衞生防護中心
Centre for Health Protection

Cancer Expert Working Group on Cancer Prevention and Screening

Recommendations on Prevention and Screening for Thyroid Cancer For Health Professionals

Local epidemiology

1. In 2015, thyroid cancer was the 17th commonest cancer in males and the 5th commonest cancer in females. A total of 801 thyroid cancer cases (160 in males and 641 in females) were recorded, accounting for 2.6% of all newly diagnosed cancer cases. The median age at diagnosis was 54 in males and 49 in females. The crude incidence rates were 4.8 in males and 16.3 in females per 100,000 population.[1] The age-standardised incidence rate (ASIR) were 3.4 in males and 12.3 in females per 100,000 standard population.

2. There were 50 deaths due to thyroid cancer in 2016, ranking thyroid cancer the 23rd leading cause and constituting 0.4% of all cancer deaths. The crude mortality rates were 0.6 in males and 0.8 in females per 100,000 population.[2] The age-standardised mortality rates (ASMR) of thyroid cancer were 0.3 in both males and females per 100,000 standard population.

3. Thyroid cancer is the commonest endocrine malignancy and its incidence has been rapidly increasing worldwide.[3,4,5] The highest incidence rate has been recorded in the Republic of Korea (commonly known as South Korea), in which the ASIR in both sexes were five to eight times of those in Hong Kong in 2012. Higher incidence rates are also reported in some countries including Canada, the United States, Australia and France when comparing to Hong Kong.[6]

4. A rising trend has also been noted in Hong Kong in the past decade. According to the Hong Kong Cancer Registry, stage I thyroid cancer, which constituted up to half of all thyroid cancer incidence (despite more than 20% of all were of unknown stage), accounted for the vast majority of the rise in ASIR.

5. In Hong Kong from 2005 to 2015, papillary thyroid carcinoma and follicular thyroid carcinoma accounted for about 85% and 10% respectively of all thyroid cancer incidence.[7] As in other countries,[8] medullary thyroid carcinoma and anaplastic thyroid carcinoma are less common.[7]

Risk factors

6. Although the aetiology of thyroid cancer is not fully understood, exposure to ionizing radiation, especially during childhood, is a recognised cause of thyroid cancer.[3]

7. Radiation exposure as a consequence of nuclear fallout has been associated with an increased risk of thyroid cancer, especially in children.[9,10,11] After the Chernobyl nuclear power plant accident in 1986, an unprecedented rise in papillary thyroid cancer development during childhood in the most contaminated areas of Belarus, the Russian Federation and Ukraine[12] was observed in subsequent years.[3]

8. Radiation therapy administered in infancy or childhood of the head and neck (such as enlarged thymus, tonsils or adenoids, or acne) also increases the risk of thyroid cancer, with diagnosis occurring in as short as 5 years after exposure.[13] Indeed, a study showed a 13% increase in thyroid cancer risk for every 10 reported dental radiographs.[14]

9. Hereditary non-medullary thyroid cancer occurs not as a single entity but as part of different tumour syndromes such as Cowden syndrome, Carney complex, Garden syndrome (familial adenomatous polyposis syndrome) and Werner syndrome.[15] For non-syndromic familial non-medullary thyroid cancer, epidemiological data indicate a very high likelihood of familial aggregation and hence a strong genetic component.[15] On the other hand, about 25% of all medullary thyroid cancers occur as part of the multiple endocrine neoplasia type 2 (MEN2) syndrome.[16,17]

Primary prevention

10. Since ionizing radiation predisposes to thyroid cancer, exposure to ionizing radiation, especially in children, should be avoided whenever possible.[3] In cases of populations or individuals are exposed to unacceptable levels of radioactive iodine, the thyroid can be protected by administering thyroid blocking agent like potassium iodide.[18,19,20]

11. Additional research into possible environmental aetiology is also warranted, so that primary prevention efforts can be informed.[21]

Early detection

12. Thyroid cancer does not always have symptoms, so it can be hard to detect and diagnose. Prompt attention to signs and symptoms is the best way to diagnose most thyroid cancers early.

13. Although a lump in the neck is a common symptom of thyroid cancer, neck pain, and persistent voice changes, pain in the throat or coughing may also occur. Medullary thyroid cancer can cause unusual symptoms and one might have frequent loose bowel movements or flushing in the face. Individuals with any of these signs or symptoms should seek medical assessment right away. Many of these symptoms can also be caused by non-cancerous conditions or even other cancers of the neck area.

Screening

14. Evidence of the accuracy of thyroid cancer screening by neck palpation, ultrasonography, or both is limited.[22] There is no randomised-controlled trial (RCT) done to evaluate the effect of thyroid cancer screening on patient morbidity or mortality compared with no screening; or whether earlier treatment or treatment of screen-detected, well-differentiated thyroid cancer compared with observation (i.e. delayed or no treatment) resulted in better patient outcome.[22] No RCT of intermediate endpoints (for example, changes in stage at diagnosis) has been conducted either.[23]

15. Although neck palpation and thyroid ultrasonography per se are very low risk procedures, a suspicious screening result can set off a chain of events that may be associated with harm. For instance, the risks of thyroid fine-needle aspiration include hospitalization, post-procedural hematoma and needle tract tumour implantation.[22] More importantly, the results of cytology can lead to additional tests and surgery with specific risks including recurrent laryngeal nerve injury and hypoparathyroidism.[23]

Overdiagnosis

16. Screening may have the potential for early detection of malignant thyroid nodules that could make treatment more effective than if detected later. However, screening may also result in overdiagnosis (identification of a thyroid malignancy that likely would not have caused symptoms or death during a patient's lifetime),[22] because it can detect very small or indolent tumours that might never affect a person's wellbeing or survival.[24,25] As such, the harms of surgery and radioactive iodine treatments as well as psychological stress that follow from a positive screening and diagnosis result raise considerable concern.

