Thyroid Cancer Canada
Cancer de la thyroïde Canada

Thyroid Cancer Unique Facts & Figures -- February 2012

by Rita Banach, BSc., DCS

Fast Facts

- *thyroid cancer usually leads to the loss of the thyroid gland -- a **major organ** of the body -- necessitating life-long hormone replacement and monitoring similar in effect to some **chronic** diseases*
- *for the most part there are no early warning signs; **no means of prevention** of thyroid cancer*
- *neck exams can find thyroid cancer at an early stage, but currently **neck exams are an optional inclusion** in most standard physical examinations*
- *thyroid cancer is now the **#1 cancer** (in incidence) in young women*
- *thyroid cancer has the **greatest range of possibilities** in prognosis, depending on the type diagnosed*
- *for some, surgery and treatments have **lasting negative after-effects***
- *80% of thyroid cancer patients are **women***
- *overall it is very treatable, however males struck with the disease have a **lower cure rate***
- *thyroid cancer is **increasing in incidence** at a higher rate than any other cancer*
- *a unique form of treatment -- **radioactive iodine** therapy -- is an option for the majority of patients*
- *thyroid cancer has a **high rate of recurrence**, up to 30 years later*
- *there is a **high rate of bankruptcy** amongst thyroid cancer survivors*
- *only **.003% of cancer research** dollars are invested in thyroid cancer*

1. No Longer a Rare Cancer

The incidence of thyroid cancer worldwide is now estimated at 213,000 persons per year, and it is the 9th most common cancer in women around the world[i]. In Canada the rate of incidence has risen by 9% in women in the last decade. Just a few years ago it was considered a rare cancer but now is the 5th most common cancer in Canadian women[ii]. It is the 4th most frequently diagnosed in women living in Ontario[iii]. The incidence rate per 100,000 women has risen from 4.5 in 1982, to a rate of 23.6 women being diagnosed in 2011 (a total of 5,700 persons in 2011).

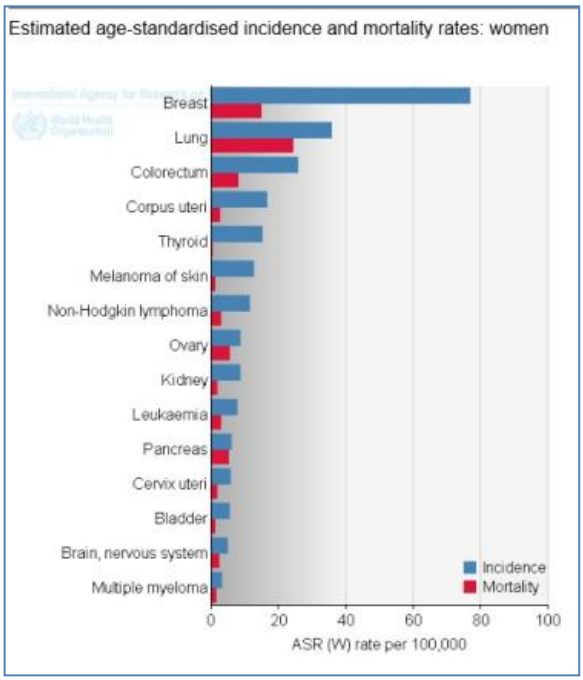


Figure 1 - Worldwide Incidence of Cancer in Women, 2011 (ref: WHO)

