

XVII CURSO NACIONAL DE NEURORRADIOLOGÍA

Neurorradiología en la Patología Vascular Cerebral

EDICIÓN VIRTUAL

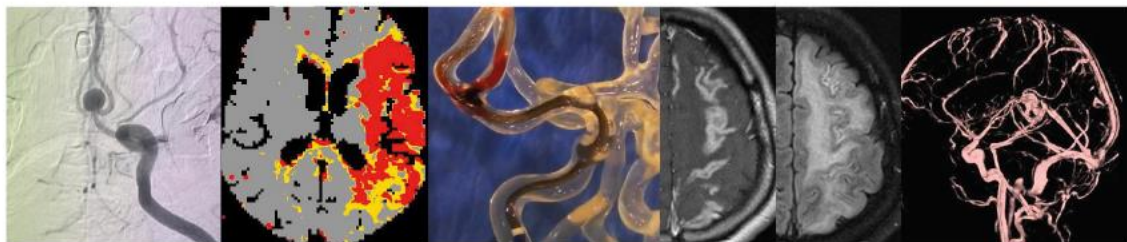
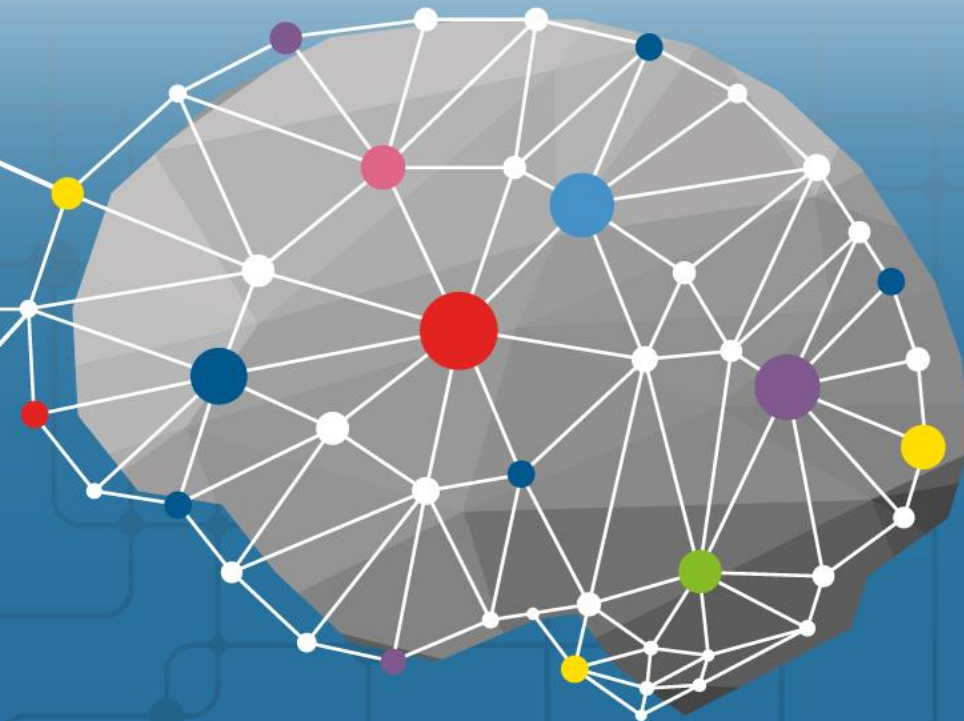
22-26 febrero 2021

**Epidemiología y fisiopatología del ictus
isquémico cerebral.**

José Vivancos Mora

Centro de Ictus y Servicio de Neurología

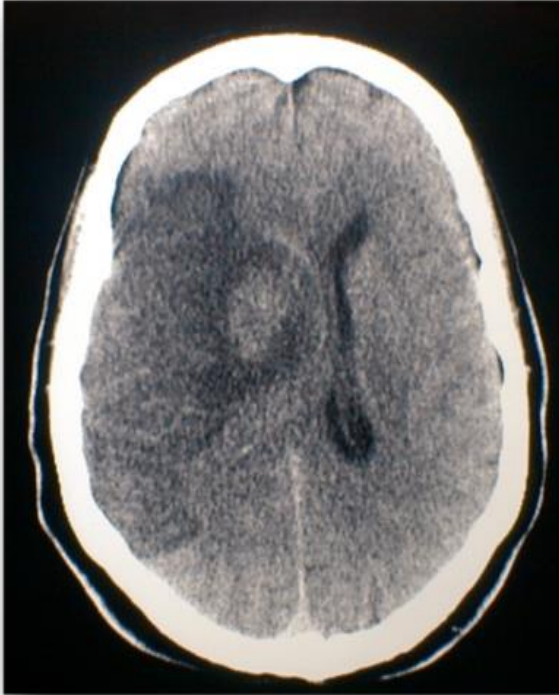
Hospital Universitario de La Princesa



El Ictus en cifras. Epidemiología en España

- 200 casos/100.000 habitantes
- 80.000 ictus al año
- 1 de cada 6 españoles sufrirá un ictus
- Primera causa de mortalidad en mujer
- 30.000 muertes al año
- 1/3 presentan secuelas graves: Dependencia
- Primera causa de discapacidad en el adulto
- Coste anual de 30.000 euros/año





85%



15%



EL ICTUS EN ESPAÑA:

INCIDENCIA: 187 / 100.000 hab.

PREVALENCIA:

- 40,1 / 1000 hab. (área rural)
- 71,0 / 1000 hab. (área urbana)
- 6% en mayores de 65 años

Cerebrovascular Diseases

Original Paper

Cerebrovasc Dis 2012;34:272-281
DOI: [10.1159/000342652](https://doi.org/10.1159/000342652)

Received: February 6, 2012
Accepted: August 13, 2012
Published online: October 20, 2012

Stroke and Transient Ischemic Attack Incidence Rate in Spain: The IBERICTUS Study

Jaime Díaz-Guzmán^a Jose-A. Egido^b Rafael Gabriel-Sánchez^d
Gloria Barberá-Comes^f Blanca Fuentes-Gimeno^e Cristina Fernández-Pérez^c
on behalf of the IBERICTUS Study Investigators of the Stroke Project of the
Spanish Cerebrovascular Diseases Study Group

Cerebrovasc Dis 2012; 34: 272

INCIDENCE OF STROKE IN SPAIN: THE IBERICTUS PROJECT

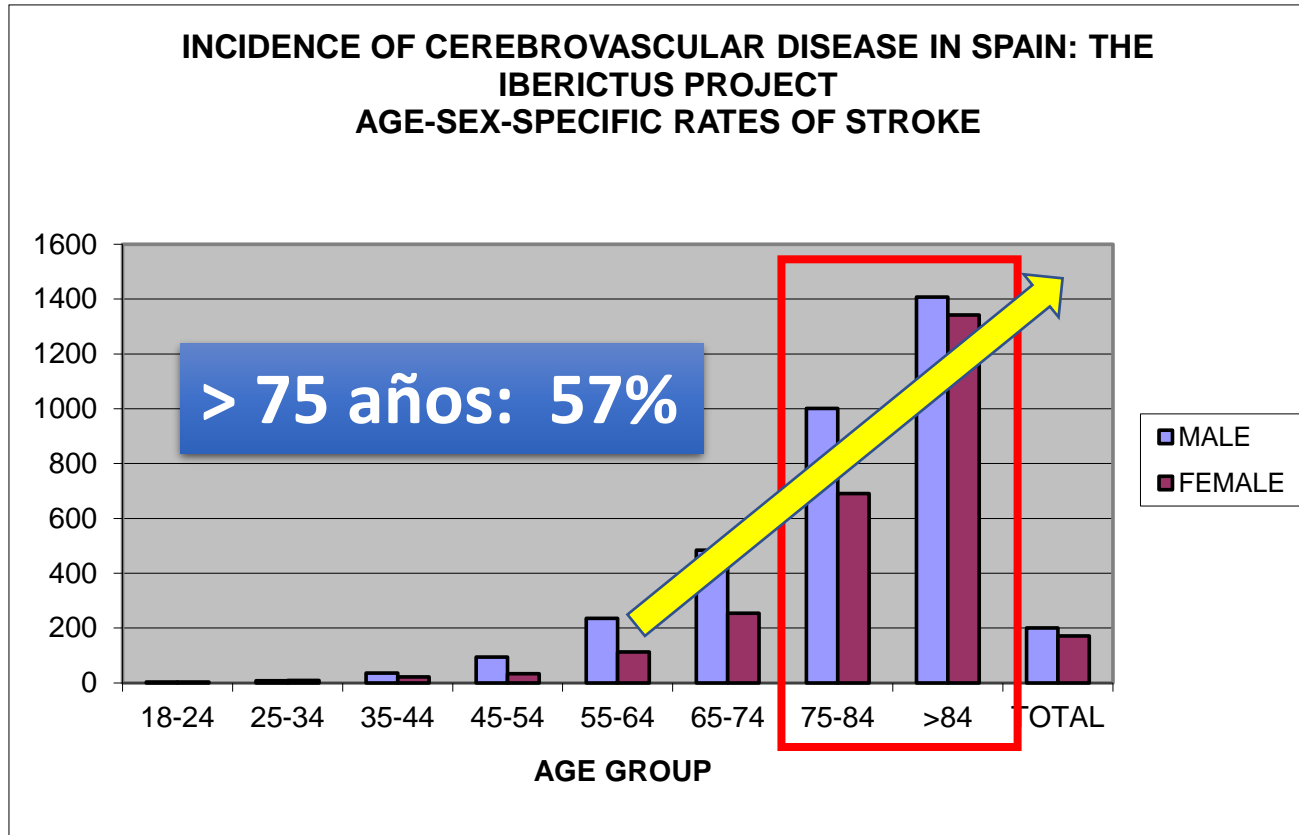


PREVALENCIA por 1.000 habitantes

- ✓ Migraña 71.2 (65.5 – 76.8)
- ✓ Ictus 46.1 (35.5 – 58.9)
- ✓ Demencia 19.9 (14.3 – 27.4)
- ✓ Epilepsia 10.3 (8.5 – 13.0)
- ✓ Parkinson 4.7 (2.2 – 8.9)

