

## Cancers of the thyroid

### Case numbers and histological types

The thyroid gland, located at the front of the neck around the trachea and beneath the larynx, is part of the endocrine system and is responsible for the production of thyroid hormone. During the most recent 5 years for which data is available (2006-2010), an average of 162 cases per year was diagnosed (Table 1). Thyroid cancers are rare, and between 2006 and 2010, they comprised just 0.9% of all invasive cancers registered (1.4% of all female cancers and 0.5% of male cancers). The lifetime risk of diagnosis was 2.5 times higher in females (1 in 240) than in males (1 in 580). Since 1994, almost all cases have been microscopically verified (97%). Almost two-thirds of female and half of male cancers were papillary subtypes. Follicular thyroid cancers represented approximately 20% of all cases diagnosed in both sexes. Medullary and anaplastic tumours were rarer, representing just 5% and 7% of all cases respectively and were more frequently diagnosed in men.

**Table 1. Annual average number of thyroid cancers diagnosed in Ireland and percentage of histological types, 2006–2010**

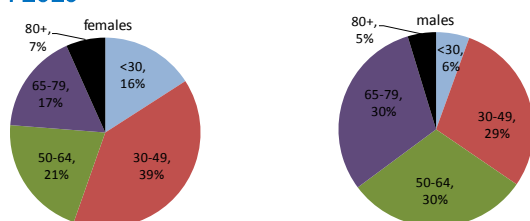
	Females	Males	Total
cases per year	117	45	162
incidence rate*	5.26	2.15	7.41
% of all cancers	1.4	0.5	0.9
lifetime risk (%)#	0.41	0.17	0.3
<b>histological subtype (1994-2010 overall)</b>			
papillary	64%	48%	60%
follicular	20%	22%	20%
medullary	3%	10%	5%
anaplastic	6%	9%	7%
other	3%	5%	4%
unspecified	4%	6%	4%

\*cases per 100,000 per year # cumulative risk to age 74

### Age profile

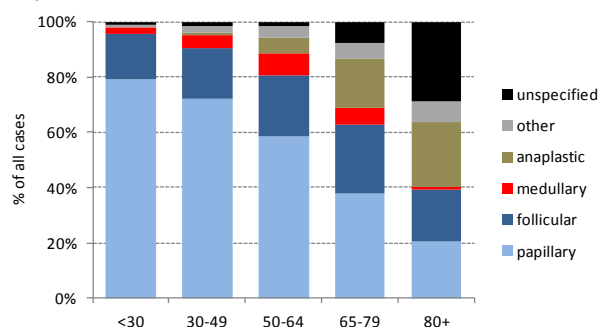
Females had a younger profile than males; 55% of all female patients were under 50 when diagnosed compared to 35% of males (Figure 1). Approximately one third of males were diagnosed in each of the age groups 30-49, 50-64 and 65-79. 16% of females, but only 6% of males, were under 30 when diagnosed. Less than 10% of all patients were aged over 80.

**Figure 1. Age distribution of thyroid cancer, females & males, 1994-2010**



Almost 80% of all tumours in patients aged under 30 years were papillary subtypes, the relative proportion of which declined with increasing age (Figure 2). Anaplastic thyroid cancer was more common in older patients; although only 2% of cancers in under 65 year olds were anaplastic, they represented 23% of all tumours diagnosed in patients aged 80 or over. Almost one-third of the cancers in these older patients were of unspecified cell type.

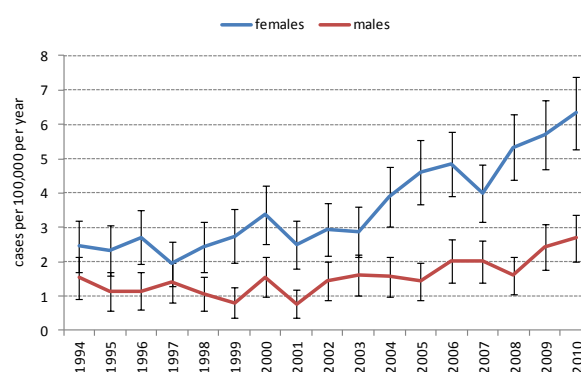
**Figure 2. Variation in thyroid cancer histological subtypes by age group, 1994-2010**



