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Original Article

Incidence of Bronchopulmonary Carcinoma in Castile-Leon and Cantabria in 2007. Study from the Castile-Leon and Cantabria Respiratory Disease Society (SOCALPAR)

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ABSTRACT

Introduction: This study sets out to find out the incidence of bronchopulmonary cancer and other epidemiological characteristics in patients living in Cantabria and Castile-Leon (Spain), by comparing current data from the communities with that obtained 10 years ago in a similar study.
Patients and methods: Prospective, multicentre study using information (age, sex, residence, smoking habits and histology) obtained from all patients diagnosed during 2007.
Results: A total of 1,486 patients were included: 1,295 males (87.1%) and 191 females (12.9%). Of these, 1,145 lived in Castile-Leon: 1,010 males (88.2%) and 135 females (11.8%); while 341 lived in Cantabria: 285 males (83.6%) and 56 females (16.4%). The incidence rates per 100,000 inhabitants adjusted to the world standard population were significantly higher in Cantabria (29.53; [males: 52.9; females: 9.76]) than in Castile-Leon (21.35; [males: 38.31; females: 5.58]). A total of 90.24% were smokers (males: 96.12% and women: 49.17%). The main histology types were: squamous, 32.82%; adenocarcinoma, 28.74%; and small cell carcinomas, 18.33%. In Castile-Leon, from 1997 to 2007, the numbers went from 920 to 1,010 in males and from 95 to 135 in females (a crude increase rate of 10.5% in males and 43% in females), with a decrease in squamous tumours and an increase in adenocarcinomas.
Conclusions: The incidence rates of bronchopulmonary cancer in 2007 were significantly higher in Cantabria than in Castile-Leon. The 2007 rates in this community were higher than in 1997 for both males and females.

Incidencia del carcinoma broncopulmonar en Castilla y León y en Cantabria durante el año 2007. Estudio de la Sociedad Castellano-Leonesa y Cántabra de Patología Respiratoria (SOCALPAR)

Palabras clave:
Cáncer de pulmón
Epidemiología
Incidencia
Tabaco
Histología
Castilla y León
Cantabria
España

RESUMEN

Introducción: Dada la importancia sanitaria del carcinoma broncopulmonar, hemos planteado un estudio para conocer su incidencia y otros aspectos epidemiológicos en los pacientes residentes en Cantabria y en Castilla y León, comparando en esta comunidad los datos actuales con los obtenidos 10 años antes en un estudio similar.
Pacientes y métodos: Obtención prospectiva y multicéntrica de información (edad, sexo, residencia, tabaquismo e histología) en todos los pacientes diagnosticados a lo largo del año 2007.
Resultados: Se incluyó a 1.486 pacientes —1.295 varones (87,1%) y 191 mujeres (12,9%)—, de los que 1.145 residían en Castilla y León —1.010 varones (88,2%) y 135 mujeres (11,8%)—, y 341 en Cantabria —285 varo-

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nes (83,6%) y 56 mujeres (16,4%)—. Las tasas de incidencia por 100.000 habitantes ajustadas a la población mundial estándar han sido significativamente superiores en Cantabria (29,53; varones: 52,9; mujeres: 9,76) que en Castilla y León (21,35; varones: 38,31; mujeres: 5,58). Habían sido fumadores un 90,24% (varones: 96,12%; mujeres: 49,17%). Los principales tipos histológicos fueron los tumores escamosos, un 32,82%, adenocarcinomas un 28,74% y carcinomas de células pequeñas un 18,33%. En Castilla y León, desde 1997 a 2007, el número de varones ha pasado de 920 a 1.010 y el de mujeres de 95 a 135 (incremento de tasas brutas: un 10,5% en varones y un 43% en mujeres), objetivándose un descenso de los tumores escamosos y un aumento de los adenocarcinomas.

Conclusiones: En 2007 las tasas de incidencia del cáncer broncopulmonar eran en Cantabria significativamente superiores a las de Castilla y León. En esta comunidad las tasas de 2007 han sido superiores a las de 1997, tanto en varones como en mujeres.