Neurological Disorders: Public Health Challenges, 2011

71.780 casos / año en > 18 años



Cerebrovascular Diseases

Original Paper

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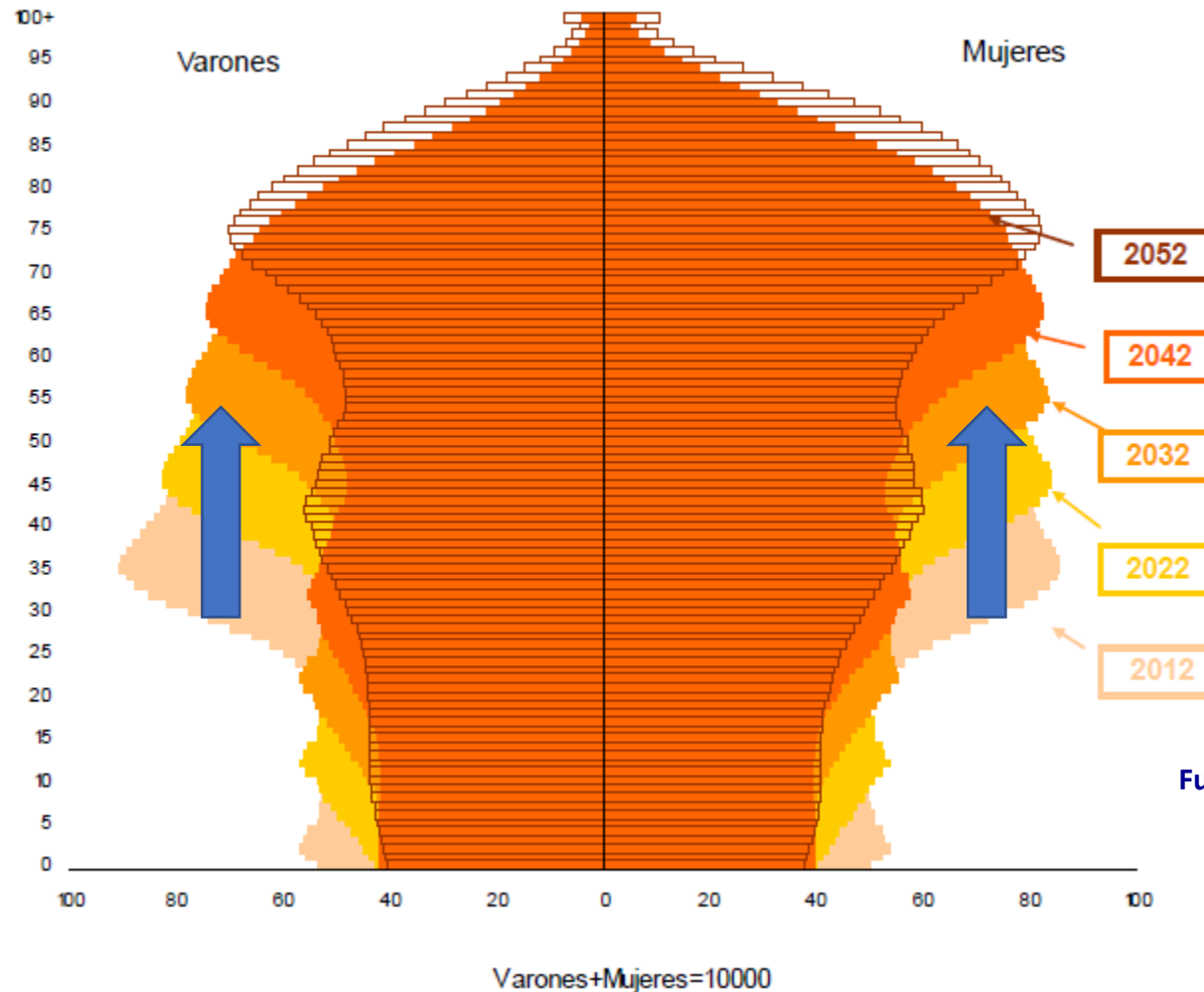
Stroke and Transient Ischemic Attack Incidence Rate in Spain: The IBERICTUS Study

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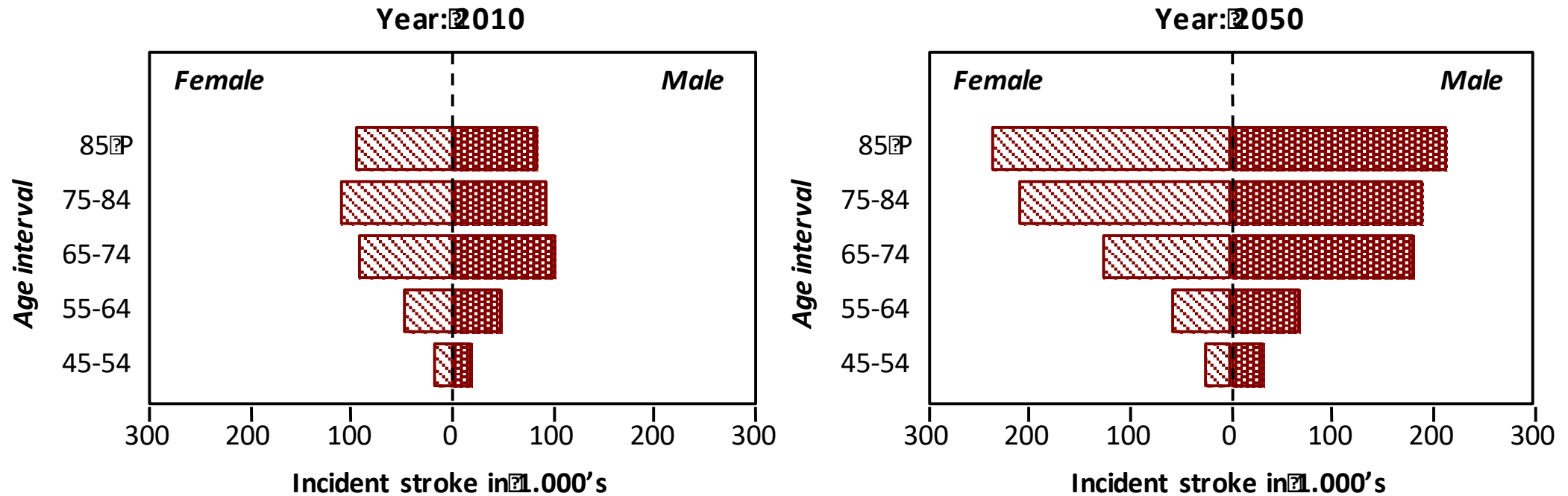
Predicciones demográficas para la población española

Pirámides de población de España

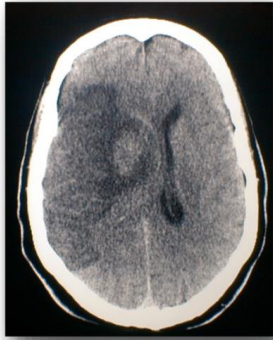


Fuente: INE 2018. www.ine.es

Projection of the distribution of incident stroke



Howard G, Goff DC. *Population shifts and the future of stroke: forecasts of the future burden of stroke.* Ann N Y Acad Sci 2012; 1268:14-20.



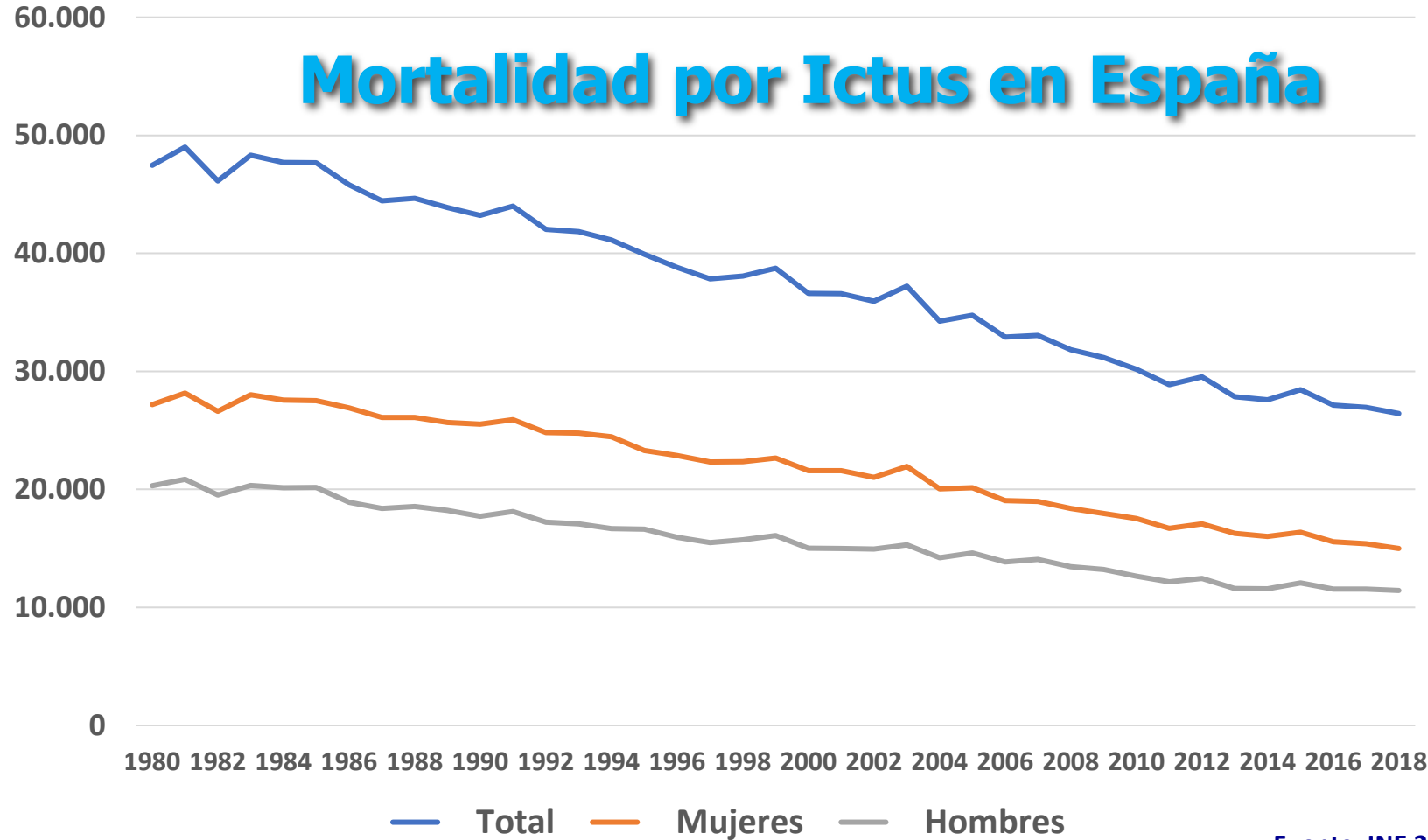
Mortalidad por Ictus en España



NÚMERO DE DEFUNCIONES SEGÚN LAS CAUSAS DE MUERTE MÁS FRECUENTES. 2017.

	TOTAL	HOMBRES	MUJERES
Total enfermedades	424.523	214.236	210.287
Enfermedades isquémicas del corazón	32.325	19.132	13.193
Enfermedades cerebrovasculares	26.937	11.555	15.382
Cáncer bronquios y pulmón	22.089	17.241	4.848
Demencia	21.001	6.977	14.024