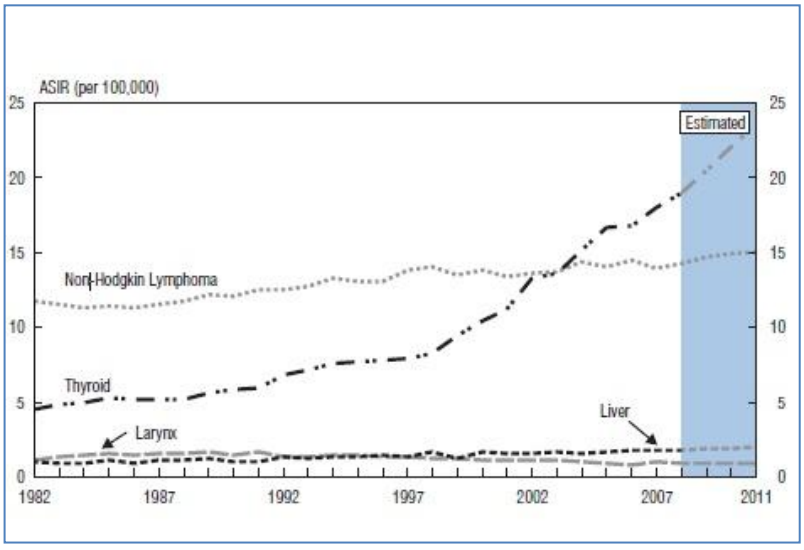


Figure 2 - Rate of Increase in incidence in women per 100,000, in Canada 1982-2011 (ref: CCS)

2. Most Common Cancer in Young Women

Between 1992-2005, thyroid cancer was diagnosed in women age 15-29 at a higher rate than any other cancer in that age group; that is almost 20% of all cancers diagnosed in young women (in Canada) were thyroid cancer[iv].

The overall ratio of patients with thyroid cancer is 80% women; 20% men. Women have a five year survival ratio of 99% whereas it drops to 94% in men[v]. The reasons for these male-female differences are unknown.

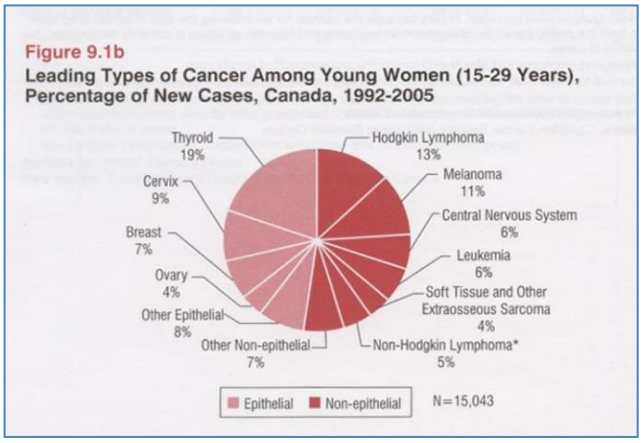


Figure 3 - Percentage Incidence in Young Women 1992-2005 (ref: CCS)