Introduction

Bronchopulmonary cancer is still a major health problem. It is one of the most frequent cancers and has the highest mortality at the global level.[1,2] Epidemiological information (incidence, histology, etc.) contributed by different tumour registries, in addition to the mortality data, shows the extent and trend over time of this disease. In Spain we have 11 good quality tumour registries covering only 24.5% of the total population. They sent their data, collected between 1996 and 2002, to the International Agency for Research on Cancer (IARC) to be published in 2007 in the monograph, *Cancer Incidence in Five Continents, Volume IX*.[3] Moreover, we know there has been an upward trend in bronchopulmonary cancer rates in Spanish women for about 20 years. However, in men, where rates had been increasing until 2001, the rate depends on the autonomous community regions: in some it continued to increase, in others it stabilised, while in others it decreased.[4,5]

In Castile-Leon, there is still no tumour data in a population-based registry, although one is planned, while the one in Cantabria does not send their results to the IARC. Also, we have the epidemiological information on bronchopulmonary cancer for 1997 in the geographical area of Castile-Leon.[6] We have conducted this study using the same methodology of prospective data collection as that done 10 years before, and with two main objectives. The first is to find out the incidence and other important epidemiological aspects of bronchopulmonary cancer in the communities of Castile-Leon and Cantabria in 2007. The second is to discuss the incidence rate trends in men and women, as well as other epidemiological data in Castile-Leon, given that it is 10 years since the previous study.

Patients and Methods

This multicentre, epidemiological study was carried out prospectively for persons resident, at least for a year, in the geographic area covered by the Castile-Leon and Cantabria Respiratory Disease Society (SOCALPAR) and the Communities of Castile-Leon and Cantabria. All patients who were diagnosed with bronchopulmonary cancer between 1 January and 31 December 2007 were included. The case was accepted when a clinical picture, radiological evidence and a cytological or histological diagnosis of bronchopulmonary cancer, according to the World Health Organisation 2004[7] classification, was submitted. Patients for whom it was not possible to perform specific diagnostic procedures (due to rejection, poor clinical status, etc.) were also included, providing the clinical and radiological data indicated the existence of a tumour, in the opinion of the members of the study group. This Study Group, SOCALPAR Bronchopulmonary Carcinoma (GE CB07-SOCALPAR), consisted of 5 coordinators, 11 local managers, an epidemiologist and 51 participants, the vast majority of whom were pneumologists and thoracic surgeons. Patients with precancerous lesions, benign, lymphoproliferative, pleural or metastatic tumours in the lung were excluded.

The same sheet of agreed variables, with information on sex, age, place of birth and residence, aetiological and diagnosis factors, which were used in the study in Castile-Leon in 1997,[6] were used for this work, after adapting them to the data protection and confidentiality laws. As then, a smoker was considered to be a person who consumed at least one cigarette a day for a year, or more than 365 cigarettes throughout their lifetime; and ex-smokers, if they had stopped at least 6 months before diagnosis. Patients were selected from the information obtained in the existing services for Pneumology, Thoracic Surgery, Internal Medicine, Pathology, Geriatrics and Oncology; from the tumour committees; the pharmacy and hospital discharge records; and from institutions and consultants, both public and private, in the Community of Castile-Leon and Cantabria.

The study quality controls were carried out in several stages. Once a participant staff member filled in the logbook data for each patient, the information was checked by the appropriate local manager, who sent a copy to the central office. No information that could identify the patient was included; instead, a personal code was entered on the general database that showed the province of origin and the order of the patient included in the study. The coordinators revised the data received in the central office and conducted audits on participating health centres. One of the study coordinators, who had access to the personal data, checked the identification data for all patients to prevent the inclusion of duplicate cases.

For reference and for the calculation of gross rates, the population in the Municipal Register of January 2007, that appears in the National Statistics Institute (INE),[8] was taken. The direct method was used for adjustment of the rates by age, with the standard world population. Epidat 3.1 was used as software for statistical analysis of the data, and confidence intervals, parametric and nonparametric tests were taken into account in the search for significant differences.

