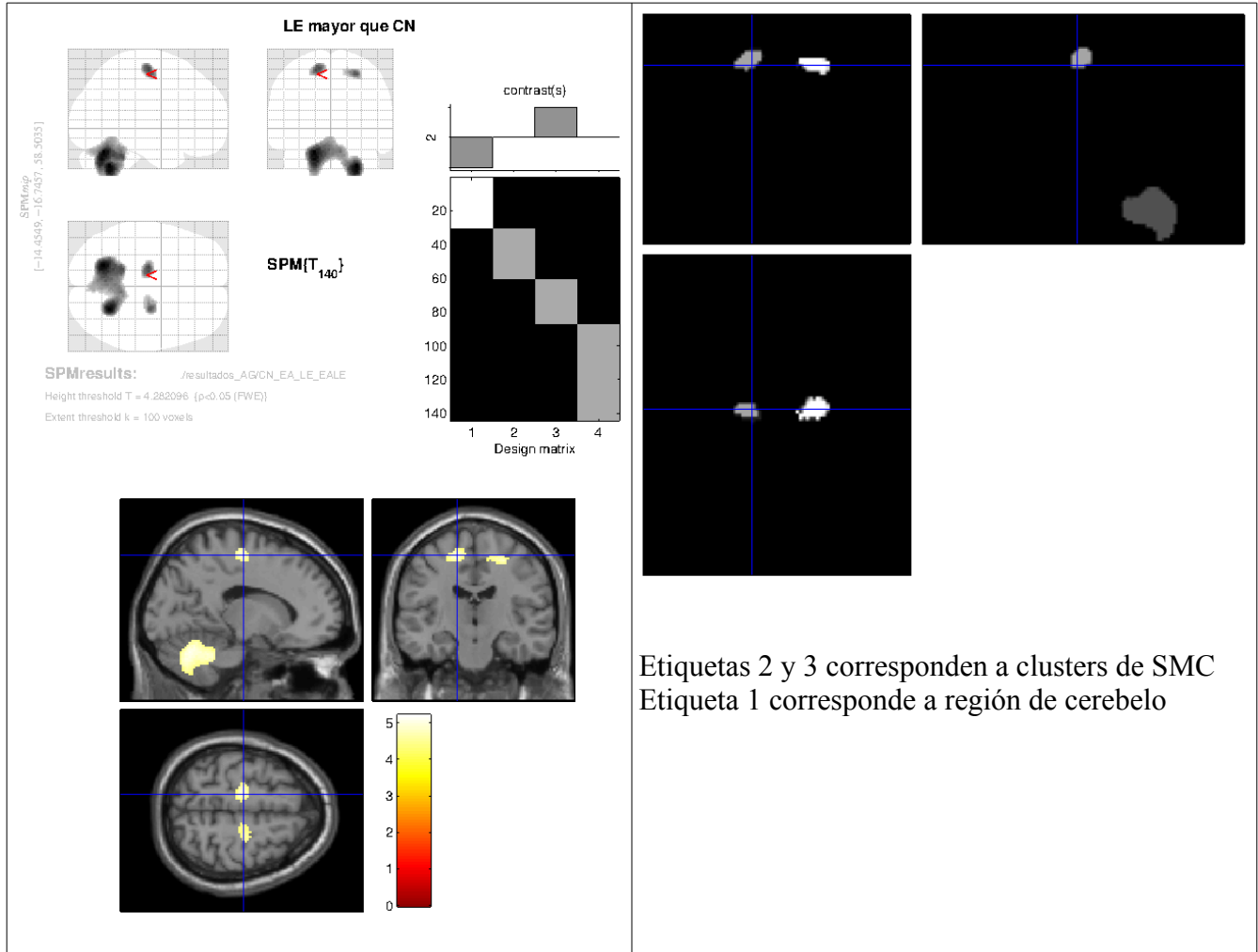
Resultados con  $p=0.05$  (FWE) como se sugiere en el artículo



Si se toman todos los pacientes en conjunto EA+Lewy



La región de SMC en “Lewy>CN” está contenida en las correspondientes de “EA>CN” y “EA\_Lewy>CN”.