Fuente: INE 2019. www.ine.es



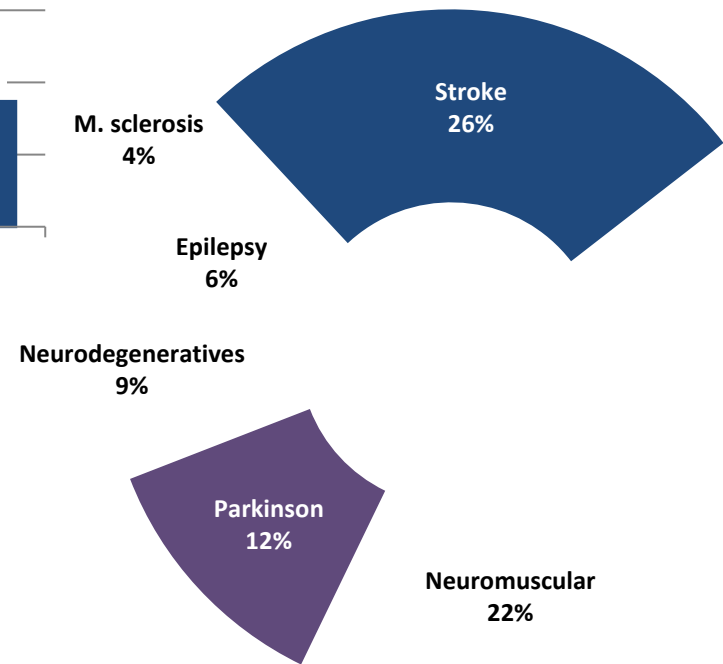
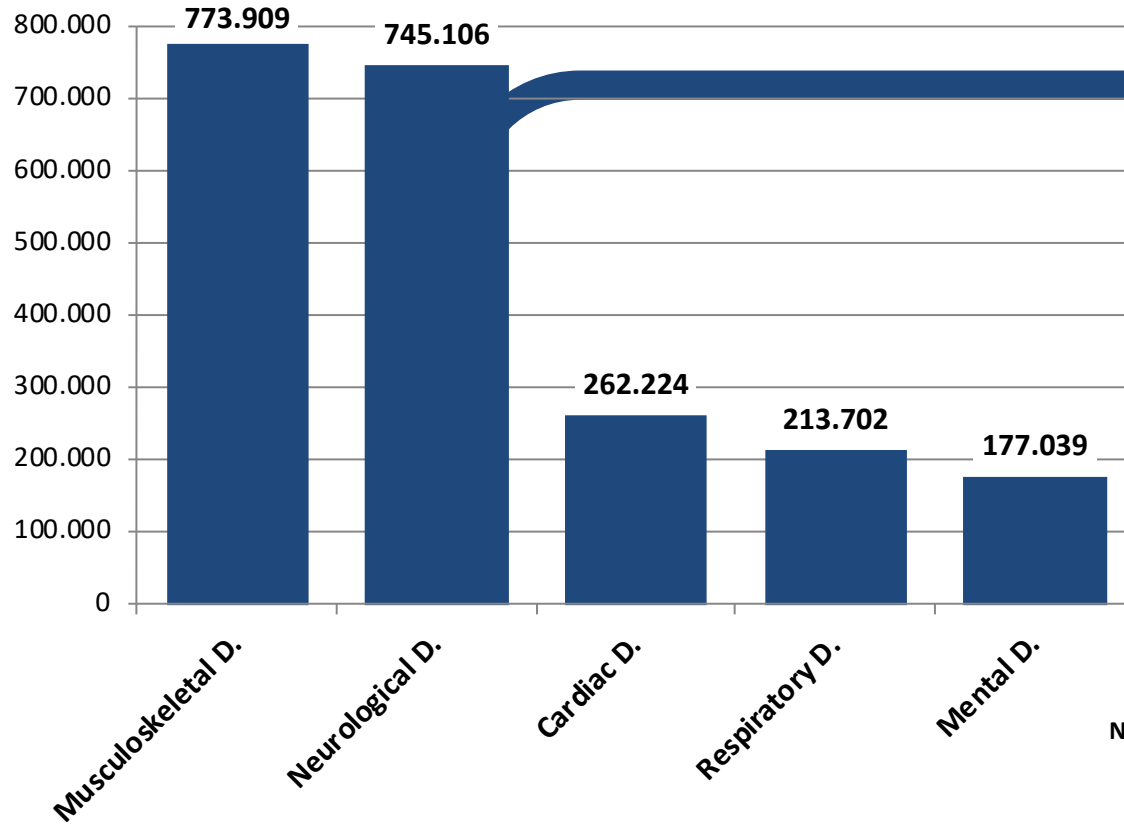
Fuente: INE 2021. www.ine.es

Previsión de cambios en las causas de mortalidad mundial

Figure S4: Change in rank order of deaths for the 20 leading causes, world, 2002-2030

2002				2030		
Disease or injury	% total deaths	Rank		Rank	% total deaths	Disease or injury
Ischaemic heart disease	12.6%	1	→	1	13.1%	Ischaemic heart disease
Cerebrovascular disease	9.7%	2	→	2	10.3%	Cerebrovascular disease
Lower respiratory infections	6.9%	3	→	3	8.7%	HIV/AIDS
HIV/AIDS	4.8%	4	→	4	7.9%	Chronic obstructive pulmonary disease
Chronic obstructive pulmonary disease	4.8%	5	→	5	3.5%	Lower respiratory infections
Perinatal conditions	4.3%	6	→	6	3.1%	Diabetes mellitus
Diarrhoeal diseases	3.3%	7	→	7	3.0%	Trachea, bronchus, lung cancers
Tuberculosis	2.7%	8	→	8	2.8%	Road traffic accidents
Trachea, bronchus, lung cancers	2.2%	9	→	9	2.4%	Tuberculosis
Road traffic accidents	2.1%	10	→	10	2.1%	Perinatal conditions
Diabetes mellitus	1.7%	11	→	11	1.8%	Stomach cancer
Malaria	1.6%	12	→	12	1.8%	Hypertensive heart disease
Hypertensive heart disease	1.6%	13	→	13	1.5%	Self-inflicted injuries
Self-inflicted injuries	1.5%	14	→	14	1.3%	Nephritis and nephrosis
Stomach cancer	1.5%	15	→	15	1.3%	Liver cancer
Cirrhosis of the liver	1.4%	16	→	16	1.2%	Diarrhoeal diseases
Nephritis and nephrosis	1.2%	17	→	17	1.2%	Colon and rectum cancers
Colon and rectum cancers	1.1%	18	→	18	1.1%	Cirrhosis of the liver
Liver cancer	1.1%	19	→	19	1.1%	Violence
Measles	1.1%	20	→	20	1.0%	Oesophagus cancer
Violence	1.0%	21	→	23	0.80%	Malaria
Oesophagus cancer	0.8%	24	→	42	0.40%	Measles

DISABILITY DISEASES IN SPAIN (2005)



INE 2009



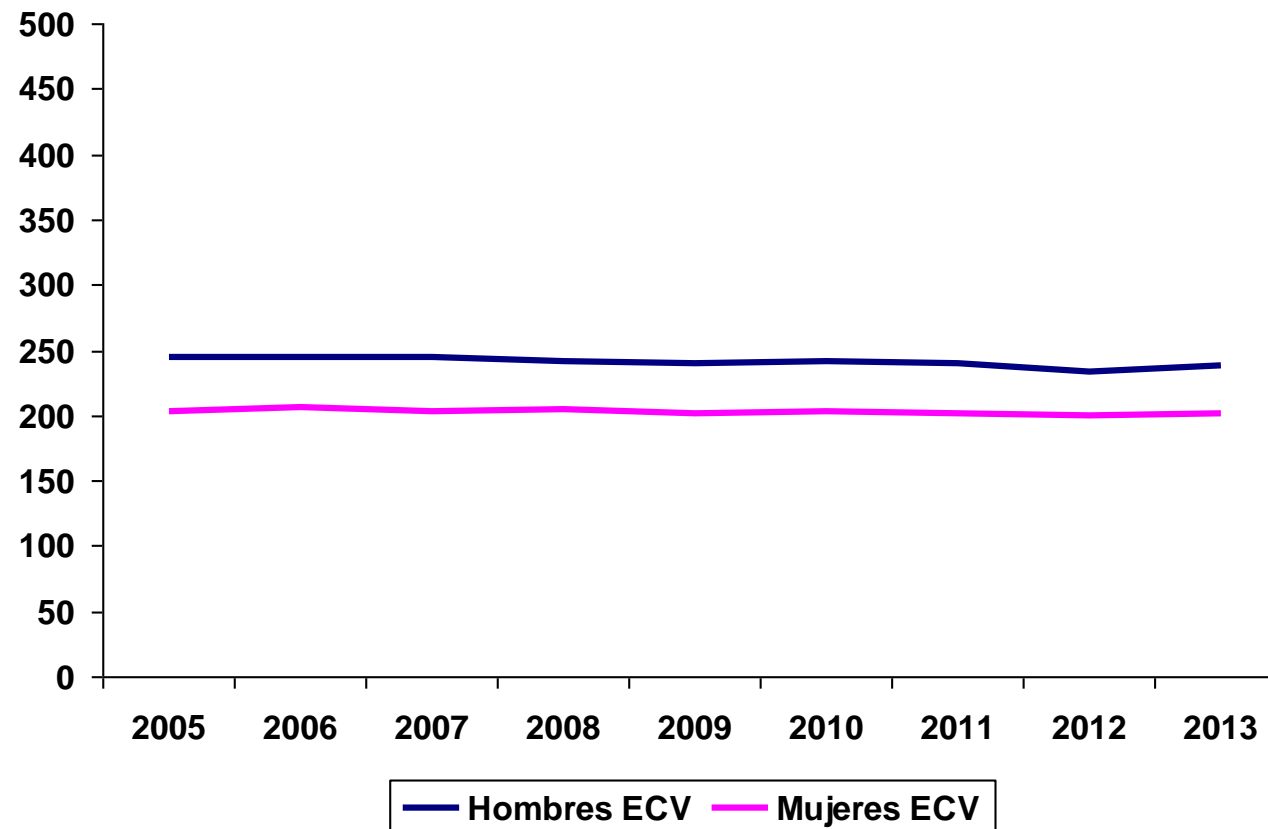
CONSECUENCIAS DEL ICTUS. Discapacidad y Dependencia

- Hemiplejia: 20%
- Imposibilidad para caminar: 20%
- Afasia: 15%
- Deterioro cognitivo: 30%
- Alteraciones psíquicas: 35%