### Time trends in incidence and mortality

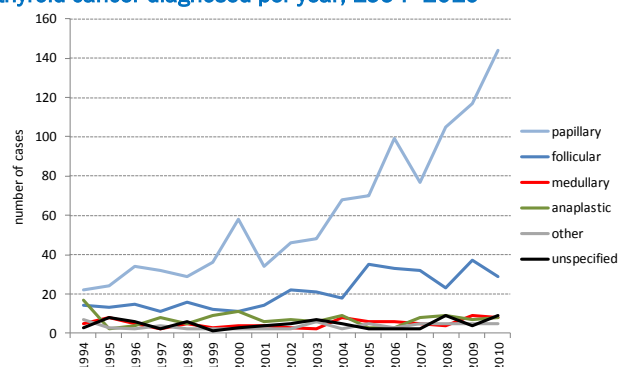
Incidence rates have increased significantly in both sexes since the mid 1990's, particularly for females (Figure 3). Case numbers have increased from approximately 40 females and 20 males per year during the mid 1990's to 120 and 45 cases per year respectively during the late 2000's. Similar trends of increasing incidence rates have been reported internationally.<sup>1, 2</sup>

**Figure 3. Trends in thyroid cancer incidence, 1994–2010**



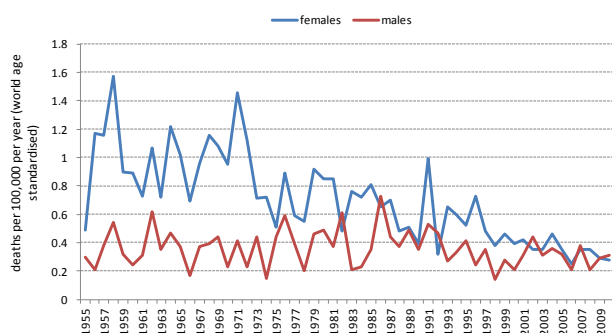
This rise in incidence is mostly due to the very large increase in the number of papillary subtypes diagnosed per year, which had an overall annual percentage increase of 12% (Figure 4). There was a much smaller increase in the number of follicular subtypes diagnosed per year (7% annual percentage change) and very little change annual case numbers for the other subtypes.

**Figure 4. Total number of the main histological subtypes of thyroid cancer diagnosed per year, 1994–2010**



Mortality rates from thyroid cancer are low and vary little from year to year. Little overall change was observed in males but there was a clear decline in females (Figure 5). From the mid 1950's to the early 1970's, up to 30 female deaths per year were registered, but recent female mortality is considerably lower (12 deaths per year over the most recent 5 years), and mortality rates are now similar for both sexes.

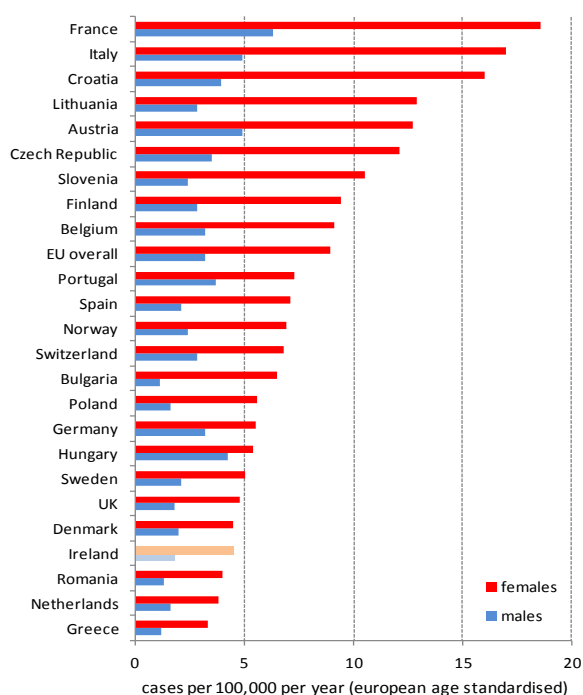
Figure 5. Trends in thyroid cancer mortality, 1955–2010<sup>3</sup>



### International variation in incidence and mortality

Incidence of thyroid cancer, particularly for females, is very variable across Europe, with Irish rates ranked amongst the lowest of 24 countries examined (Figure 6).<sup>4</sup> The highest female incidence rates, over 15 cases per 100,000 per year, were recorded in France, Italy and Croatia and the lowest rates were found in Greece, Netherlands and Romania. In almost all countries, incidence in females was considerably higher than in males, although differences between the sexes were somewhat lower in Hungary, Germany and Portugal. In contrast, thyroid cancer mortality varied little, with most countries having rates between 0.4 and 0.9 deaths per 100,000 per year, and little difference between the sexes.

