



## Case Report

Trends in Lung Cancer Incidence in a Healthcare Area<sup>☆</sup>

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## ABSTRACT

The aim of this study was to identify trends in the incidence of lung cancer in the Leon Healthcare Area. All cases of cancer among residents of the Leon healthcare catchment area listed in the hospital-based tumor registry of the Centro Asistencial Universitario de Leon (CAULE) between 1996 and 2010 were included. Gross incidence rates over 3-year intervals were calculated and adjusted for the worldwide and European populations.

A total of 2491 cases were included. In men, incidence adjusted for the European population rose from 40.1 new cases per 100 000 population (1996–1998) to 61.8 (2005–2007), and then fell to 54.6 (2008–2010). In women, incidence tripled from 3.0 (1996–1998) to 9.2 new cases per 100 000 (2008–2010).

Although lung cancer is an avoidable disease, it is a serious problem in the Leon Healthcare Area. Of particular concern is the rising incidence among women.

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## Tendencia de la incidencia de cáncer de pulmón en un Área de Salud

## RESUMEN

El presente estudio tiene por objetivo conocer la tendencia de la incidencia del cáncer de pulmón en el Área de Salud de León.

Fueron incluidos los casos de cáncer de pulmón del Registro Hospitalario de Tumores del Centro Asistencial Universitario de León (CAULE), entre 1996–2010, con residencia en el Área de Salud de León. Se calcularon las incidencias trienales brutas y ajustadas a población mundial y europea.

Se incluyeron 2.491 casos. Las tasas estandarizadas a población europea en varones ascendieron de 40,1 (trienio 1996–1998) a 61,8 (trienio 2005–2007), descendiendo a 54,6 casos nuevos por 100.000 (trienio 2008–2010). En el caso de las mujeres las tasas se triplicaron de 3,0 (trienio 1996–1998) a 9,2 casos nuevos por 100.000 (trienio 2008–2010).

El cáncer de pulmón, a pesar de ser evitable, es un problema grave en el área de salud de León, siendo preocupante el incremento de la incidencia en mujeres.

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## Palabras clave:

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## Introduction

Lung cancer (LC) is the malignant disease with the highest incidence and mortality rate worldwide. In 2012, there were an estimated 1.8 million new cases and 1.59 million deaths from LC, representing 13% and 19.4% of the total number of tumor cases, respectively.<sup>1,2</sup>

In Spain, in 2012, there were estimated to be 26 715 cases of LC, with an incidence adjusted for the worldwide population of 52.5

**Table 1**  
Triennial Distribution of Cases, Population and Lung Cancer Rates in the Leon Healthcare Area (1996–2010).

Triennials	Cases		Population		Gross rate $\times 10^{-5}$		EEP rate $\times 10^{-5}$		EWP rate $\times 10^{-5}$	
	M	W	M	W	M	W	M	W	M	W
1996–1998	312	26	526 329	556 710	59.3	4.7	40.1	3.0	27.3	2.1
1999–2001	422	42	515 405	546 105	81.9	7.7	53.6	5.2	36.6	3.8
2002–2004	468	51	508 107	538 532	92.1	9.5	59.4	5.7	40.8	4.0
2005–2007	517	95	512 088	541 735	101.0	17.5	61.8	9.7	42.1	6.8
2008–2010	476	82	516 266	542 918	92.2	15.1	54.6	9.2	36.8	6.4

EEP rates: rates adjusted to the European population; EWP rates: rates adjusted to the world population.

per 100 000 in men, and 11.3 per 100 000 in women.<sup>1,2</sup> This confirms the slightly downward trend in men and the upward trend in women observed since the 1990s.<sup>3</sup> This is the first study to determine the incidence of LC in the Leon Healthcare catchment area (LHA).

The aim of this study has been to determine rates and trends in LC incidence in the LHA.