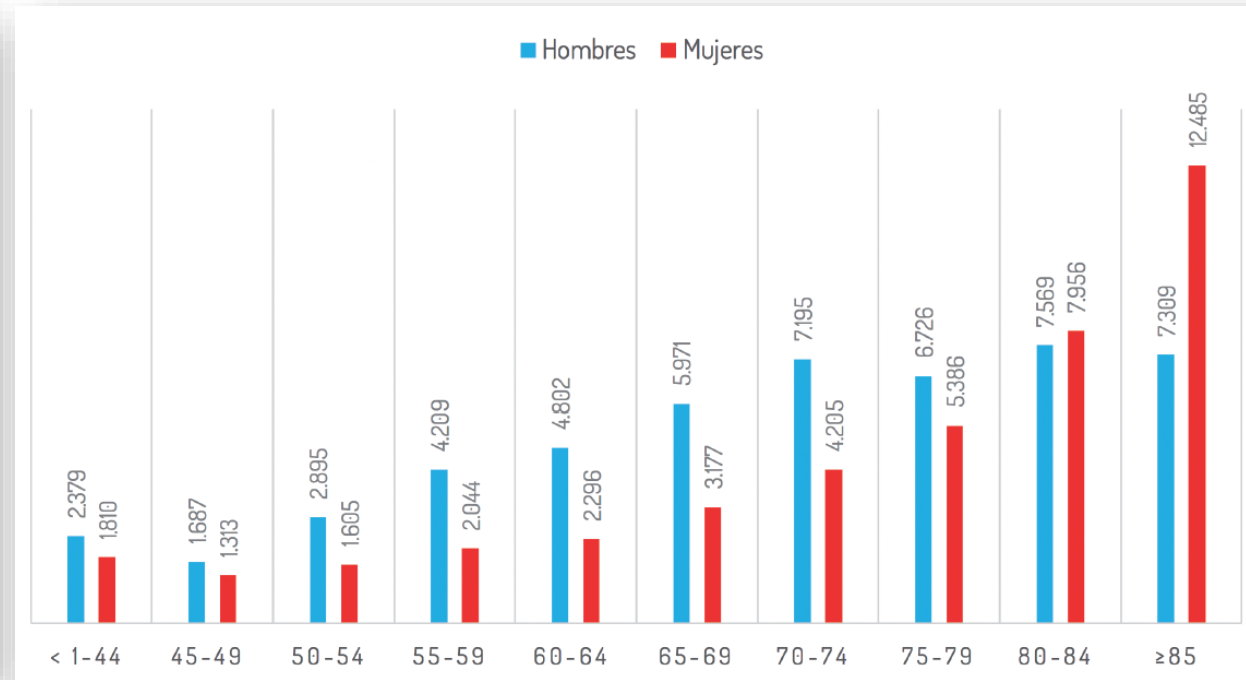
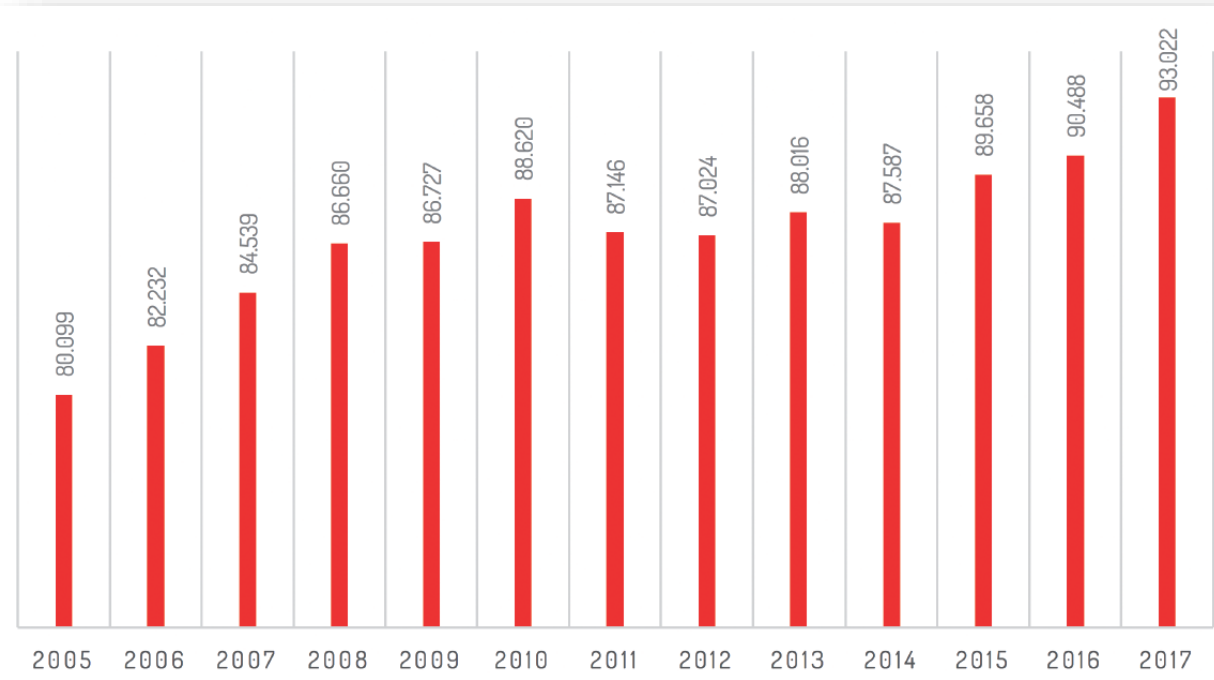
Trends in stroke hospital admission morbidity rates

European population age & sex adjusted (/100.000) 2005-2013



INE 2015; Stroke Hospital admission morbidity Survey.

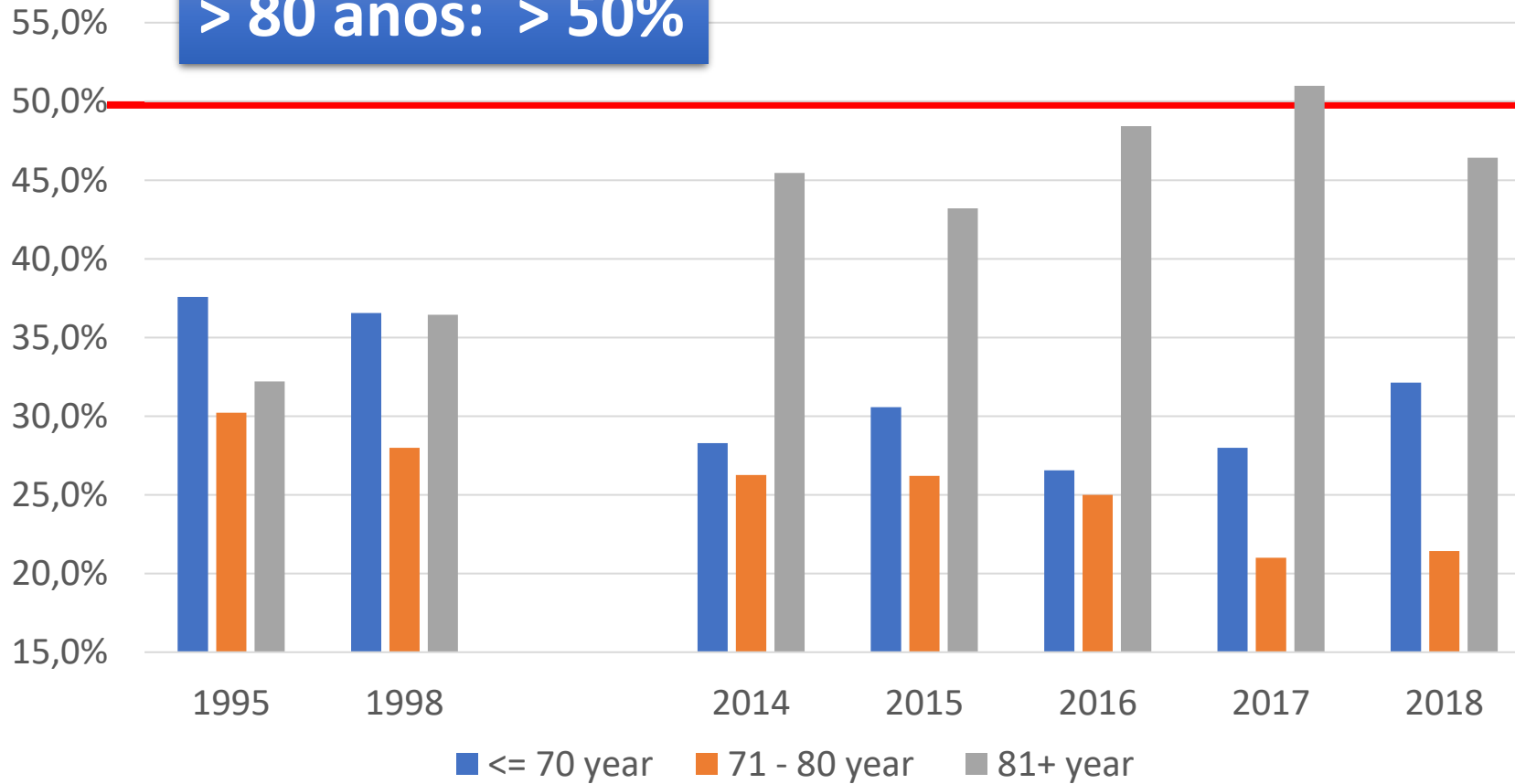
Altas Hospitalarias por Ictus 2005-2017



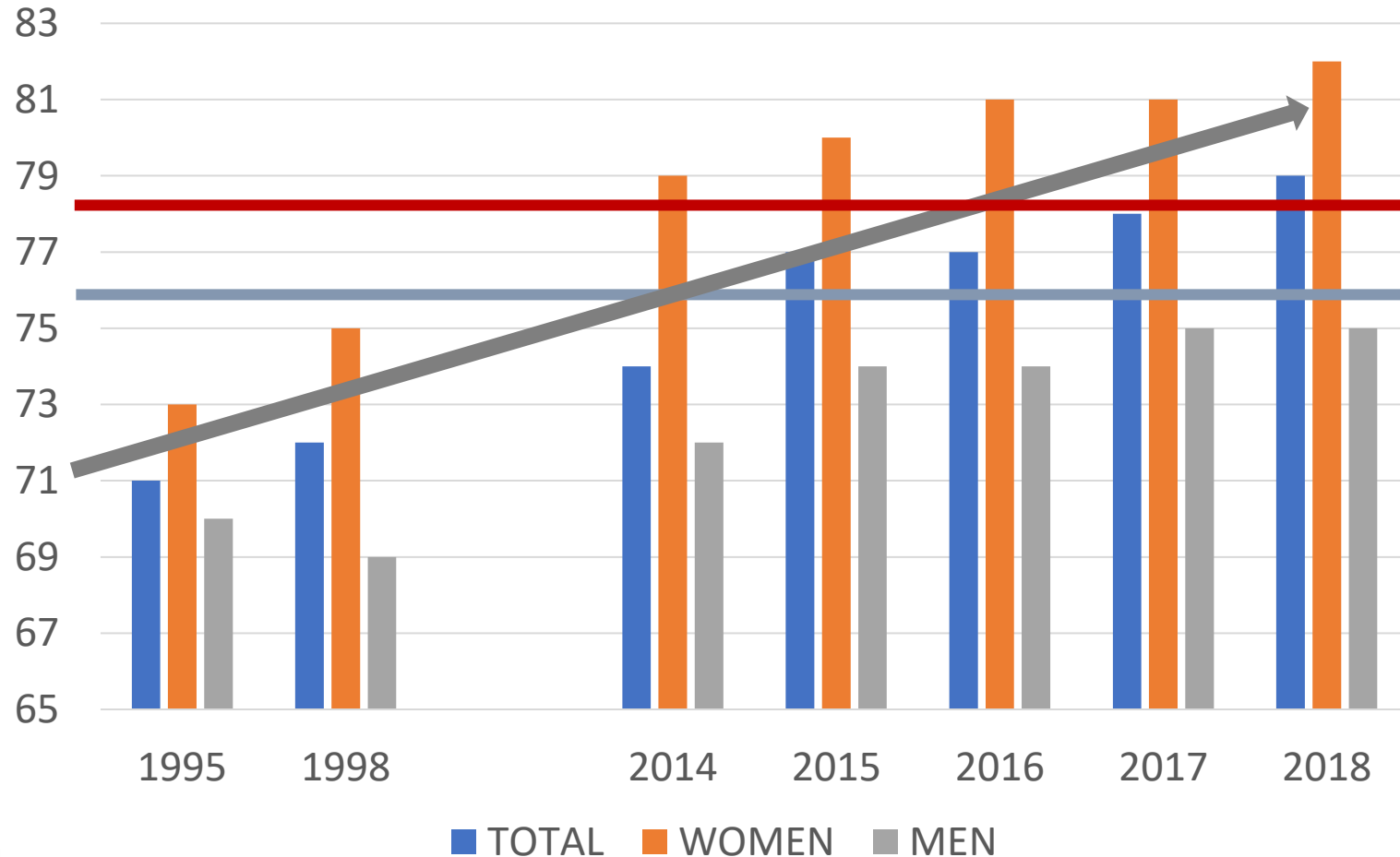
Fuente: Ministerio de Sanidad, Consumo y Bienestar Social. Registro de Actividad de Atención Especializada