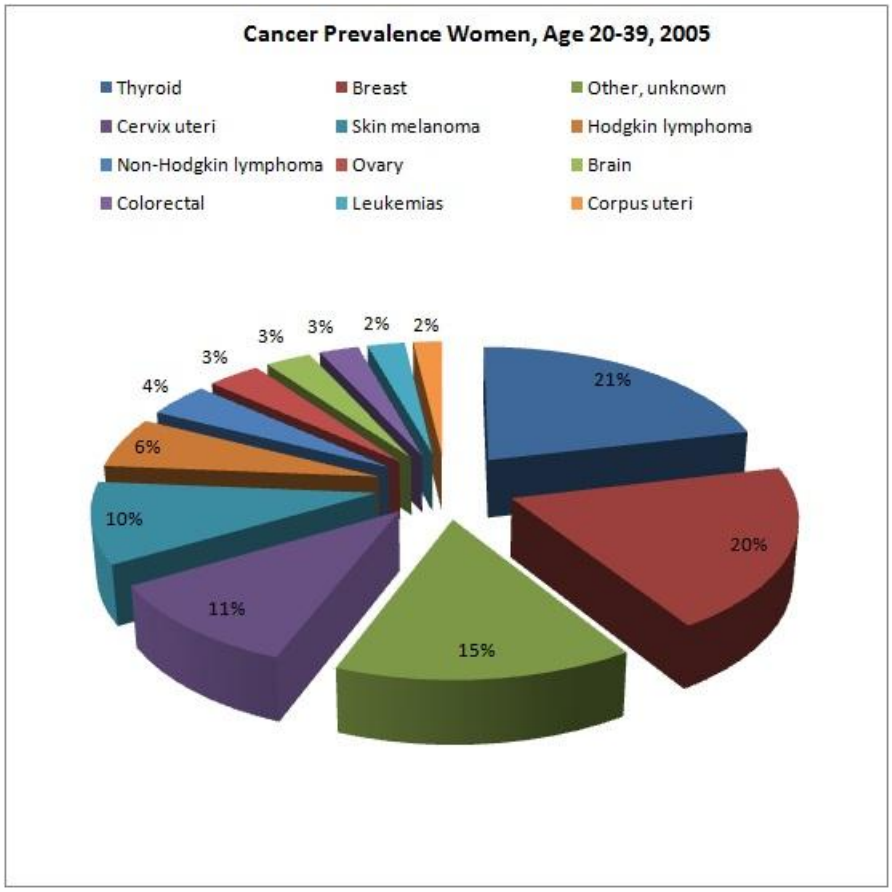
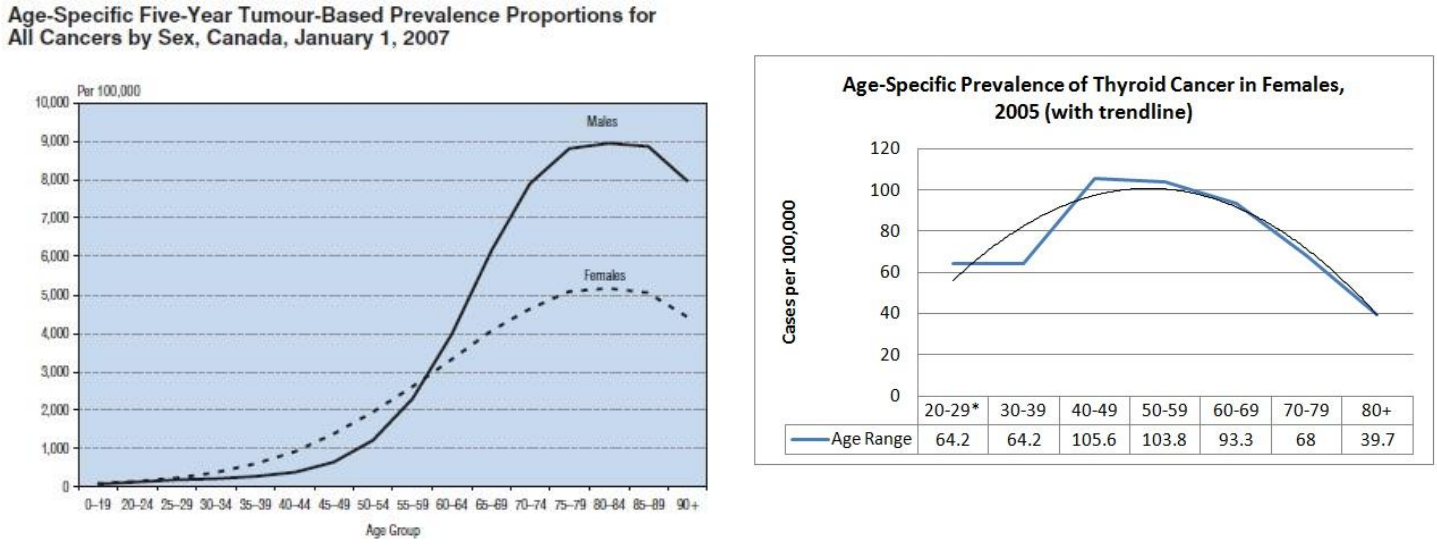


Figure 4 - Cancer Prevalence in Women age 20-39 (ref: adapted from Table 3, *Age-specific , five-year proportions for all cancers combined, by sex, Canada, January 1, 2005*)

Similarly, the prevalence of thyroid cancer in women in the year 2005 (that is, the number of surviving women post-diagnosis) was higher than that of any other type of cancer for those age 20-39 (Figure 4). Of all female cancer survivors, more than 21% (in the youngest adult age group) are living in the aftermath of thyroid cancer. This for example, represents a larger group than those who survived breast cancer (at 20%).[vi]

Cancer as a group of diseases, has a sharp rate of increase in prevalence for those over 60 years of age. However, the prevalence of thyroid cancer greatly contrasts with this trend. Rather than representing an upward trend over decades, prevalence of thyroid cancer is on a bell-curve with the highest prevalence in the age 40-49 group. This reflects the heightened time of incidence/diagnosis in the age range of 20-39 described above. The Statistics Canada data is not attuned to this unique feature in the format of its cancer report and combines the first 2 decades of adulthood into a 20-39 age group, whereas it individualizes the other decades. We have separated and averaged the 2 decades in Figure 5B*)