Valores medios y std en clusters de SCM determinada en “Lewy>CN”

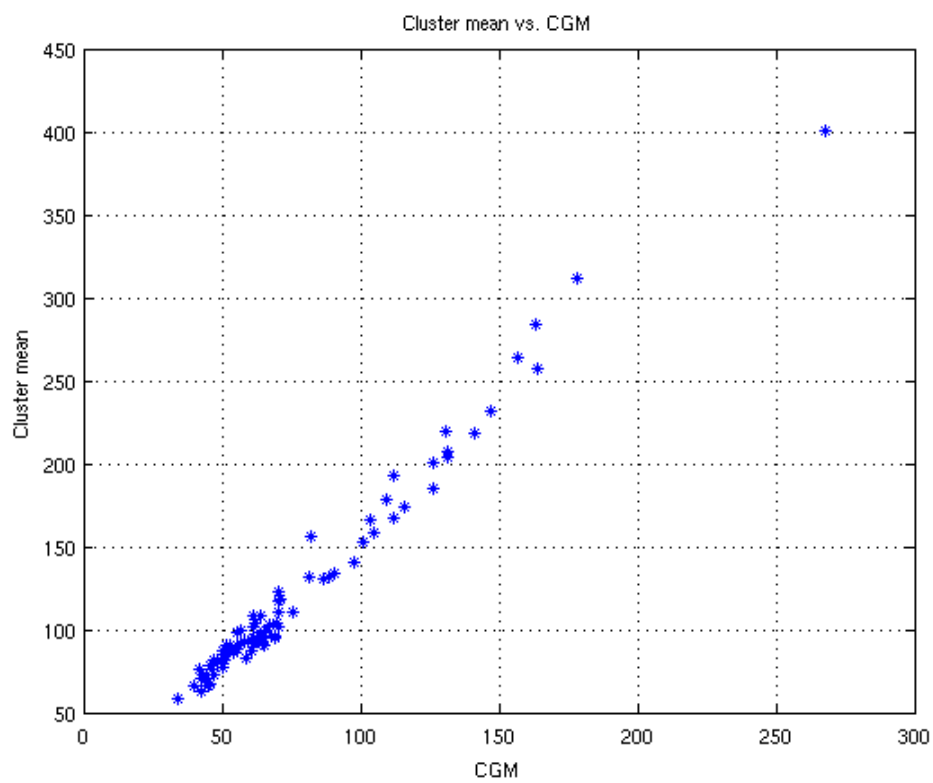
Paciente	CGM	SMC_mean	SMC_std
CN_01	126.524	184.9618	5.056
CN_02	65.3929	90.465	3.8953
CN_03	64.4591	91.8599	4.0989
CN_04	58.9254	82.5159	2.0369
CN_05	60.4569	87.7771	3.1857

CN_06	69.1693	95.0955	2.4173
CN_07	69.5837	103.5924	4.5601
CN_08	100.8358	152.7452	1.9997
CN_09	109.4	178.3121	5.5607
CN_10	126.3993	200.1083	8.6873
CN_11	90.8276	134.0955	4.4503
CN_12	81.2892	131.5924	3.8246
CN_13	65.6203	99.2229	3.7495
CN_14	88.631	132.0191	3.7408
CN_15	68.8841	95.879	3.8303
CN_16	112.0498	192.3631	5.4304
CN_17	116.1966	173.5032	4.4124
CN_18	64.8944	95.4713	4.5129
CN_19	267.7411	400.2994	10.3784
CN_20	86.8621	130.6051	4.5344
CN_21	61.1297	94.758	2.9686
CN_22	75.4069	110.121	2.6683
CN_23	104.9177	157.9045	3.3908
CN_24	62.7922	95.0892	3.1284
CN_25	61.8142	104.0191	3.8104
CN_26	65.1239	98.1592	3.7391
CN_27	67.1852	102.2484	3.5996
CN_28	54.3699	85.8662	2.8914
CN_29	63.1846	96.4904	3.1268
CN_30	55.1318	88.7261	2.7377
EA_01	46.3124	75.9172	3.8112
EA_02	57.949	93.0064	3.0393
EA_03	163.8673	257.2102	6.1738
EA_04	52.7537	90.0701	3.4809
EA_05	50.8778	82.1592	3.0749
EA_06	70.3498	122.3439	7.7532
EA_07	62.3743	94.2994	3.0956
EA_08	47.3822	81.4076	2.3505
EA_09	55.4298	87.8089	2.6388
EA_10	61.6332	108.1592	3.9019
EA_11	55.687	90.0064	1.8997
EA_12	61.0184	94.1529	3.0238