Ingresos en la Unidad de Ictus por Rango de edad

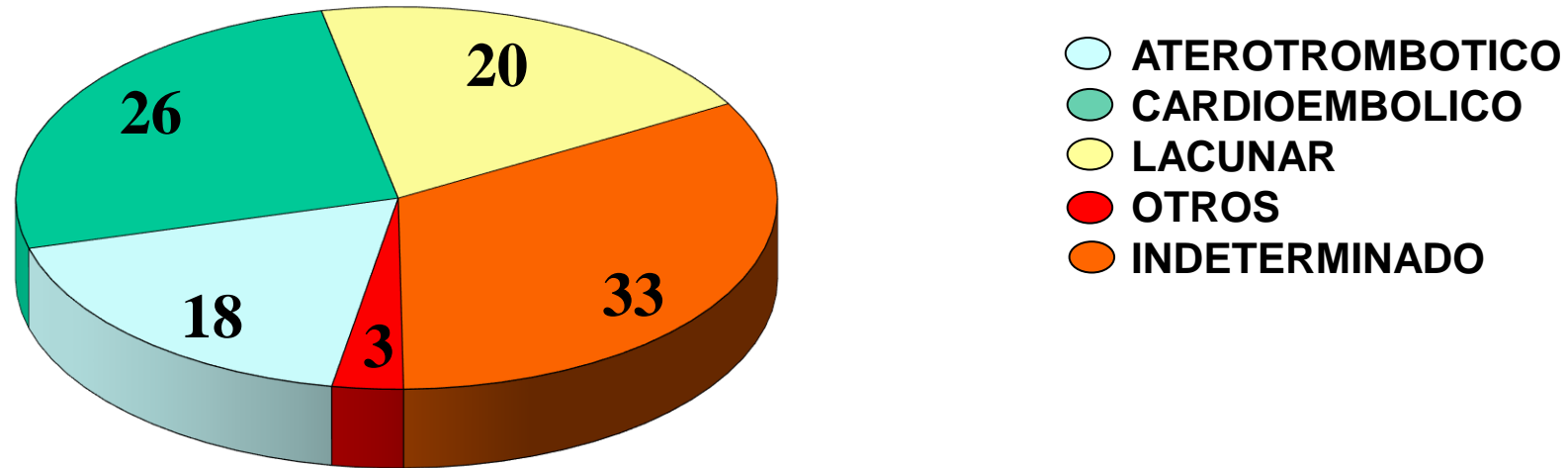
> 80 años: > 50%



Ingresos en la Unidad de Ictus del HUP por mediana de edad



Sutipos de Ictus isquémico



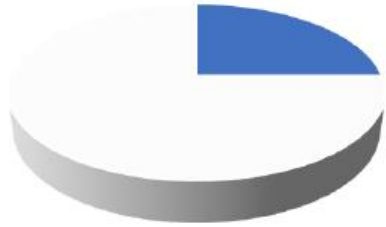
N = 1243

BADISEN 1998



Ictus isquémico

25%



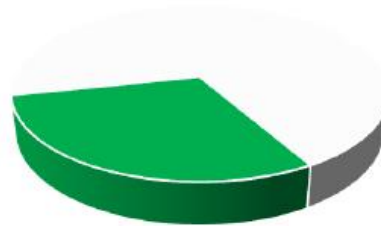
Aterosclerosis de gran vaso

20%



Cardioembólico

25%



Lacunar

5%

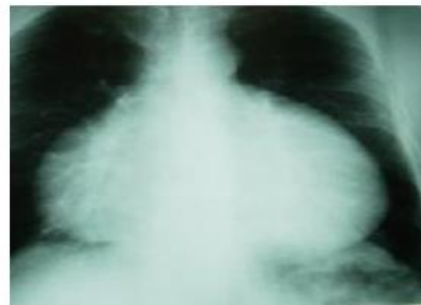
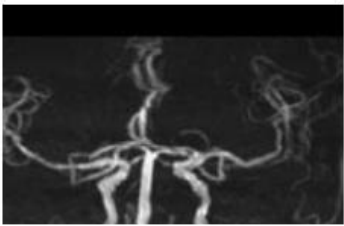