Figures 5A + 5B - Figure 5A illustrates average age curve for all cancers combined (ref: CCS Annual Statistics, 2011, Figure 8.1) Figure 5B illustrates age curve of thyroid cancer prevalence in women (re: adapted from Table 3, *Age-specific , five-year proportions for all cancers combined, by sex, Canada, January 1, 2005*, Statistics Canada)

3. Greatest Range of Possible Outcomes

Thyroid Cancer is divided into 4 main types or subgroups of disease. The vast majority (85-95%) have a very curable form known as Papillary. The cure rate for this type is excellent, especially in young women (near 100% cure rate for this segment). However, the rare type known as Anaplastic (1-2%) has amongst the worst prognosis for any possible type of cancer and is almost always fatal, with the vast majority of patients dying within a few months of diagnosis.

On a spectrum, most patients fall between the two extremes of possibilities.

What needs to be recognized is that a significant segment of patients have a more aggressive form of the common (curable) type of the disease, as they were diagnosed at a later stage and/or have a rare or aggressive sub-variant.

Patients over 45 years old at diagnosis and males are also amongst those at greater risk. Up to 22% of patients who have the otherwise highly curable form of the disease, fall into a high risk group[vii]. The survival rate for the latter group drops from 99% to 57%.

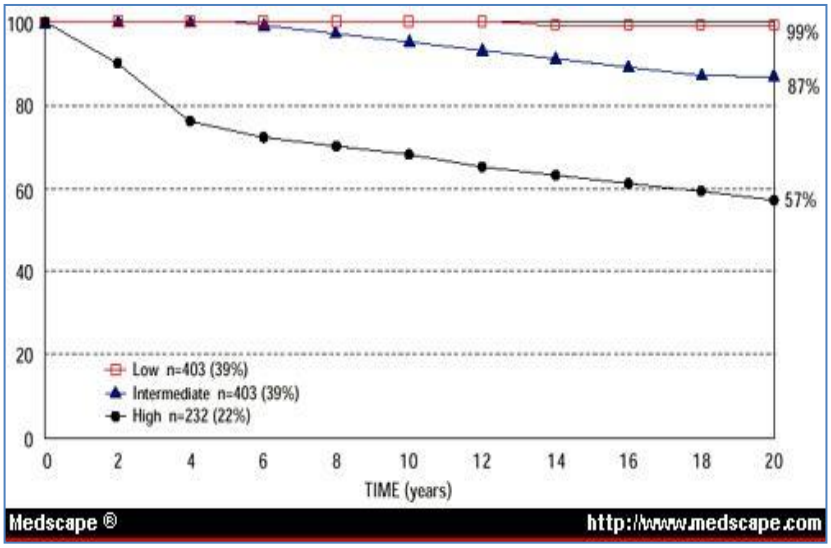


Figure 6 - Survival Trends Based on Level of Risk at Diagnosis (ref: Memorial Sloan-Kettering Cancer Center thyroid data base, 1,038 patients)

4. Prevention

With the exception of those exposed to very high doses of ionizing radiation (such as those in the area of the Chernobyl nuclear meltdown 25 years ago), there is no known cause or association to thyroid cancer established for the most common types. There is some promise for further research in the area of genetics, with one form of Medullary thyroid cancer having well-established familial heredity connections, and other forms of thyroid cancer showing some greater-than-chance inheritability as well.

There are no known preventative actions -- including health or lifestyle changes -- to avoid being afflicted with thyroid cancer. In fact studies in this area provide conflicting information. For example some studies suggest an association to lack of iodine in the diet, and others to ingesting too much iodine. One study purports: "Research suggests that chronic iodine deficiency is associated with an increased risk of follicular carcinomas, whereas high iodine intake is associated with increased papillary carcinoma".[viii]

Unlike many other cancers, thyroid cancer in its early stages usually has no warning signs or health side-effects. There are no cancer marker tests to warn of or lead to a diagnosis, other than the tests which are conducted once a nodule becomes apparent by other means.

Other than exposure to radiation, there are some other factors that are considered risk factors, however for the most part they are very non-specific. These factors include: benign thyroid conditions, family history of thyroid cancer, and some inherited conditions.