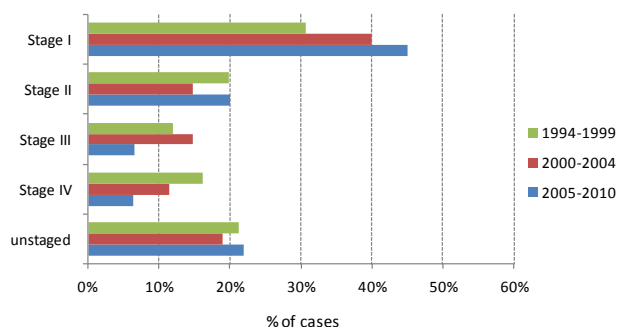
Figure 6. Incidence of thyroid cancer in Europe, 2008<sup>4</sup>



### Stage at diagnosis

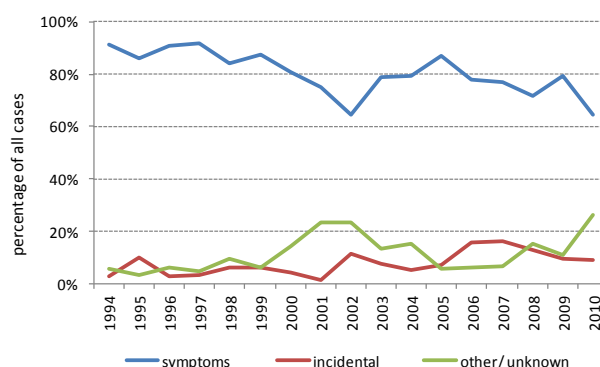
There has been a distinct increase in the diagnoses of stage I tumours over time, and in recent years these early stage tumours have represented 45% of all cancers diagnosed (Figure 7). Similar trends have been observed in male and female patients. A decline in the proportion of late stage (stage IV) tumours has also been observed. However this pattern is more a reflection of the very large increase in case numbers of early stage tumours (stage I: 116 cases in 1994-1999, 366 cases in 2005-2010), rather than a decline in late stage cancers, of which case numbers have not changed greatly over time (stage IV: 61 cases in 1994-1999, 52 cases in 2005-2010). Approximately one-fifth of all cancers were unstaged and this proportion has remained fairly constant overall.

Figure 7. Percentage of thyroid cancers by stage, 1994-2010



There is some evidence of a change in the way thyroid cancers are first detected (Figure 8). Similar to international trends<sup>5,6</sup>, there has been an increase in the proportion of thyroid cancers detected incidentally through unrelated medical testing or treatment and a decrease in the proportion of patients presenting with symptomatic disease. This has led to some debate as to whether patients with very early stage asymptomatic tumours are being over-diagnosed or benefiting from treatment, which itself carries a health risk<sup>6</sup>. The increase in the proportion of incidental tumours in Ireland may explain the increase in overall incidence rates and in the proportion of early stage tumours in recent years.

Figure 8. Variation in how patients have first presented with thyroid cancer, 1994-2010

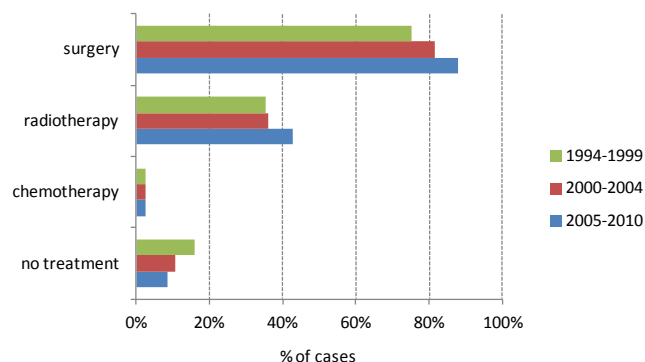


### Treatment

Surgery is the principal treatment for thyroid cancer and 84% of all patients diagnosed since 1994 have had tumour-directed surgery. Some increase in the proportion of patients undergoing surgery has been observed over time (Figure 9). The percentage having radiotherapy has also increased; 43% of patients diagnosed between 2005 and 2010 had radiotherapy. Less than 5% of patients had

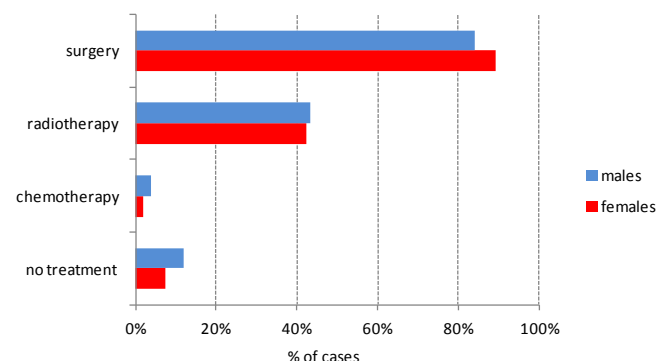
chemotherapy, with no change over time. The proportion of patients not having any tumour directed treatment is low - less than 10% of all cases - and this has declined somewhat over time.