Causas raras

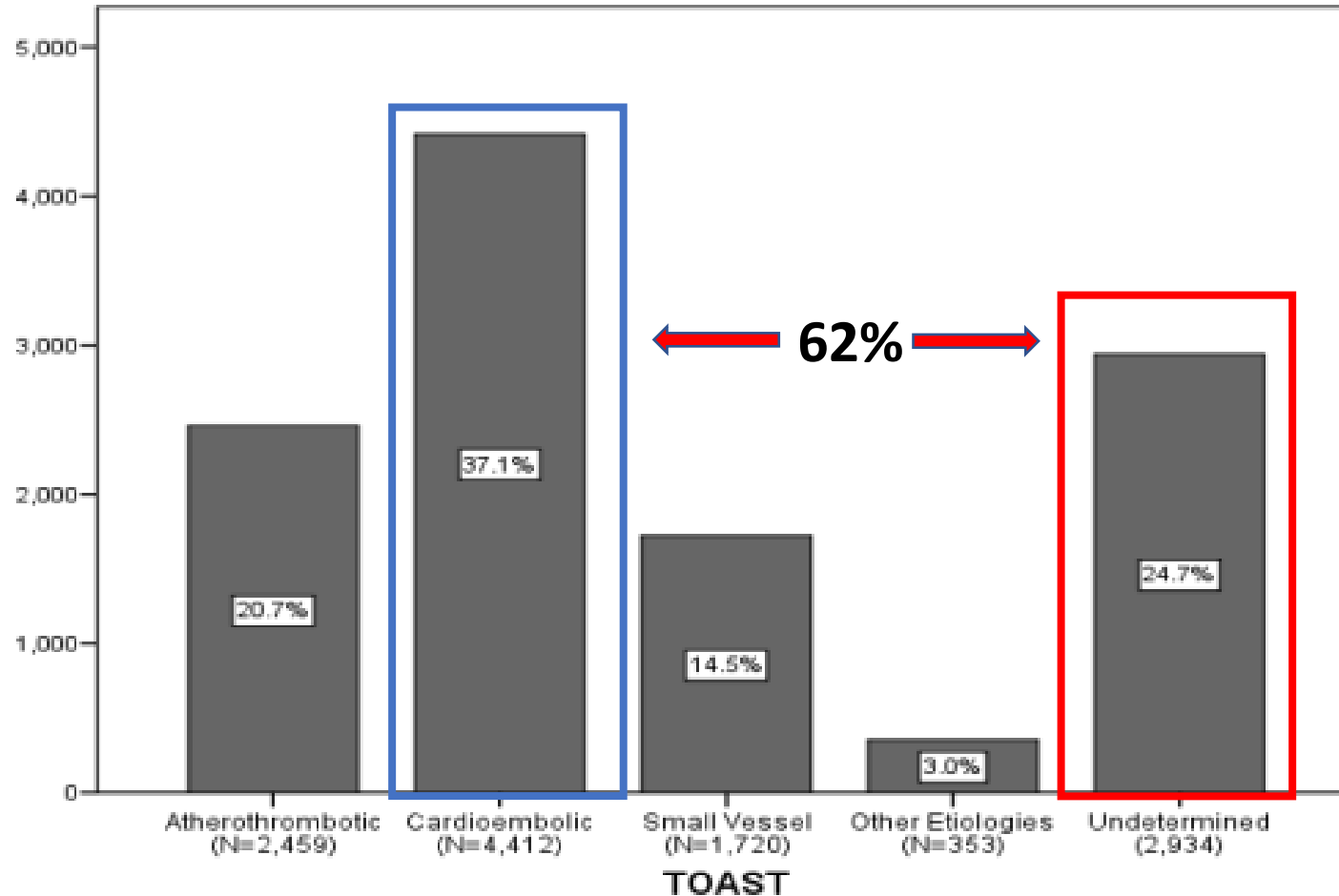
25%



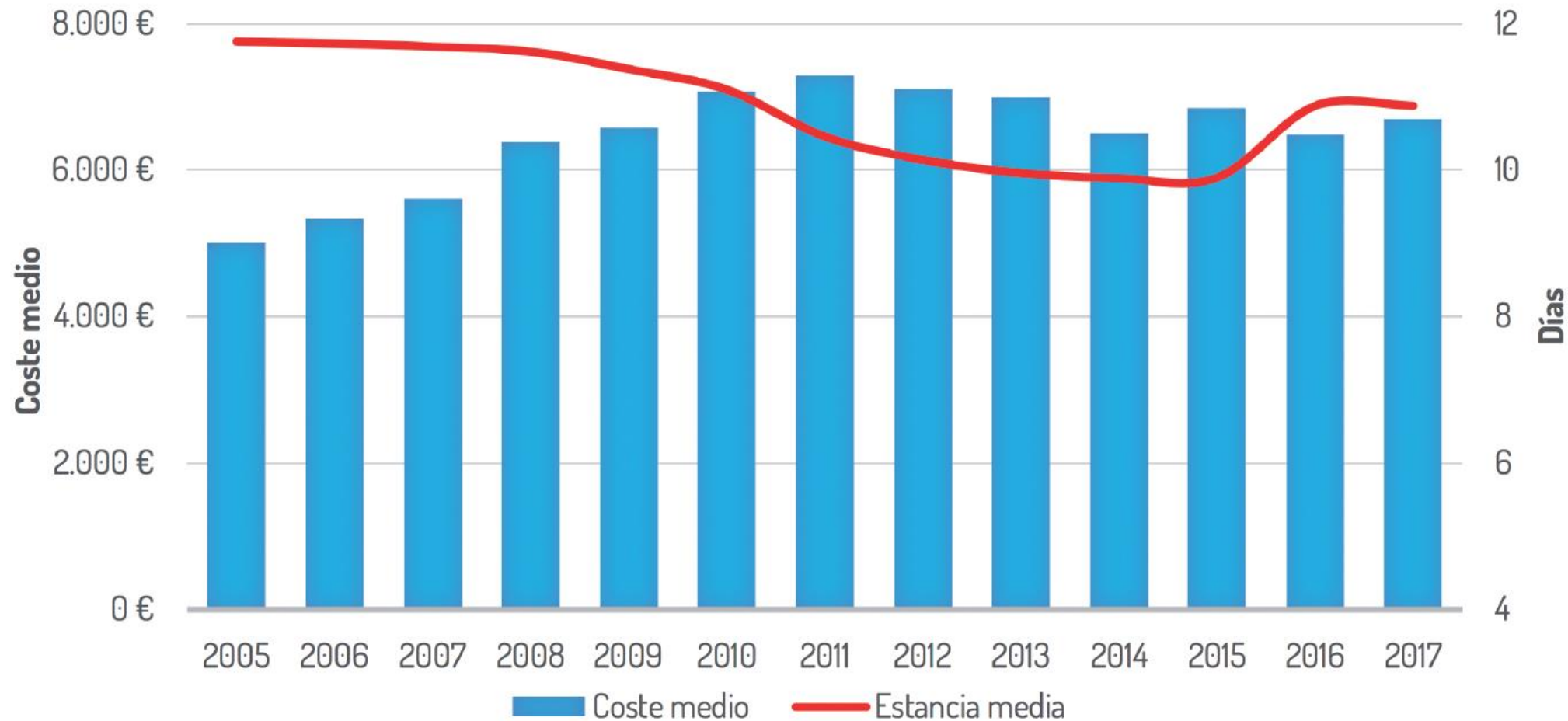
Criptogénico



Sutipos de Ictus isquémico

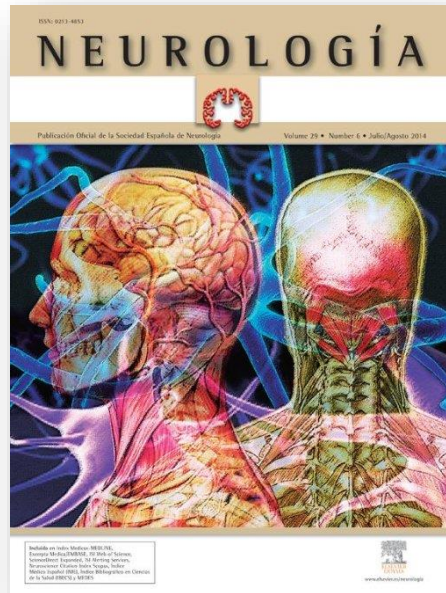


Estancia media y coste medio de hospitalizaciones por ictus



El coste del ictus cardioembólico en España

El estudio CODICE



13.139 €

- 45% c. hospitalización
- 29% c. rehabilitación



NEUROLOGÍA

www.elsevier.es/neurologia

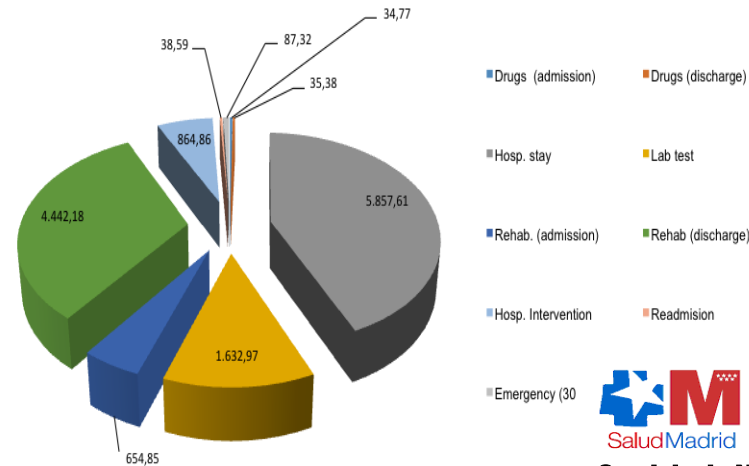


ORIGINAL

Utilización de recursos sanitarios y costes asociados al manejo de los pacientes con infarto cerebral cardioembólico agudo en la Comunidad de Madrid: Estudio CODICE[☆]

F. de Andrés-Nogales^{a,*}, J. Vivancos Mora^b, F.J. Barriga Hernández^c, F. Díaz Otero^d, L. Izquierdo Esteban^e, M.Á. Ortega-Casarrubios^f, L. Castillo Moreno^c, Á. Ximénez-Carrillo Rico^b, M.P. Martín Torres^d, C.I. Gómez-Escalonilla Escobar^e, C. Torres González^a, M. de Salas-Cansado^g, M.Á. Casado Gómez^a, J. Soto Álvarez^g, A. Gil-Núñez^d y Grupo de Investigación Estudio CODICE^o

<http://dx.doi.org/10.1016/j.nrl.2014.06.002>





COSTS IN PATIENTS ALONG FIRST YEAR POSTSTROKE IN SPAIN

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INTRODUCTION

- Stroke is the 2nd cause of death in Spain, and the 3rd in women¹. The one-year mortality approaches 30%². In addition, stroke is a prominent cause of disability and represents a high burden for the health care system and the society³.
- Atrial fibrillation (AF) 5-folds the risk of stroke. Moreover, strokes in AF patients are more severe, with higher mortality and recurrence rates, and worse disability levels⁴.
- Increased stroke severity in AF can represent an increase on resource use⁵.
- CONOCES is the first costs of stroke study comparing patients with and without AF in Spain.

OBJECTIVE

The objective of the present study was to compare the first year post-stroke costs in patients with or without AF in Spanish stroke units using a societal perspective

METHODS

The CONOCES study "Socioeconomic Stroke Costs in Spain" is an observational, multicenter, naturalistic and prospective study on stroke socioeconomic costs. The study included 16 hospitals (stroke units of National Health System hospitals) from 16 different Spanish regions. Patients were recruited during November 2010 to May 2011.

Patients inclusion criteria: older than 18, diagnostic of clinical ischemic or hemorrhagic stroke with less of 24 hours evolution. We included 50% of patients with AF and 50% with non-AF. Patients exclusion criteria was ischemic attack, stroke history, intrahospitalary stroke. They were recruited at first stroke hospitalization (1st visit), and monitoring was at 3 and 12 months post-stroke.

The information was collected for patients and caregiver through direct physician interviews. We analyzed sociodemographic and clinical patients characteristics; and patient neurologic status, disability, dependency and QoL (NIH scale, Rankin scale, Barthel index and EQ-5D), and caregiver Zarit scale.

The study took into account consumption of direct healthcare and non-healthcare costs, societal costs (formal and informal care) and indirect costs (productivity lost and early mortality costs) during the first year post-stroke. Unit costs (€2011) were obtained from different Spanish sources (official published data).

RESULTS

321 post-stroke patients were recruited, 160 with AF and 161 without AF. 291 had an ischemic stroke (IS) and 30 an intracranial hemorrhage (ICH) (table 1). The most predominant comorbidity was arterial hypertension (AHT). The time between stroke episode and neurology assistance was 4.96±4.85 hours. Stroke Code Activation took place in 52% of the patients. 7.8% of patients had stroke recurrences with no differences between AF and non-AF. Patients exits one year post-stroke was 13.0% non-AF vs 21.9% AF (statistically significant, p=0.036).

NIH value improved between hospital entry and exit and it showed differences statistically significant between non-AF and AF patients at hospital entry (p<0.001) and at hospital exit (p=0.005) (table 1). Barthel index and Rankin scale improved along the year (table 1). Barthel index showed statistically significant differences between non-AF and AF patients in all visits. Also, Rankin scale showed the same profile as Barthel index between non-AF and AF patients. The global patients status one year post-stroke was mild disability and dependence.

Table 1. Patients Clinical and Sociodemographic characteristics

	non-AF N=155	AF N=113	Total patients N=268	p-value
Age (years±SD)	67.7±14.54	71.4±10.27	72.1±12.19	<0.001
Male	60.0%	48.0%	54.0%	0.03
Ischemic stroke	88.3%	95.0%	90.7%	1
Intracranial hemorrhage	13.7%	5.0%	10.3%	0.01
Rankin scale-hospital exit >2	41.0%	50.3%	48.0%	0.004
Rankin scale 2 nd visit >2	28.0%	41.0%	35.0%	0.016
Rankin scale 3 rd visit >2	22.9%	38.4%	29.9%	0.016
Barthel index hospital exit (mean)	71.19	50.17	65.33	0.003
Barthel index 2 nd visit (mean)	81.74	71.93	77.08	0.005
Barthel index 3 rd visit (mean)	84.27	78.21	80.59	0.014
NIH scale at hospital entry (mean±SD)	7.39±5.53	10.94±7.48	9.11±6.79	<0.001
NIH scale at hospital exit (mean±SD)	4.23±5.73	6.45±7.84	5.31±6.91	0.005
Stroke risk factors (%)	74.0%	91.0%	79.2%	-
NIH value in OAC patients (mean±SD)	1.75±0.21	1.80±1.17	1.85±1.12	-
Exits during first year post-stroke	13.0%	21.9%	17.4%	0.036
Dependence	6.2%	9.4%	7.8%	0.189

The overall cost per year and patient was 27,711€. Direct healthcare costs were 30.6% of total costs (table 2). Intrahospital costs were 68.7% and extrahospital costs were 31.2% of total direct healthcare costs. The main direct cost was hospital stay which represented 70.1% of total intrahospital costs. Mean of hospital stay was 10.47±7.79 days.

Table 2. Stroke total costs

	non-AF N=155	AF N=113	Total patients N=268	p-value
Direct healthcare costs	8,077 €	9,915 €	9,401 €	0.291
Direct non-healthcare costs	17,707 €	18,512 €	18,043 €	0.950
Indirect costs	691 €	456 €	576 €	0.204
TOTAL €(€2011)	26,475 €	28,883 €	27,711 €	0.466

Direct non-healthcare costs were 67.3% of total costs, and informal care supposed 89.5% of these costs (table 2-3). Only 5.4% of patients received formal care. The informal caregiver provided 46.42 hours per week in the 2nd visit and 42.19 hours per week in the 3rd visit. There were no significant differences between non-AF and AF patients. Indirect costs were 2.1% of total costs (table 3).

AF costs were higher than non-AF but only formal care and support therapy costs were statistically significant (table 2). The most explicative variables for these results were age, male sex, NIH stroke scale, AHT comorbidity, and exitus along study.

Table 3. Stroke intrahospital and extrahospital costs

	non-AF N=155	AF N=113	Total patients N=268	p-value
INTRAHOSPITAL COSTS				
Direct healthcare costs	6,942 €	6,040 €	5,838 €	0.387
Direct non-healthcare costs	10 €	14 €	12 €	0.095
Total intrahospital costs	6,952 €	6,054 €	5,850 €	0.384
EXTRAHOSPITAL COSTS				
Direct healthcare costs	2,406 €	2,976 €	2,803 €	0.433
Direct non-healthcare costs	17,707 €	18,498 €	18,031 €	0.951
Indirect costs	691 €	456 €	576 €	0.204
Total extrahospital costs	20,804 €	21,930 €	21,860 €	0.218

CONCLUSIONS

- The management of stroke patients has improved in terms of morbidity and recurrence.
- Stroke and its consequences represent an important use of healthcare and social resources during the first year post-stroke (hospital stay and informal care costs mainly).
- The costs are higher in AF patients than in non-AF patients, although global study do not show statistical significance. We obtain significance in formal care costs and support therapy costs.
- Several studies from others countries showed similar healthcare costs but lower informal care costs, which were more than two-thirds of total costs in our study, with a very high burden over the family or informal caregiver.

REFERENCES

1. World Health Organization. Global Burden of Disease, Injuries, and Risk Factors Study 2010. *Lancet*. 2012;380(9859):2163-2196. [http://dx.doi.org/10.1016/S0140-6736\(12\)61861-1](http://dx.doi.org/10.1016/S0140-6736(12)61861-1)

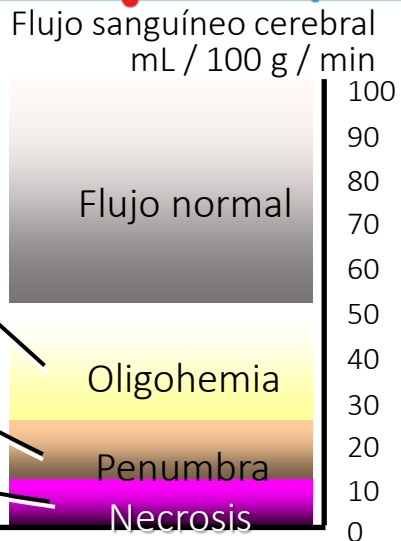
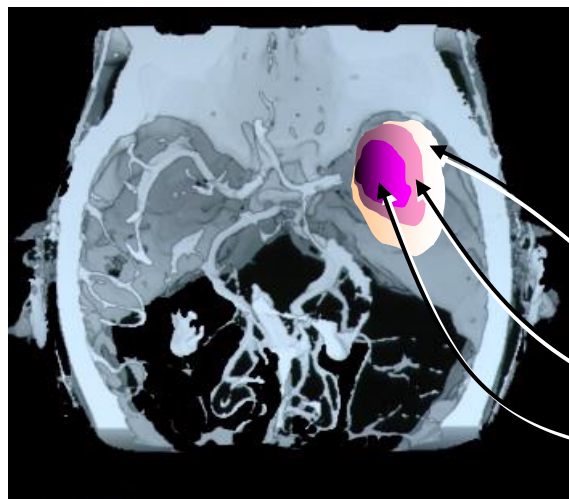