Small thyroid cancer nodules are often palpable before they are otherwise noticed by the patient. That is, if a physician includes a thyroid gland palpation during a physical examination he/she can often take notice of small thyroid nodules. Although the vast majority of thyroid nodules are benign, thyroid cancer experts suggest that any nodule greater than 1 cm in size, and/or growing in size in a relatively short interval, should be further investigated. Some studies suggest that all palpable thyroid nodules should be investigated (using ultrasound) especially if other clinical risk factors exist (family history, etc.)[ix]

With thyroid cancer incidence rising rapidly, it seems prudent that all physicians conducting a routine clinical physical exam include a neck examination. Furthermore, this procedure should be a standardized and established inclusion in all medical jurisdictions. Medical doctors of various specialities (but especially family practice physicians) would be well-advised to include a neck exam in their standard practice and examinations of all patients.

5. Surgical After-Effects

For the most part, thyroidectomy surgery (the primary treatment for all thyroid cancer types) is very safe and very effective, with relatively few negative after-effects. However, in an international survey of patients' experiences conducted in 2010 by an association of patient groups (Thyroid Cancer Alliance) of almost 2,400 respondent-patients, the researchers found that patients reported far greater number of after-effects than what is normally reflected in the scientific literature. For example in the literature[x], temporary hypoparathyroidism (a potentially highly debilitating medical issue creating low blood calcium levels) was cited as occurring 27.8% of the time following surgery, whereas patients report it at a rate of 39%. Worse still, the literature claims this to be a permanent issue in 4.8% of patients, whereas in the patient survey 32% of respondents who had this issue reported it to be a lasting after-effect.

In the Thyroid Cancer Alliance study, post-surgery after-effects were frequent with several symptoms reported by more than a quarter of respondents undergoing a neck operation (Figure 7). At least some post-surgery symptoms remained unresolved in 1,010 respondents, which corresponded to 57.9% of those noting such symptoms (n= 1743) and 42.4% of the total undergoing neck operations for thyroid cancer (n= 2380).

Several of the symptoms, namely, low blood calcium levels (parathyroid), voice problems, numbness, and restricted neck/shoulder movement, persisted in more than one third of affected respondents (Figure 8).

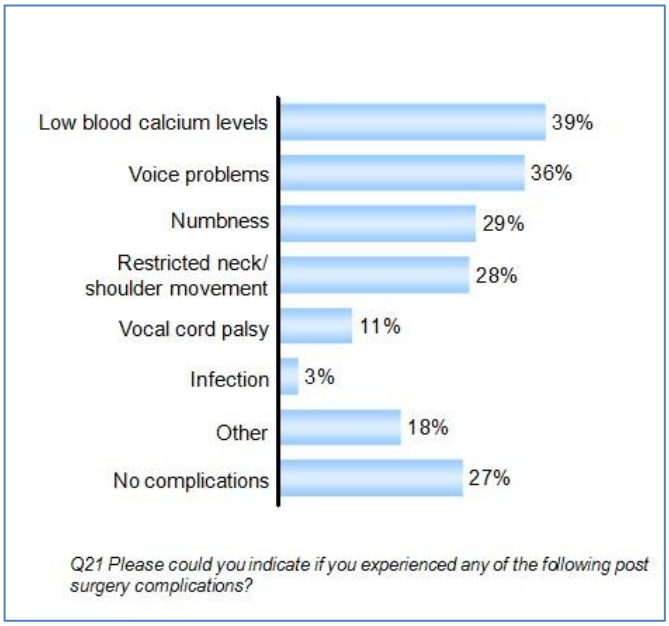


Figure 7 - Surgical Complications, TCA Patient Survey, 2010

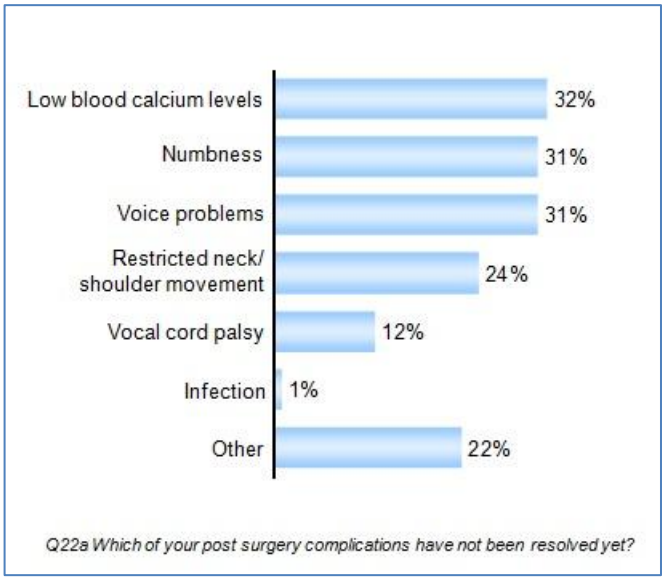


Figure 8 - Of those Reporting After-Effects, Surgical Complications Unresolved, TCA Patient Survey, 2010