Results

Throughout 2007, 1,486 patients were diagnosed of bronchopulmonary cancer, 1,295 males (87.1%) and 191 females (12.9%), of which 1,145 lived in Castile-Leon, 1,010 males (88.2%) and 135 females (11.8%), and 341 in Cantabria, 285 males (83.6%) and 56 females (16.4%). Male: female ratio was 6.8:1 in the sample, 7.5:1 in Castile-Leon and 5.1:1 in Cantabria. The mean age (± standard deviation) for the total was 67.86 ± 11.93 years (males: 68.33 ± 11.54,

Table 1
Incidence rates of bronchial cancer per 100,000 population, crude and age-adjusted to the standard world population, in Castile-Leon and Cantabria for 2007

	Crude			Adjusted for age to the standard world population					
	Men	Women	Total	Men	95% CI	Women	95% CI	Total	95% CI
Avila	84.81	9.55	47.44	32.28	23.58–40.97	4.75	0.95–8.54	18.18	13.39–22.96
Burgos	74.71	11.59	43.45	36.79	30.03–43.55	6.31	3.32–9.31	21.29	17.56–25.02
Leon	116.9	15.72	65.14	53.56	46.49–60.63	6.87	4.34–9.41	29.13	25.45–32.82
Palencia	87.71	13.67	50.21	42.52	31.98–53.06	7.64	2.81–12.46	25.02	19.13–30.92
Salamanca	74.02	8.9	40.7	34.45	27.73–41.18	5.04	1.85–8.22	18.95	15.32–22.59
Segovia	68.33	2.54	35.78	34.97	24.55–45.39	1.26	?0.82–3.33	17.62	12.34–22.9
Soria	61.47	12.93	37.4	27.83	16.33–39.33	9.42	1.56–17.27	18.4	11.42–25.39
Valladolid	62.5	7.9	34.7	33.28	27.79–38.76	4.38	2.33–6.43	17.94	15.1–20.78
Zamora	71.57	9.05	40.05	32.24	23.58–40.9	5.52	1.43–9.61	18.56	13.78–23.34
Castile-Leon	80.73	10.57	45.29	38.31	35.68–40.94	5.58	4.49–6.67	21.35	19.94–22.76
Cantabria	101.68	19.14	59.53	52.9	46.30–59.50	9.76	6.87–12.65	29.53	25.99–33.07

CI: confidence interval.

Table 2
Smoking in Castile-Leon and Cantabria, 2007

a. Smokers and ex-smokers. Percentages			
	Men	Women	Total
Active smokers			
Total	96.12	49.17	90.24
Castile-Leon	95.7	47.7	90.18
Cantabria	97.5	52.8	90.44
Ex-smokers			
Total	50.3	29.2	48.84
Castile-Leon	48.4	26.2	47.05
Cantabria	56.7	37.5	54.78
b. Other data. Averages			
	Castile-Leon	Cantabria	Total
Age started (years)	17.69	16.66	17.52
Years smoking	41.62	41.41	41.57
Cigarettes per day	27.27	30.59	28.07
Packets/year	56.80	62.49	58.18
Cigars per day	4.45	7.43	4.69
Ex-smokers. Years without smoking	12.4	11.79	12.24

women 64.63 ± 13.88); for Castile-Leon, 67.69 ± 11.93 years (males: 68.13 ± 11.56, women: 64.39 ± 13.97); and Cantabria, 68.41 ± 11.95 years (males: 69.04 ± 11, 48; women: 65.20 ± 13.79). The average age of males was significantly greater than that of females in Castile-Leon (p = 0.001) and was close to being statistically different in Cantabria (p = 0.08). In the whole sample, the minimum age was 14 years (carcinoid tumour), and the maximum was 96, with 1,083 patients (72.88%) over 60 years of age and 746 (50.2%) over 70. Only 15 patients (1%) were immigrants; the countries that contributed the most cases were Portugal, with 4, and Morocco, 3.

Crude incidence rates per 100,000, age-adjusted to the standard world population, are shown in Table 1 for Castile-Leon and Cantabria. As can be seen, the highest crude rates were found among women in Cantabria and men in Leon; with the lowest rates in women in Segovia and men in Soria. When we compared the incidence rates and adjusted them to the same standard (world) population, we see (Table 1) that both, the total and those for males and females, are significantly higher in Cantabria than in Castile-Leon, as the confidence intervals do not overlap. Looking at the provinces, men in Leon and the Cantabrian community had significantly higher rates than the rest, except in Palencia. While for women, Cantabria had the highest, but they are significantly higher than those found in Valladolid and Segovia only.

No information on active smoking was obtained for 41 patients (2.7%, 31 males and 10 females). The percentages of smokers and ex-smokers, the age they started smoking and smoking frequency of the remaining 1,445 are listed in Table 2. 1,360 people (94.11%) had smoked cigarettes only; there were 24 smoking cigars only (1.66%) and 61 for both cigarettes and cigars (4.22%).