28.886 €
Primer año
Ictus + FA

El coste del ictus en España

COMUNIDAD AUTÓNOMA	NUEVOS CASOS DE ICTUS	COSTE (M€)	DISTRIBUCIÓN PORCENTUAL
Andalucía	12.719	352,47 M€	18%
Aragón	2.042	56,59 M€	3%
Asturias	1.670	46,28 M€	2%
Baleares	1.792	49,67 M€	2%
Canarias	3.403	94,31 M€	5%
Cantabria	914	25,32 M€	1%
Castilla y León	3.872	107,29 M€	5%
Castilla-La Mancha	3.111	86,22 M€	4%
Cataluña	11.401	315,93 M€	16%
Comunidad Valenciana	7.597	210,52 M€	11%
Extremadura	1.668	46,23 M€	2%
Galicia	4.338	120,22 M€	6%
Comunidad de Madrid	9.983	276,65 M€	14%
Murcia	2.190	60,70 M€	3%
Navarra	980	27,17 M€	1%
País Vasco	3.379	93,64 M€	5%
La Rioja	483	13,40 M€	1%
Ceuta	120	3,34 M€	0%
Melilla	114	3,16 M€	0%
TOTAL	71.780	1.989,10 M€	100%

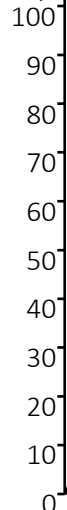
Coste de nuevos casos :
27,711 € / año



- Tiempo
- Magnitud de la isquemia
- Vulnerabilidad selectiva
- Circulación Colateral
- Daño post-reperusión



cc/100 g/min



Ventana terapéutica

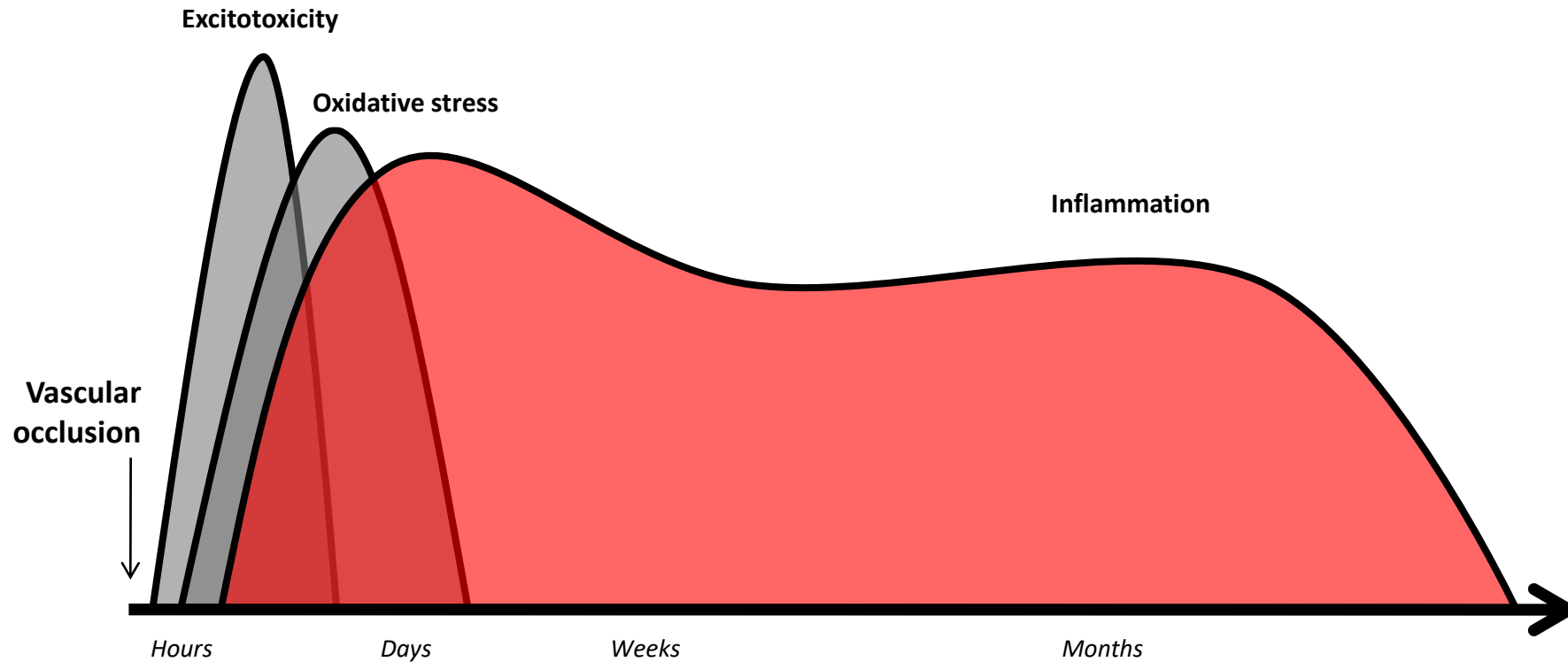
Penumbra

Infarto

Tiempo

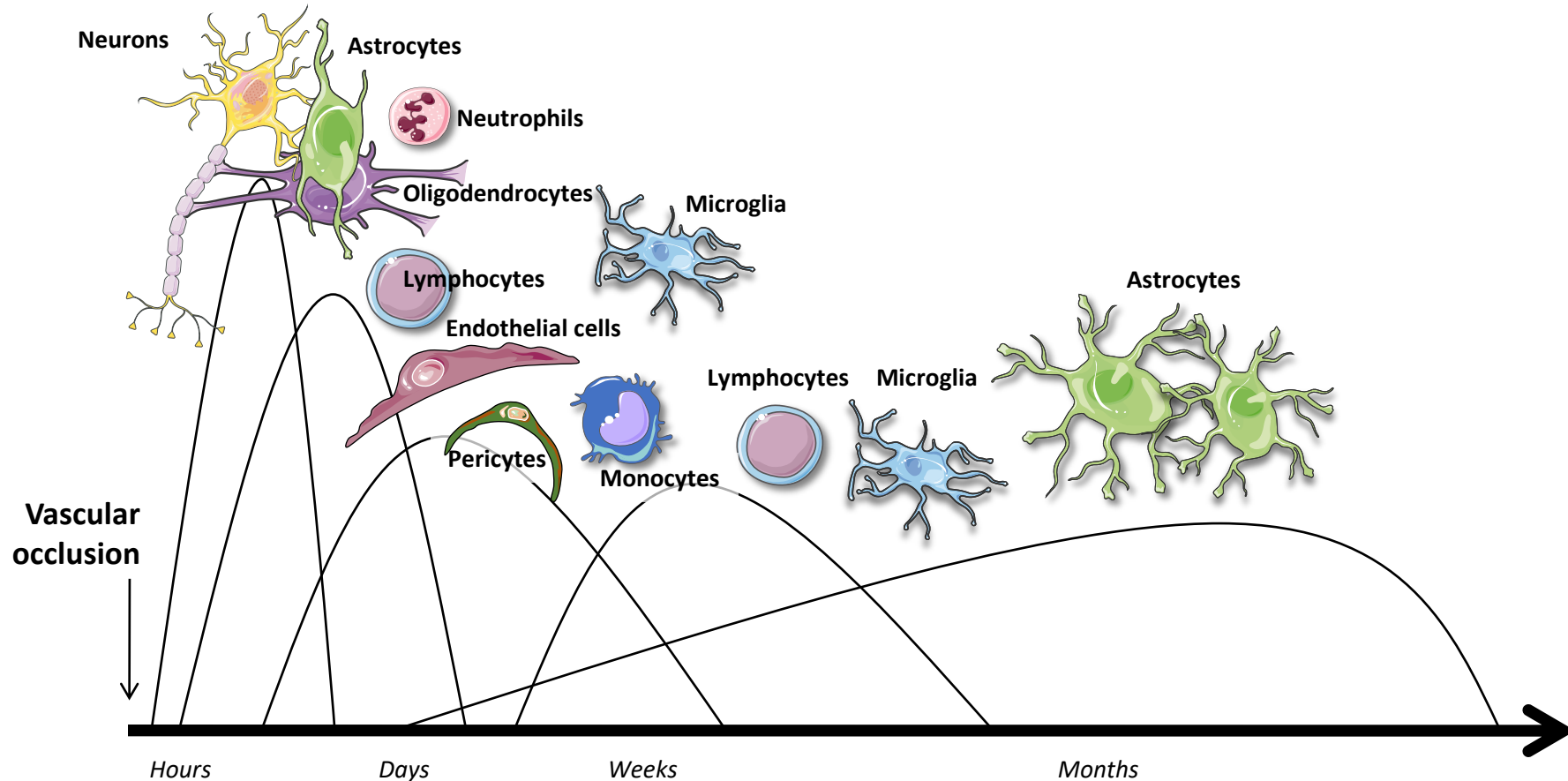
El infarto cerebral no es un instante, es un proceso en el tiempo

Timeline of the Ischemic brain

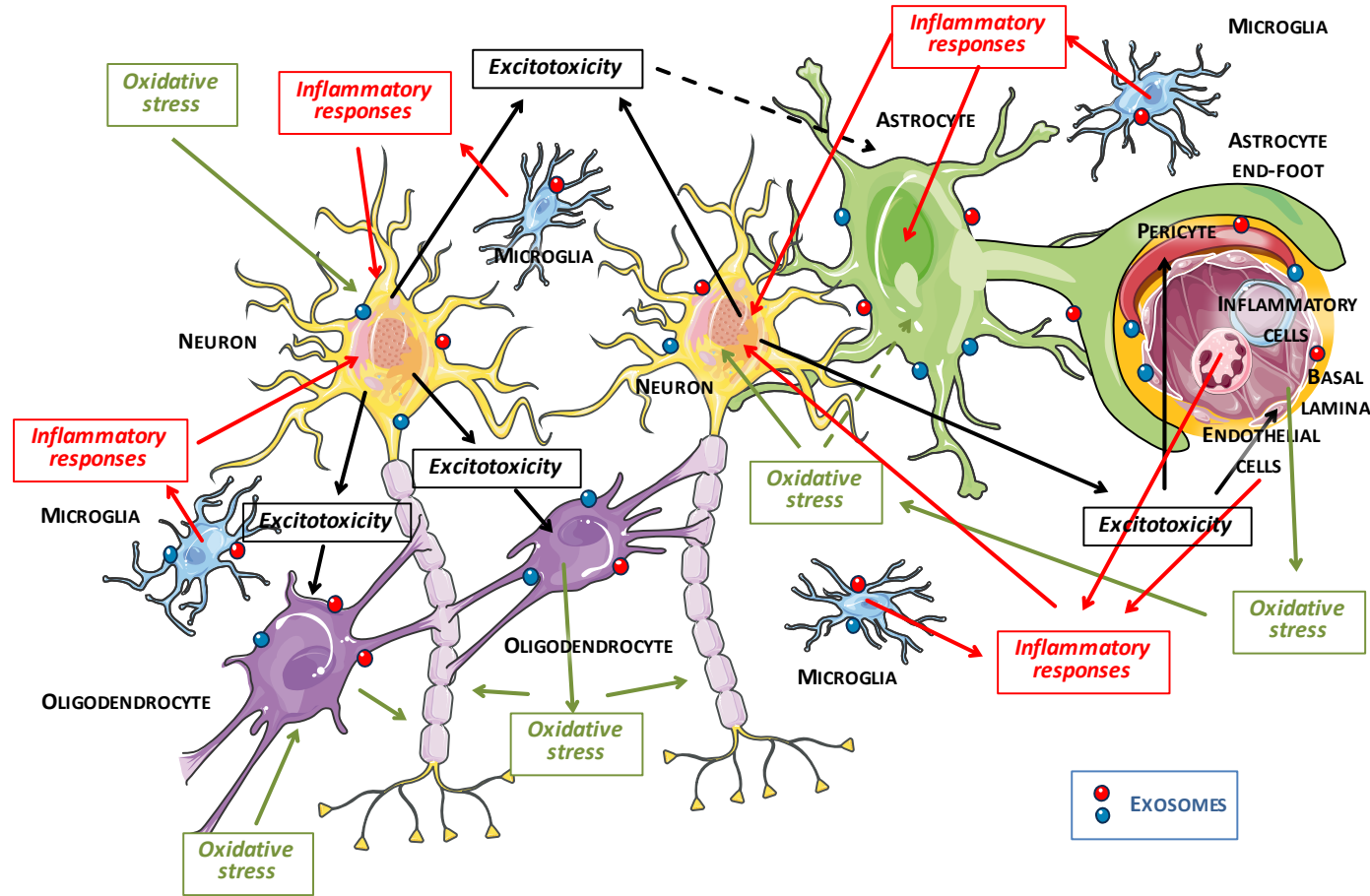


Rodríguez-González R et al. *Neuroplasticity and cellular therapy in cerebral infarction*. *Cerebrovasc Dis* 2007; 24(suppl 1):167-180.