EA_13	55.236	88.3248	3.2644
EA_14	131.4065	206.7197	8.7184
EA_15	48.4075	80.5669	2.9161
EA_16	81.8994	156.0701	6.0406
EA_17	45.0419	66.1529	1.4104
EA_18	39.8825	65.9936	1.9398
EA_19	51.7873	90.7707	2.0905
EA_20	52.2186	86.7452	5.0775
EA_21	163.2731	283.7643	6.5761
EA_22	44.234	72.6561	2.3608
EA_23	49.7387	80.949	3.6247
EA_24	50.0541	84.5032	2.1798
EA_25	47.0305	73.1847	2.0344
EA_26	103.7498	166.1529	7.0102
EA_27	45.8452	77.7962	2.2382
EA_28	45.5887	66.9236	1.8931
EA_29	141.4252	218.2548	7.1053
EA_30	41.7329	76.0573	2.5776
LE_01	42.4155	70.9809	2.4507
LE_02	54.3379	85.5924	3.3204
LE_03	131.3073	203.6115	8.7131
LE_04	44.7877	70.2866	2.998
LE_05	56.8562	99.5032	3.6084
LE_06	178.167	311.7962	6.5777
LE_07	52.8274	90.6943	3.6456
LE_08	56.7615	92.0637	3.515
LE_09	42.8371	62.6051	1.5432
LE_10	50.8123	84.5669	3.6765
LE_11	55.5542	98.0828	4.6381
LE_12	112.1093	167.6369	4.4551
LE_13	70.3597	110.3057	4.9233
LE_14	50.0278	87.5924	4.1028
LE_15	61.1442	91.121	3.0871
LE_16	97.4117	140.4777	2.3523
LE_17	71.2293	118.8025	3.5867
LE_18	131.0227	219.121	6.3552
LE_19	43.3549	72.3312	3.3462

LE_20	34.2982	57.8726	1.6476
LE_21	70.3226	117.0446	4.5592
LE_22	64.2141	108.0701	4.1666
LE_23	146.9206	232.1529	5.852
LE_24	50.0627	77.3758	3.2233
LE_25	70.6154	101.6561	3.8808
LE_26	156.5978	263.8217	4.9788
LE_27	61.3264	101.7389	3.8165