Cytological and/or histological diagnosis was reached in 1,249 patients (84.05%): 1,090 men (84.17% of the total) and 159 women (83.25% of the total). The histological types encountered were: squamous cell carcinoma, adenocarcinoma, small cell carcinoma, large cell carcinoma, undifferentiated non-small cell carcinoma, carcinoid, adenosquamous, sarcomatoid, salivary gland type and others of an epithelial type (Table 3). The most predominant in the series was squamous cell carcinoma, as in Castile-Leon. However, in Cantabria, the most common type in both men and women was adenocarcinoma. We have smoking and histological type data for 1,220 people (Table 4). Among those who smoked at some point in their lives, the most frequently diagnosed was squamous cell carcinoma (34.72%). This also occurred in males (36.29%), but not in female smokers, where adenocarcinomas predominated (38.67%). In people who had never smoked, the most common type found was adenocarcinoma (total 52.5%, male 44.19%, women 57.14%). Those diagnosed by clinical and radiological criteria only, by participants in the study group, CB07-SOCALPAR, were 237 patients (15.95% of the total), of whom 205 (15.83%) were men and 32 (16.75%) women.

Table 5 shows the incidence data, age, smoking and clinical and histological diagnosis found in 2007 in the Community of Castile-Leon, along with those obtained in the 1997 study.[6] As can be seen, the number of cases and crude rates in both men and women were higher in 2007 than in 1997 (10.5 and 43%, respectively). An increase of 0.7 years in average age of diagnosis is seen, along with a clear increase in the percentage of women smokers (increasing from 22.72 to 47.7%); a slight increase in ex-smokers; a significant reduction in squamous tumours (from 50.62 to 35.25%); and an increase of adenocarcinomas (from 17.67 to 27.09%). The evolution of histological types in the population of males and females is shown in Figure 1.

Discussion

This study provides the incidence rates for bronchopulmonary cancer in Castile-Leon and Cantabria in 2007. It is particularly important for the Community of Castile-Leon, where at that time

Table 3
Histological types, total and autonomous communities

	Men	Percentage in men	Women	Percentage in women	Total	Percentage
Total						
Squamous	393	36.05	17	10.69	410	32.82
Adenocarcinoma	281	25.78	78	49.05	359	28.74
SCBC	203	18.62	26	16.35	229	18.33
LCLC	105	9.63	20	12.57	125	10
UNSCC	83	7.61	8	5.03	91	7.28
Carcinoid	10	0.91	4	2.51	14	1.12
Others*	15	1.37	6	3.77	21	1.68
Total	1,090	100	159	100	1.249	100
Castile-Leon						
Squamous	324	38.34	13	11.71	337	35.25
Adenocarcinoma	209	24.73	50	45.04	259	27.09
SCBC	148	17.51	19	17.11	167	17.46
LCLC	74	8.75	13	11.71	87	9.1
UNSCC	71	8.40	7	6.3	78	8.15
Carcinoid	9	1.06	3	2.7	12	1.25
Others	10	1.18	6	5.40	16	1.67
Total	845	100	111	100	956	100
Cantabria						
Squamous	69	28.16	4	8.33	73	24.91
Adenocarcinoma	72	29.39	28	58.33	100	34.13
SCBC	55	22.45	7	14.58	62	21.16
LCLC	31	12.65	7	14.58	38	12.97
UNSCC	12	4.9	1	2.08	13	4.44
Carcinoid	1	0.41	1	2.08	2	0.68
Others	5	2.04	0	0	5	1.71
Total	245	100	48	100	293	100

LCLC: large cell lung carcinoma; SCBC: small cell bronchopulmonary carcinoma; UNSCC: undifferentiated non-small cell carcinoma.
*Men: 4 adenosquamous, 4 sarcomatoid, 2 salivary gland type and 5 other epithelial; women: 3 adenosquamous, 2 sarcomatoid and one salivary gland type.