### Clinical Observation

This is an observational descriptive study that included all cases of LC diagnosed from 1996 to 2010 (ICD [international classification of disease]-9: 162; ICD-10: C33-C34) in residents in the LHA. This area, according to the Hospital Tumor Register (HTR) of the Centro Asistencial Universitario de León (CAULE), operational since 1993, had an average population of 353 613 during the study period. In order to avoid duplication of records and to establish each individual's town or city of residence, each patient's date of birth, clinical record number and National Identity Card number were checked, and their place of residence was determined from their healthcare service card.

We calculated gross triennial incidence rates, grouped by gender and age group, using data from the Spanish National Statistics Institute (NSI) distributed by sex and 15-year age groups. The age-adjusted rates were calculated using the direct method and the worldwide and European population as the standard.

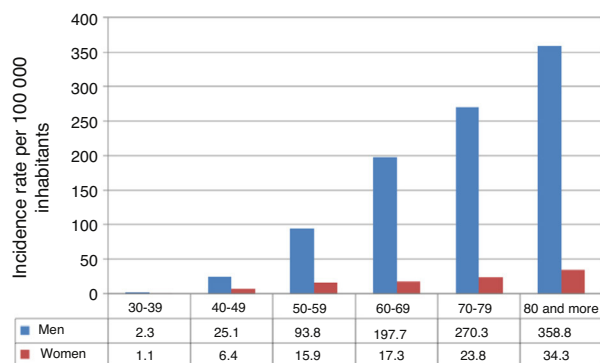
Of 2554 cases of LC registered in the HTR of the CAULE between 1996 and 2010, 2491 were resident in towns or cities in the LHA, 2195 (88.1%) were men with a mean age of 70.3 $\pm$ 11.2 years, and 296 (11.9%) were women, with a mean age of 69.5 $\pm$ 14.0 years.

The gross average incidence rate for the study period was 85.1 new cases per 100 000 men, and 10.9 per 100 000 women, with a ratio of men to women of 7.8:1. The incidence rate adjusted to the European population showed an increasingly slower upward trend in men in the first 3 triennials, with a reverse trend in the fourth period (+34%; +11%, +4%; –12%). Analysis of these trends on a joinpoint model showed a turning point after the third triennial. The upward trend in women is more erratic (+74%; +10%, +69%; –5%), with a 300% increase between the first and last triennial (Table 1) and no turning point on the joinpoint model.

Incidence in individuals under 40 years is very low, but the risk increased exponentially from this age onwards, with the highest rates occurring in the over-80 age group. Incidence for men is higher than for women in all age groups (Fig. 1).

### Discussion

LC is one of the leading causes of death from cancer. In the LHA, over 200 new cases are registered each year, most of them preventable. In this region, the average rate per 100 000 men, adjusted to the European population, is 35, lower than the 2012 rate in the EU (66.3) and Spain (76.8). The difference is even more striking in



**Fig. 1.** Incidence rates of lung cancer adjusted to the European population by age group and sex in the Leon Health Area (1996–2010).

women, with only 9 per 100 000 women in the LHA compared with 26.1 and 15.7 in the UE and Spain, respectively.<sup>1,2</sup>

In terms of gender, rates in the LHA are similar to those in Spain for both sexes, with a slight decrease in men, although this trend seems to have started later in the LHA. In contrast, the trend in women is on the rise, with a mean annual increase of 8% in the LHA.

This trend and the magnitude of the incidence rates illustrate the different phases of the smoking epidemic in both men and women.<sup>4</sup> Based on the evolution of smoking, we can expect a significant decrease in inter-gender differences in mortality and incidence in LC in coming years.<sup>5</sup>

The main limitation of this study lies in the fact that the source of information is an HTR and not a population register, and therefore does not reflect the number of LC-related deaths. Nevertheless, since the CAULE is the only hospital in the area, and the regional health service attends around 95% of the population, there will be few cases of LC that are not diagnosed or treated in this center. In any event, the incidence rate observed can serve as a reference for the lowest incidence in the area and the trend over time.

LC is a serious problem in the Leon health area, with rates and trends similar to those found in Spain as a whole. The 300% increase in incidence in women in the last 15 years is a cause for concern.

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