6. Treatment of Thyroid Cancer

The main treatment for all types of thyroid cancer is surgery to remove the gland.

Following surgery all patients must take thyroid hormone in pill form, daily. For those with the most common forms of the disease (known as 'differentiated disease' such as Papillary and Follicular and some sub-variants) the dose of the replacement hormone is titrated to keep Thyroid Stimulating Hormone (TSH) levels relatively low (measured via blood tests) and taking a daily pill becomes the second most important form of treatment, as it prevents recurrence of the disease. Patients must be followed by expert clinicians for life to assure that the TSH is balanced and in the targeted range, while at the same time being mindful of possible long term side effects such as

bone loss and heart arrhythmia. The fact that most patients have lost a major organ of their body, have lifelong requirement for balanced hormone levels, and regular follow-up blood tests (often requiring expertise of a thyroid cancer specialist such an endocrinologist to interpret) akin the decades of post-surgery life to other chronic diseases.

Another common treatment for differentiated disease is radioactive iodine treatment (RAI). This treatment is unique to thyroid cancer. There are several possible after-effects of the treatment -- some common but temporary (loss of taste, pain in salivary glands) and some rare but permanent (blockage to tear ducts requiring corrective surgery). RAI treatment is also associated with a slightly higher risk of a secondary cancer.[xi] Currently there is some debate in the scientific community as to which patients are appropriate candidates for this form of treatment, suitable treatment doses, etc.

RAI treatment has a set of other issues associated with it, as special preparation for the treatment must be undertaken, such as several weeks of withdrawal from replacement hormone or temporary use of a special medication (rhTSH). Additionally patients must prepare with a special Low Iodine Diet.

7. High Rate of Recurrence

Patients are often given good news about their overall prognosis, which is greatly appreciated. However clinicians sometimes 'paint a rosier picture' than what is reflected in real circumstances and go so far as to call thyroid cancer "the good cancer". In actuality, thyroid cancer has a high recurrence rate of up to 30% and that recurrence can happen up to 30 years after the initial treatment. As well, patients over 45 years old at diagnosis have a higher rate of recurrence.[xii]

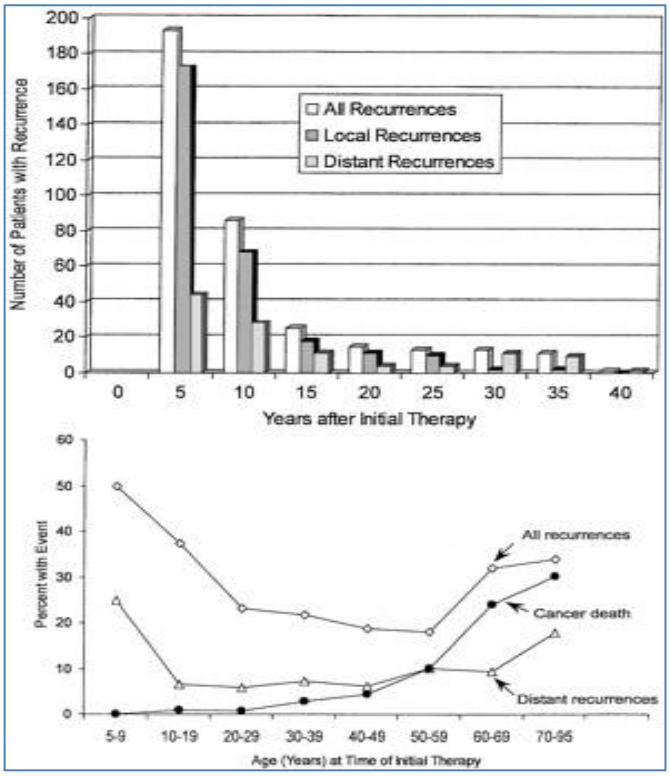


Figure 9 - Recurrence Rates, Ernest L. Mazzaferri and Richard T. Kloos, 2001

8. Low Ratio of Research Dollars Invested

The dollar investment in research per type of cancer is extremely disproportional. For example, *brain cancer* had a ratio of over $8,000 invested per patient in 2007, with a 10 year average of over $3,000 per patient. Comparatively, *thyroid cancer* researchers invested $171 per patient in 2007, with a 10 year average of $29 per thyroid cancer patient![xiii]