**Figure 9. Treatment of thyroid cancer by time period: 1994–2010**



Looking at treatment patterns in recent years (2005-2010), treatment was similar for males and females, although slightly more female patients had surgery and the proportion of patients having no treatment was higher in males (Figure 10). This may reflect the generally younger age distribution of female patients (Figure 1). Radiotherapy rates were similar between the two sexes.

**Figure 10. Thyroid cancer treatment in males and females 2005-2010**



## Survival

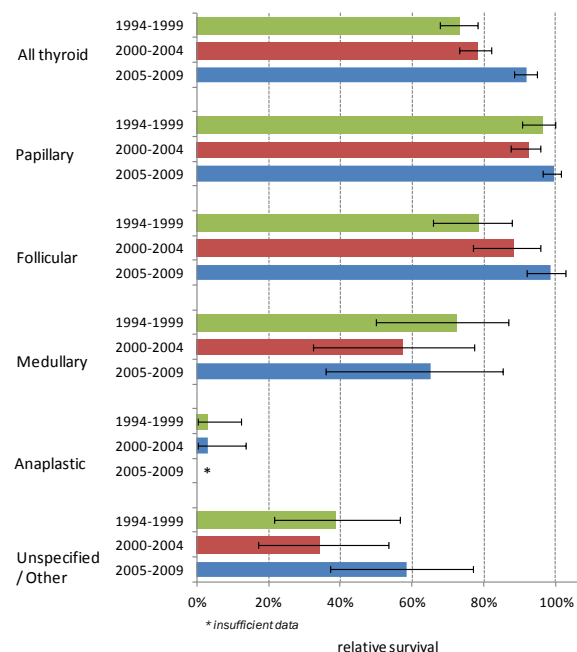
Five year relative survival for thyroid cancer has improved for both males and females over time, and most recent estimates are 94% for females and 88% for males approximately (Table 2). Although survival in female patients has been higher than that for males, over all 3 time periods examined, the difference in survival between the sexes has decreased in recent years.

**Table 2. Five year relative survival (RS) for patients diagnosed with thyroid cancer, 1994-1999, 2000-2005 & 2005-2009**

Period of diagnosis	Females RS %	Males RS %
1994-1999	76.9 (70.6-82.4)	63.9 (52.8-73.7)
2000-2004	80.9 (75.6-85.5)	69.4 (58.8-78.4)
2005-2009	93.5 (89.7-96.3)	87.9 (79.4-94.3)

Relative survival was best for papillary and follicular subtypes, with patients diagnosed between 2005 and 2009 having almost 100% survival at 5 years post diagnosis (Figure 11). The higher survival rates observed in females compared to males may be due to the related factors of female's younger age distribution and their greater relative proportion of papillary cancers compared to males, and the greater proportion of medullary and particularly anaplastic cancers diagnosed in men (Table 1), which have poorer survival.

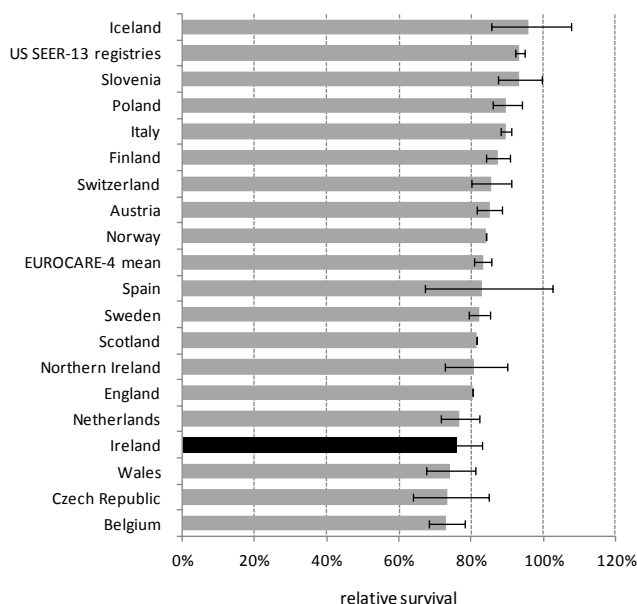
**Figure 11. Five year relative survival (with 95% confidence intervals) for thyroid cancer, all cases and main subtypes**



## International variation in survival

Five year relative survival for thyroid cancer ranged from 73% in Belgium to 96% in Iceland (Figure 12). Period analysis estimates for Ireland (76%) are somewhat lower than estimates for Northern Ireland (81%) and the European average (83%).

**Figure 12. Five year relative survival thyroid cancer (period analysis 2000-2002)**



## References and notes

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