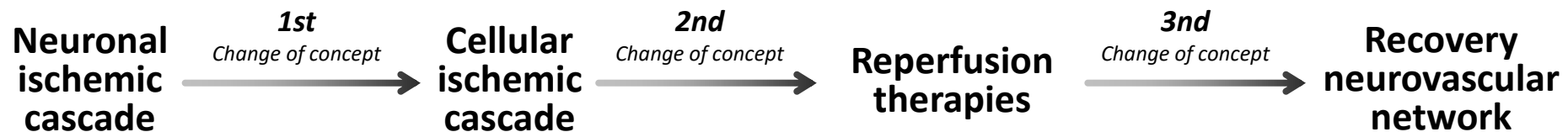
Cellular Timeline of the Ischemic brain

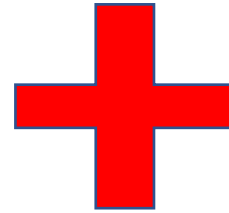
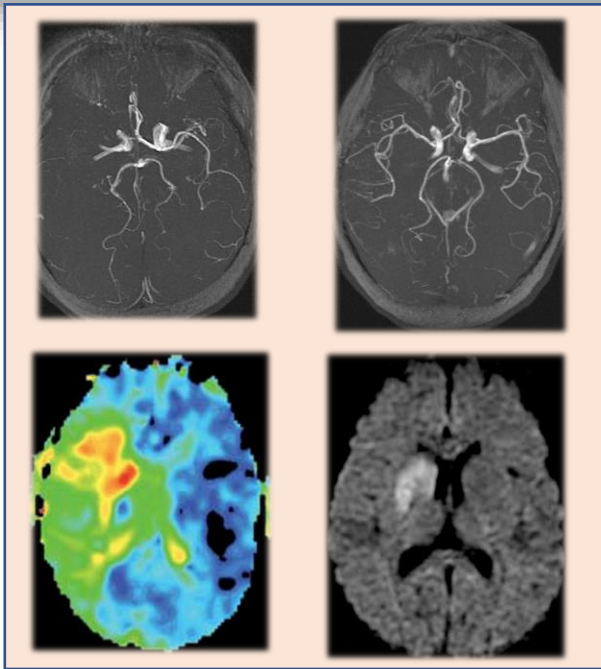


Rodríguez-González R et al. *Neuroplasticity and cellular therapy in cerebral infarction*. *Cerebrovasc Dis* 2007; 24(suppl 1):167-180.



Gentiliza del Dr. J. Castillo

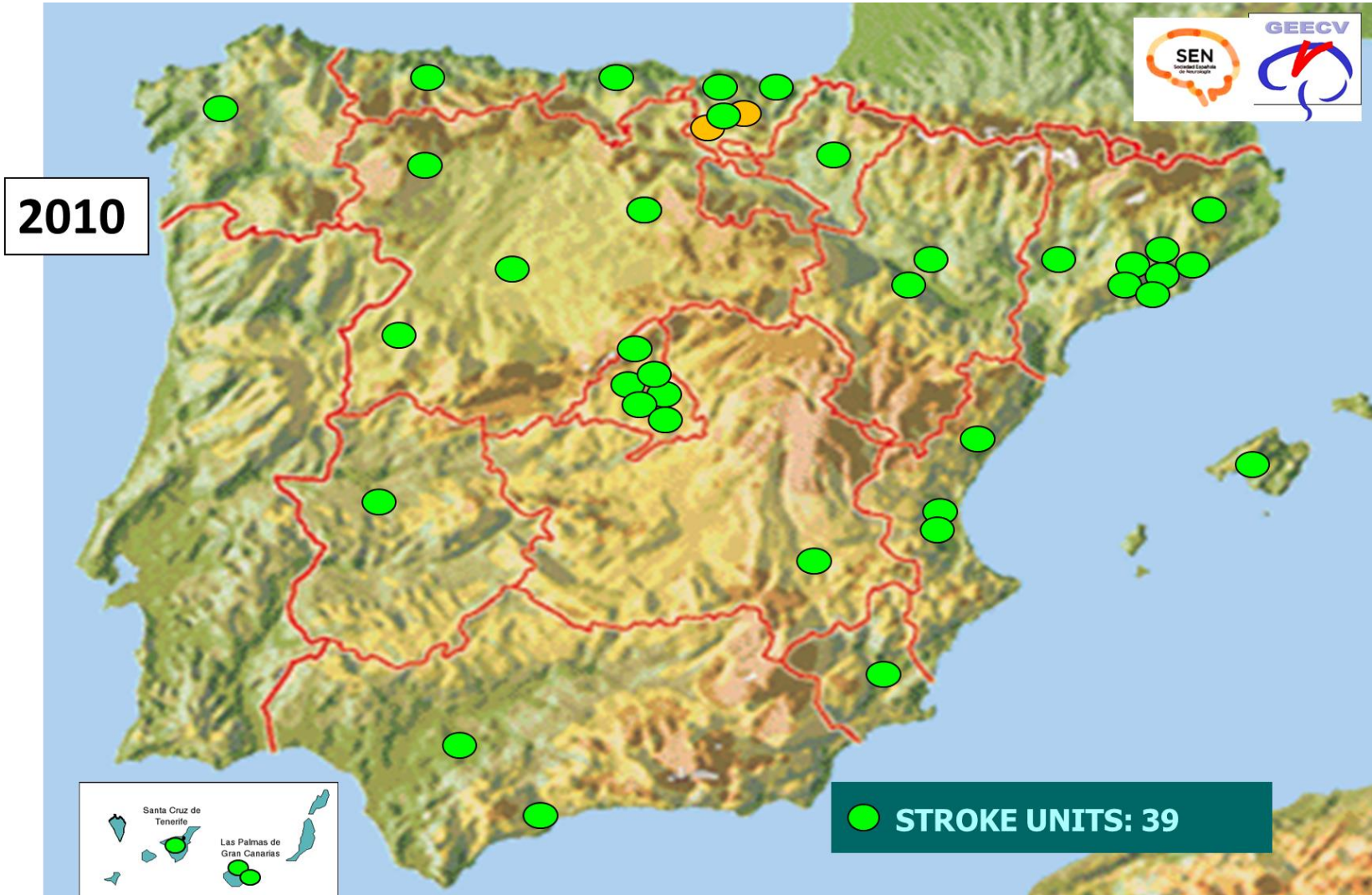


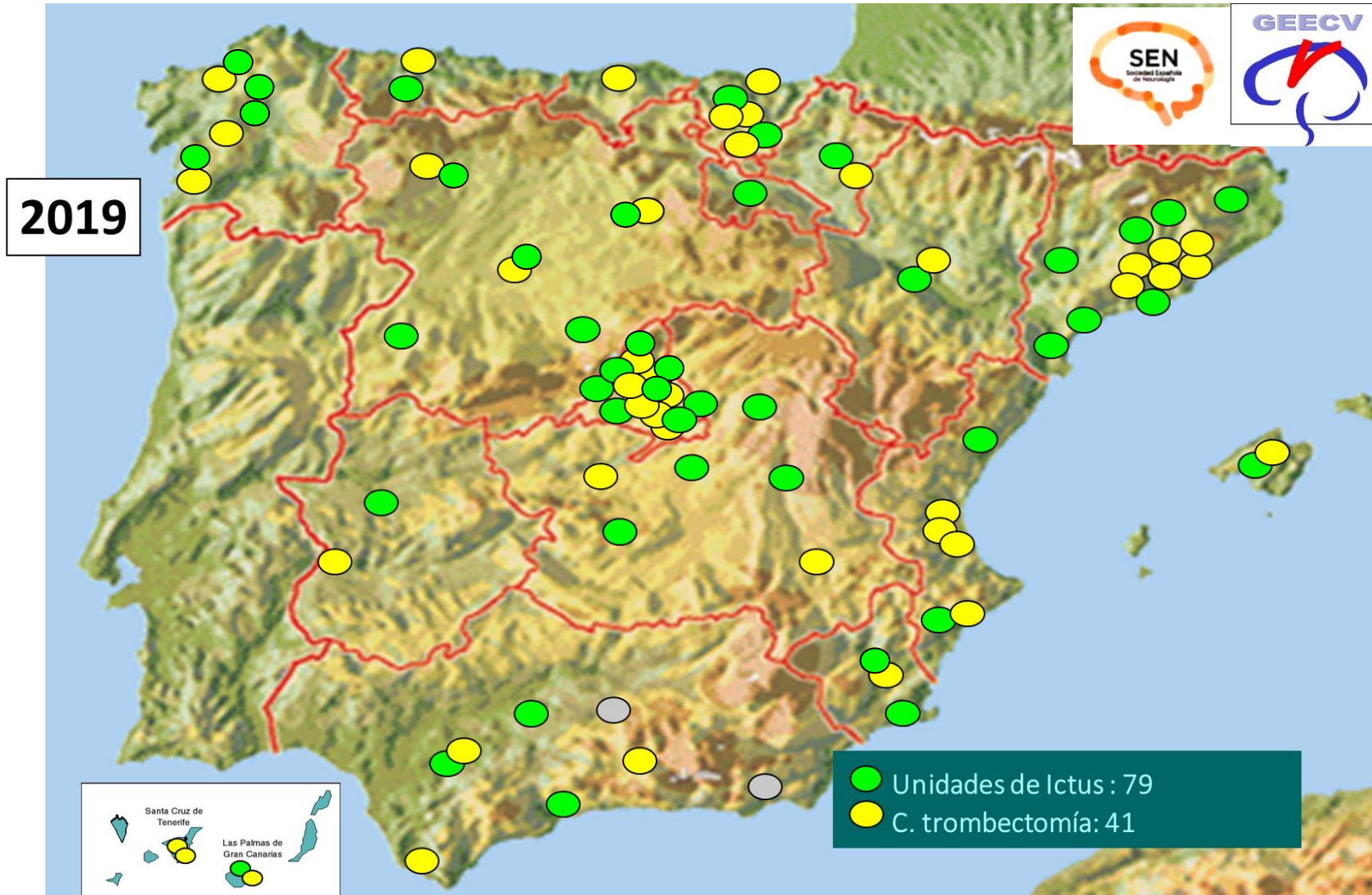




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Mucho ánimo!