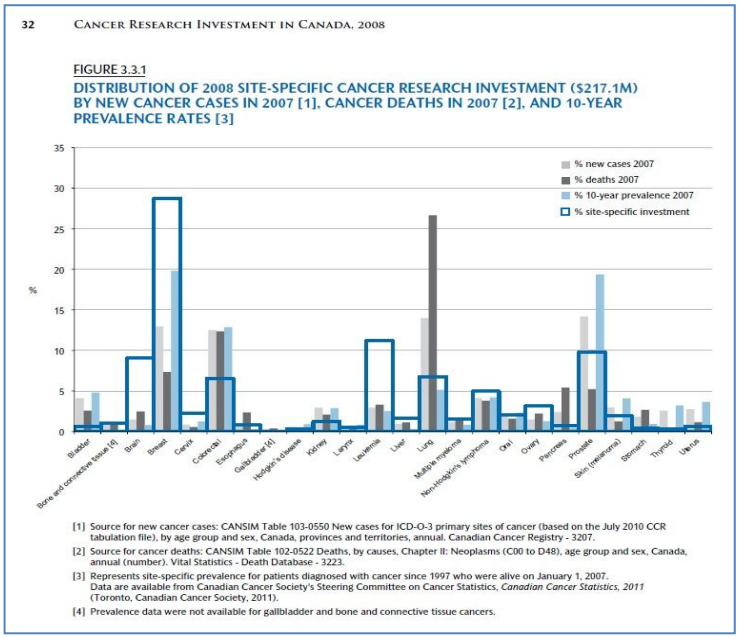


Figure 10 - Cancer Research Investment (ref: CRIC 2011)

As well, many Canadians who make personal donations to large national cancer funds intending or specifying that monies they donate be allocated to 'thyroid cancer' research and/or thyroid cancer patient-support, are unaware that this is currently not a possibility. For example:

- Canadian Cancer Society allows donors to specify a form of cancer to allocate their donation to, but does not include 'thyroid cancer' amongst those choices of cancers
- online search of Canadian Cancer Society Funding Database, including all studies financially supported to date by the CCS (since 1947) found only 2 (of 5) studies listed in a search of 'thyroid' were studies directly related to thyroid cancer[xiv] (in total $450 million has been allocated to research by the CCS in the last 10 years; of that $800,000 to the 2 thyroid cancer studies; that represents .002% of total funds)

9. Thyroid Cancer & Bankruptcy

Unlike many other cancers, the period of time to diagnosis and treat thyroid cancer, and the recovery from surgery and treatment, is often prolonged. Once diagnosed, the treatment and follow-up for thyroid cancer is life-long. Not only does thyroid cancer have a relatively high recurrence rate (see #6 above), but 'loosing' the thyroid gland has the effect of creating a chronic condition in patients, which must be mitigated through a daily dose of hormone replacement. The hormone medication not only serves to replace that which had previously been produced by the gland, but also acts as a treatment against recurrence. It is not unusual for patients to require a prolonged series of

titrations of their dosage initially as well at other points in their lifecycle to create the ideal level of hormone, whilst during this balancing process possibly feeling very unwell.

Additionally, the preparation for and recovery from RAI treatment (if needed) often takes weeks, and patients must be isolated for at least one week post-treatment.