Table 4
Histologic types and smoking

	Men		Women		Total	
	N	%	N	%	N	%
Smokers						
Squamous	372	36.29	10	13.33	382	34.72
Adenocarcinoma	257	25.07	29	38.67	286	26
SCBC	196	19.12	19	25.33	215	19.55
LCLC	101	9.85	11	14.67	112	10.18
UNSCC	78	7.61	3	4	81	7.36
Carcinoid	7	0.68	0	0	7	0.64
Others	14	1.36	3	4	17	1.54
Total	1,025	100	75	100	1,100	100
Non-smokers						
Squamous	12	27.91	5	6.49	17	14.17
Adenocarcinoma	19	44.19	44	57.14	63	52.5
SCBC	2	4.65	7	9.09	9	7.5
LCLC	2	4.65	9	11.69	11	9.17
UNSCC	5	11.63	5	6.49	10	8.33
Carcinoid	2	4.65	4	5.19	6	5
Others	1	2.32	3	3.9	4	v3.33
Total	43	100	77	100	120	100

LCLC: large cell lung carcinoma; SCBC: small cell bronchopulmonary carcinoma; UNSCC: undifferentiated non-small cell carcinoma.

there was no register of population-based tumours in operation. Referring to the 1997 study,[6] we can advance the knowledge of the trend for that disease.

In both, males and females, the incidence rates in Cantabria were significantly higher than those of Castile-Leon as a whole (Table 1). This finding could be explained by the different exposure of the populations to different aetiological factors, where the history of tobacco consumption is more pronounced than the others.[9] Although difficult to quantify, it is possible that exposure to carcinogens in the workplace occurred more in the Cantabrian population than in Castile-Leon, as Cantabria is the more industrialised area. However, if we analyse the smoking data from the National Health Surveys for the regions, available from the Spanish Ministry of Health and Social Policy,[10] at least since the first available date in 1987, the percentage of male smokers in Cantabria has usually been higher than the Spanish average, and 4% higher than that found in Castile-Leon men. Cantabrian women also smoked more than the Spanish average, at least during the 1980s and 90s. During this period, it was 8% more than in Castile-Leon. Therefore, we thought that this might be the main cause for Cantabria having incidence rates significantly higher than those of Castile-Leon. In the latter, the incidence rates from the different provinces are very similar among women (Table 1). However, for males, Leon has rates higher than those of other provinces, with the exception of Palencia. The explanation for this is unclear, since in the 1997 survey rates Leon men were very close to the average of all Castile-Leon. It seems prudent to await results of further work which might or might not confirm these findings. It must be remembered that the highest rates in the 1997 study[6] were found in Zamora men and Avila women, but this was not found in 2007.

Incidence rates adjusted for the world standard population of men in Castile-Leon in 2007 are among the lowest of those recorded by the 11 Spanish registers included in the IARC publications, and are also significantly lower than the averages estimated for Spain and southern Europe in 2002.[3,11] However, the incidence rates for males in Cantabria are among the highest of those found in the 11 registers, but less than those estimated for 2002 in Spain and the

Table 5
Comparison of data obtained in Castile-Leon in the 1997[6] and 2007 studies

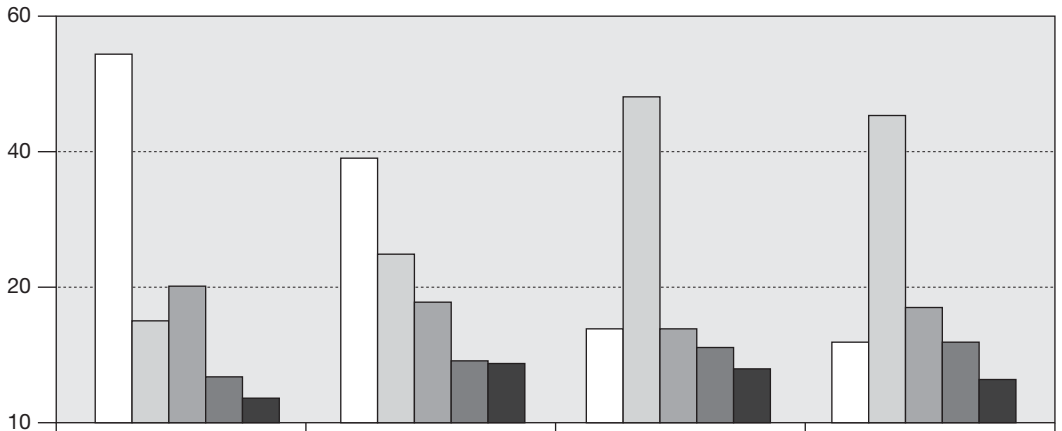
	1997	2007
Number of patients	1,015	1,145
Men	920 (90.64%)	1,010 (88.2%)
Women	95 (9.35%)	135 (11.8%)
Crude rates		
Total	39.86	45.29
Men	73.04	80.73
Women	7.38	10.57
Average age (years)		
Total	67	67.7
Men	67.3	68.13
Women	64.5	64.4
Smokers		
Total (%)	90.14	90.18
Men (%)	96.61	95.7
Women (%)	22.72	47.7
Ex-smokers		
Total (%)	44.75	47.05
Men (%)	45.42	48.4
Women (%)	15	26.2
Clinico-radiological diagnosis (%)	13.6	16.5
Squamous cell carcinoma (%)	50.62	35.25
Adenocarcinoma (%)	17.67	27.09
SCBC (%)	19.38	17.46
LCLC (%)	6.84	9.1
UNSCC (%)	3.76	8.15
Carcinoid (%)	1.02	1.25
Others (%)	0.68	1.67