# La relación entre estos valores de normalización

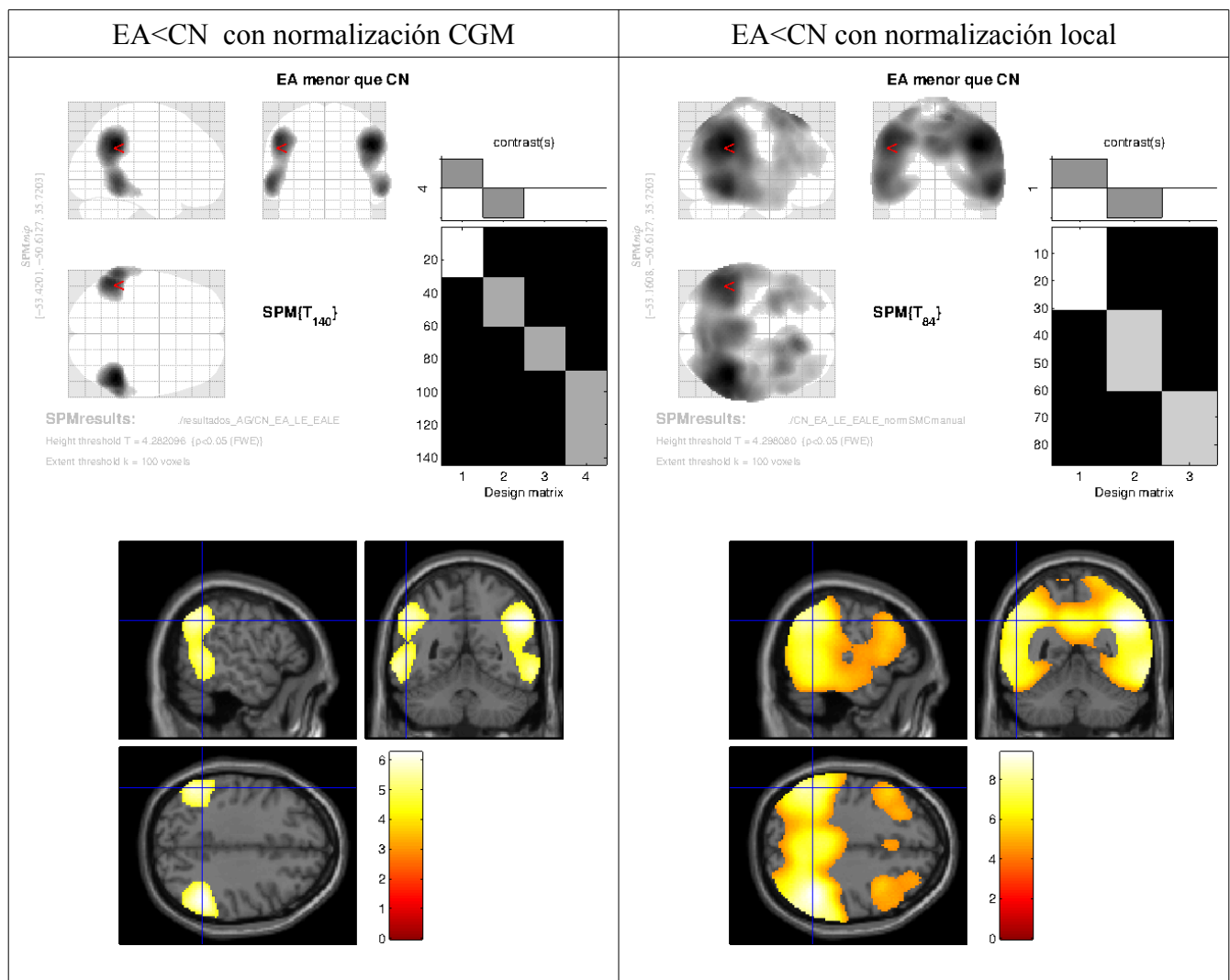




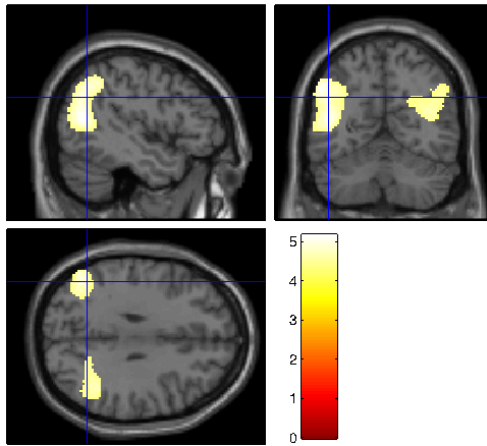
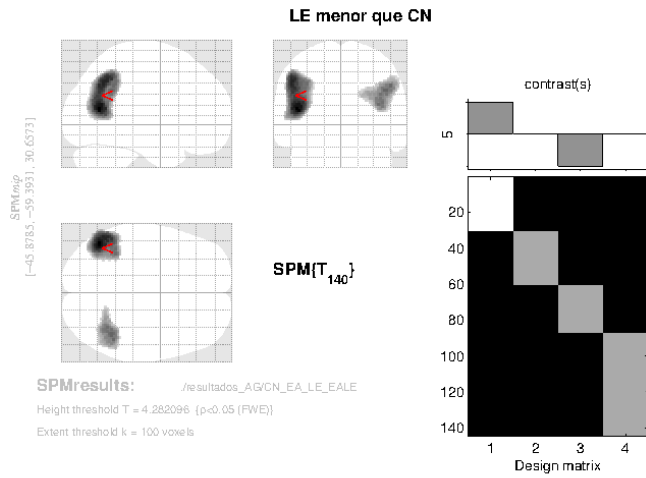
## 2) Comparación de resultados de zonas de decrecimiento de actividad con normalización CGM y normalización local por actividad de cluster

Seteos para el análisis:

- Se trabaja sobre los estudios previamente normalizados, o sea, divididos por los valores de la tabla (cluster\_mean)
- Thresholding mask: None
- Explicit masking (mask del análisis anterior (LE>CN))
- Global calculation: Omit
- Global normalisation, Over all grand mean scaling: No
- Normalisation: None



### Lewy<CN con normalización CGM



### Lewy<CN con normalización local