The combination of all these factors may help to explain why thyroid cancer patients have the second highest risk of financial bankruptcy, measured as a conditional probability at 5 years post diagnosis.[xv]

	Lung	Thyroid	Leukemia/ lymphoma	Uterine	Colorectal	Melanoma	Breast	Prostate
Conditional probability of bankruptcy at 5 years	7.70%	4.80%	3.60%	3.20%	3.10%	3.00%	2.90%	1.70%
Hazard ratios*								
Age =65	-	-	-	-	-	-	-	-
Female	-			n/a		+	n/a	n/a
Married	+						-	
Regional**	-				-			
Distant**	-		-		-			
Surgery	+				+		+	
Radiation								
Chemotherapy	+				+		+	
White				-			-	-

* Indicates a higher (+) and lower (-) bankruptcy risk; significant at a=.05. Models adjusted for year of diagnosis and rural/urban residence. **Reference = localized stage at diagnosis.

Figure 11 - Cancer Diagnosis as a Risk Factor in Bankruptcy
http://www.asco.org/ASCOv2/Meetings/Abstracts?&vmview=abst_detail_view&confID=102&abstractID=82633

10. Off the Radar

Despite the significant rise in incidence, the high prevalence, the lack of explanation for causes of the disease and/or conflicting theories[xvi], proportionally little attention is paid to thyroid cancer.

A very simple internet Google search of 'breast cancer' for example lends one to over 127 million hits, whereas a 'thyroid cancer' search will only produce 5 million listed links (less than .04% as many links). Another telling factor is the simple word count in the recent *American Cancer Society* publication "Cancer Facts & Figures 2012"[xvii]. The average number of words in each section of description of the six 'leading cancers' (which includes: new cases, deaths, signs & symptoms, risk factors, early detection, treatment and survival) is 480 words on average. In contrast, the word count for thyroid cancer is 288 words.

The lack of attention paid to thyroid cancer is in effect a circular problem. In very simple terms, with less exploration of thyroid cancer, less resources are assigned to it. With less resources assigned, it remains an unknown entity -- and we wait longer for significant advancements.

11. Next Steps?

Despite the obvious growing patient population and the needs of thyroid cancer patients, resources in the community are not keeping pace. There is a great demand for more expert clinicians, researchers, support services, and more informational resources.

As well, authoritative sources of information do not always keep pace with needs or findings.

Certainly there is cause for more research to help ascertain the elements that lead to the development of thyroid cancer, how to best treat it, and how to prevent it. In the meantime, there is also great need for additional support resources.

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[i] World Health Organization, International Agency for Research on Cancer: http://globocan.iarc.fr/
[ii] Canadian Cancer Society, Canadian Cancer Statistics, 2011
[iii] Thyroid Cancer Incidence In Ontario (Feb 1010) Cancer Care Ontario
[iv] Canadian Cancer Society, Canadian Cancer Statistics, 2009
[v] Canadian Cancer Society, Canadian Cancer Statistics, 2011
[vi] Cancer prevalence in the Canadian population, Research Article, Health Reports, Vol. 20, no.1, March 2009, Statistics Canada, Catalogue no. 82-003-XPE
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[viii] Peterson E , De P , Nuttall R , 2012 BMI, Diet and Female Reproductive Factors as Risks for Thyroid Cancer: A Systematic Review. PLoS ONE 7(1): e29177. doi:10.1371/journal.pone.0029177
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[xii] Current Approaches to Primary Therapy for Papillary and Follicular Thyroid Cancer , Ernest L. Mazzaferri and Richard T. Kloos, The Journal of Clinical Endocrinology & Metabolism Vol. 86, No. 4 1447-1463, 2001
[xiii] Canada Research Investment in Canada 2008
[xiv] Canadian Cancer Society Funding Database (search of all years up to 2016) http://webapps.cihr-irsc.gc.ca/funding/run_search
[xv] Cancer diagnosis as a risk factor for personal bankruptcy. S. D. Ramsey, C. R. Fedorenko, K. S. Snell, A. C. Kirchhoff, W. Hollingworth, D. K. Blough; Fred Hutchinson Cancer Research Center, Seattle, WA; University of Bristol, Bristol, United Kingdom; University of Washington, Seattle, WA J Clin Oncol 29: 2011 (suppl; abstr 6007)
[xvi] Peterson E , De P , Nuttall R , 2012 BMI, Diet and Female Reproductive Factors as Risks for Thyroid Cancer: A Systematic Review. PLoS ONE 7(1): e29177. doi:10.1371/journal.pone.0029177
[xvii] American Cancer Society. *Cancer Facts & Figures 2012*. Atlanta: American Cancer Society; 2012

For more information contact:
Rita Banach
rbanach@thyroidcancercanada.org