Crude rates (incidence) cases per 100,000 population.
LCLC: large cell lung carcinoma; SCBC: small cell bronchopulmonary carcinoma; UNSCC: undifferentiated non-small cell carcinoma.

southern European countries. These data are shown in Figure 2 for comparison purposes. However, it must be borne in mind that, although they are the most recently available, the information sent by the Spanish registers was collected between 1996 and 2002, and we do not know what figures will arrive for 2007. In recent times, the evolution of male lung cancer incidence rates in different provinces or communities is not the same. The mortality rates, which accurately reflect the incidence of lung cancer reached its highest point nationally in 2001, and stabilised later.[5] It must be remembered that Spanish men began to reduce their tobacco consumption in the early 1980s,[12] so the observed improvement in the trend of the disease for the male group was expected. However, between 2001 and 2005, these mortality rates rose in Asturias, Extremadura and Castile-Leon, and decreased especially in Aragon, the Balearic Islands, Cantabria and Madrid.[5]

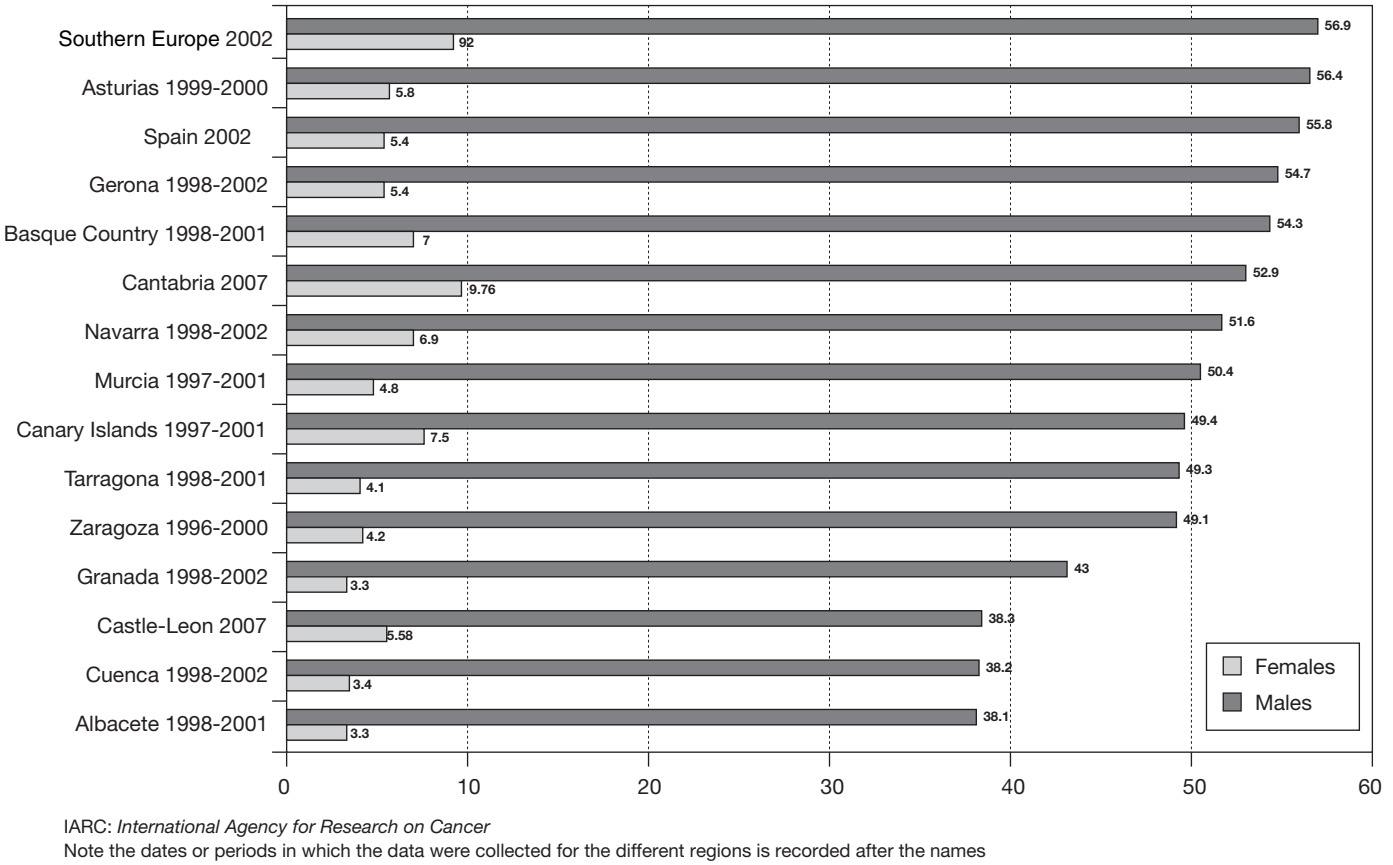
For women in Castile-Leon in 2007, the incidence rates adjusted for world standard population were higher than those in a number of registers (Fig. 2), close to the Spanish average and well below the estimates for the southern European countries in 2002. Those documented in 2007 for Cantabrian women are higher than in the above-mentioned places (Fig. 2). However, given the increase that had been observed continuously since the early 1990s in the mortality rates of Spanish women, parallel to the increased consumption of tobacco in the earlier decades,[13-16] the incidence rates are expected to be higher when the data from the Spanish registers are available in 2007. Then it will be known if they reach or exceed those of Castile-Leon and Cantabria.

In this study we found that the number of cases and crude incidence rates in 2007 in Castile-Leon were greater than those found in 1997 in men and especially women. The crude rates for the latter, taking the 1997 figures as a base, have increased by 43%, in line with the mortality observed in studies conducted in Spain.[5,13,17,18] For men, the increase in crude rates between 1997 and 2007 was 10.5%, but there are 2 circumstances pointing to the possibility that in recent years there has been a stabilisation. Firstly, in the 2002 Avila study, male incidence rates were not only higher than those found in 1997,[6,19] but also higher than those documented in this 2007 study. Secondly, the absolute numbers of lung cancer deaths for men in Castile-Leon had increased dramatically: from 904 in



	Males 97	Males 07	Females 97	Females 07
Squamous	54.4	38.34	13.6	11.71
Adenocarcinoma	14.5	24.73	48.1	42.04
SCBC	20	17.51	13.6	17.11
LCLC	6.4	8.75	11.1	11.71
UNSCC	3.4	8.4	7.4	6.3

Figure 1. Major histologic types (percentages) found in men and women in Castile-Leon in 1997[6] and 2007. LCLC: large cell lung carcinoma; SCBC: small cell bronchopulmonary carcinoma; UNSCC: undifferentiated non-small cell carcinoma.



IARC: *International Agency for Research on Cancer*
Note the dates or periods in which the data were collected for the different regions is recorded after the names

Figure 2. Incidence rates age-adjusted to standard world population in men and women. Spanish tumour registries at the International Agency for Research on Cancer (IARC),[3] Globocan 2002[11] and Castile-Leon and Cantabria 2007. The date or period in which the cases were collected is recorded after the names.

1997 to a maximum of 1,078 in 2004. Then it went from 1,010 in 2005 to 997 in 2006 and 1,034 in 2007.[20] The absolute incidence or mortality figures may be better indicators of trend than the rates themselves, given that the denominator for these calculations is the general population, which has recently increased significantly due to the arrival of immigrants, mostly of working age. They constituted about 10% of the Spanish population in 2007,[8] but the immigrant community, as we saw in our study, contributed only 1% of patients in 2007.

The average age of patients in Castile-Leon and Cantabria is more or less the same as that documented in other national studies.[21-25] It is noteworthy that the average male is about 4 years older than the average woman, which was also noted in the 1997 Castile-Leon study.[6] This was also found in A Coruña (1995–1996),[26] Asturias (2001)[22] and Avila (2002),[19] but not in Castellón (1993–2002)[24] or in the 2003 Spanish multicentre study, EpicliCP-2003.[23] At present, it is not clear if there are other factors, hormonal or otherwise, that may affect bronchopulmonary cancer susceptibility in women.[9,27]

As regards tobacco consumption, we found that patients diagnosed in Cantabria smoked a greater percentage and amount than those diagnosed in Castile-Leon, so it is likely that the differences observed in the incidence rates will be maintained in the future. In Castile-Leon, the percentage of male smokers hardly changed between 1997 and 2007 (table 5), but there was a significant rise in the percentage of female smokers (increasing from 22.72 to 47.7%), confirming the increasing prevalence of smoking among women diagnosed with lung cancer. It must be remembered that 52.8% of Cantabrians smoked in this study and, to mention other relevant figures, 44% of women diagnosed in 2001[22] and 32% of those included in the EpicliCP-2003 study.[23]

In our patients, the predominant histological type was squamous cell carcinoma (Table 3), as occurred in other Spanish studies,[3,19,22,24-26,28] but adenocarcinoma was the most frequent in the group of non-smoking patients, for both men and women (Table 4). This was also the case for men and women diagnosed in Cantabria, having risen 10% in Castile-Leon between 1997 and 2007 to the detriment of squamous cell tumours, which fell 15% in this period. These results are similar to those found in Barcelona[25] and Avila,[19] and confirm the changes in the proportion of observed histological types in countries with a more extensive history of smoking than ours.[3,9]

Considering the possible limitations of this study: Firstly, it did not include those patients who moved to other communities, for personal reasons, to have the disease diagnosed. However, sometimes patients require medical assistance later in their usual place of residence, so they can be detected then. Therefore, with current regional health transfers, we believe the number of patients lost to be small. Secondly, to be more comprehensive about the collection of cases, the tumour registries usually review the death certificates and compare them with the identities of incidence. This is to detect so-called DCO cases (death certificate only), which correspond to those whose cause of death is registered as cancer but are not found in the tumour registry. This requires an active and retrospective

search for additional information on the patient and the disease on the death certificates to identify the true DCOs and update the cancer registry database. The DCO rate (number of real DCOs in a year / total number of cancer cases in the year x 100) is a quality indicator[29] and must be as small as possible. Another indicator of the completeness of the register, closely related to the above, is the ratio of the mortality rate and incidence.[30] In this study, we did not conduct a DCO case detection procedure. However, from the death certificates sent to the National Statistics Institute, we know the figures for bronchopulmonary cancer deaths in 2007 for Castile-Leon (men 1,034, women 164) and Cantabria (men 241, women 52) to compare with our incidence figures for 2007 (Castile-Leon: 1,010 men and 135 women; Cantabria: 285 men and 56 women). Even assuming that all excess mortality in relation to the incidence in the study year corresponds to true DCOs, the rate would be 4.42% in Castile-Leon and less than 0 in Cantabria, since here the incidence figures were higher than mortality, and the ratio between mortality and incidence rates was 1.046 in Castile-Leon and 0.859 in Cantabria. These data confirm the proper collection of patients in our study.[29] The third point to bear in mind is that we have evaluated the trend that bronchopulmonary cancer in Castile-Leon follows based on the specific data of 1997 and 2007. This means that random variations have a greater effect than if we had taken the incidence data from each intervening year. Looking again at the mortality figures from the National Statistics Institute for Castile-Leon,[20] for the years between 1997 and 2007 there was a steady increase of deaths in men until 2004, with a subsequent stabilisation, as discussed above. While for women there was a clear upward trend in the annual number of deaths from bronchial cancer. These facts support the validity of our results.

In short, we know the incidence rates in 2007 for bronchopulmonary carcinoma in Castile-Leon and Cantabria, where they are significantly higher in the latter community. More than 95% of males and around 50% of women had a smoking history. As in other parts of Spain, in the Castile-Leon community the rise of incidence rates in women and the relative increase of adenocarcinoma type tumours is confirmed, with the latter increase similar in size to the observed decrease in squamous tumours.

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