17. Ecologic data showed that thyroid cancer screening resulted in detection of thyroid cancers that would not have been diagnosed otherwise. Increases in incidence without much change in mortality in countries in which opportunistic thyroid cancer screening occurs cannot be explained by changes in treatment or risk factor prevalence over the years.

18. In South Korea, thyroid cancer screening increased dramatically in conjunction with the 1999 establishment of a free national cancer screening programme. Although not offered as part of the free package, thyroid cancer screening with ultrasonography was offered simultaneously at low cost, and many South Koreans opted for this examination.[26] It was then reported that the thyroid cancer incidence increased 15-fold from 1993 to 2011 when no change in thyroid cancer mortality occurred concurrently.[27,28] This has presented a compelling case to argue against thyroid cancer screening in community settings.[23]

19. Over time, the thyroid cancer incidence rates in Hong Kong as well as in countries including the United States and the United Kingdom have increased, but thyroid cancer mortality has remained constant or decreased slightly.[29,30] Such trends and patterns is consistent with the detection of cancers that are not destined to cause symptoms or result in death (i.e. overdiagnosis) and support the interpretation of the South Korean findings.[31]

20. Autopsy studies also support the explanation of overdiagnosis resulting from thyroid cancer screening. A 2014 review of 15 autopsy studies reported a 11.5% yield of papillary thyroid carcinoma, although the range across studies was wide (1.0% to 35.6%).[32] Natural history studies have demonstrated the slow growing nature of thyroid tumours, tumour stability, and low potential for recurrence.[33]

International recommendation and practice

21. No professional medical society recommends population-based screening for thyroid cancer.[34-43] In 2014, the British Thyroid Association stated that no screening is indicated for the general population.[42] In May 2017, the US Preventive Services Task Force (USPSTF) recommended against thyroid cancer screening for the general population because, based on observational evidence, the net benefit of screening for thyroid cancer is negative.[34]

34. South Korea appears to be the only country that regularly practices screening for asymptomatic thyroid cancer using ultrasonography. Nevertheless, this practice began to wane in 2013 because of concerns about overdiagnosis and overtreatment. Indeed, the

Korean Committee for National Cancer Screening Guidelines issued a recommendation against thyroid cancer screening with ultrasonography for healthy individuals in 2015.[27]

Local consideration and recommendation

22. Taking into consideration the overall scientific evidence including international practice and local epidemiology, screening for thyroid cancer will result in harms that outweigh the benefits. Hence, screening for average risk persons is not recommended.

23. The Cancer Expert Working Group on Cancer Prevention and Screening (CEWG) thus formulated recommendations on thyroid cancer screening as follows:

For persons at average risk	
1.	Screening for thyroid cancer is not recommended in asymptomatic persons at average risk.
For persons at increased risk	
2.	Persons at increased risk, including those with a history of head or neck irradiation in infancy or childhood, familial thyroid cancer or family history of multiple endocrine neoplasia type 2 (MEN2), should consider seeking advice from doctors regarding the need for and approach of screening.

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References

1. Thyroid Cancer in 2015. Hong Kong Cancer Registry, Hospital Authority. Available at: http://www3.ha.org.hk/cancereg/pdf/factsheet/2015/thyroid_2015.pdf. Last accessed 7 November 2017.

2. Mortality Statistics 2016.Department of Health and Census and Statistics Department, HKSAR.

3. Stewart BW, Wild CP, Editors. World Cancer Report 2014. Lyon, France: International Agency for Research on Cancer.

4. Jemal A, Bray F, Center MM, et al. Global cancer statistics. CA Cancer J Clin. 2011;61(2):69-90.

5. Pellegriti G, Frasca F, Regalbuto C, et al. Worldwide increasing incidence of thyroid cancer: update on epidemiology and risk factors. J Cancer Epidemiol. 2013;965212.

6. Ferlay J, Soerjomataram I, Ervik M, et al. GLOBOCAN 2012: Estimated Cancer Incidence, Mortality and Prevalance Worldwide in 2012. Lyon, France: International Agency for Research on Cancer. Available at: http://globocan.iarc.fr. Last accessed 27 October 2017.

7. Ngan RKC. Progress Report of the Hong Kong Cancer Registry. Slides presented in the meeting of the 11th Cancer Coordinating Committee meeting on 5 May 2017.

8. Katoh H, Yamashita K, Enomoto T, et al. Classification and General Considerations of Thyroid Cancer. Ann ClinPathol2015;3(1):1045.

9. Pacini F, Vorontsova T, Molinaro E, et al. Prevalence of thyroid autoantibodies in children and adolescents from Belarus exposed to the Chernobyl radioactive fallout. Lancet 1998;352 (9130): 763-6.

10. Cardis E, Kesminiene A, Ivanov V, et al. Risk of thyroid cancer after exposure to 131I in childhood. J Natl Cancer Inst2005;97(10):724-32.

11. Tronko MD, Howe GR, Bogdanova TI, et al. A cohort study of thyroid cancer and other thyroid diseases after the chornobyl accident: thyroid cancer in Ukraine detected during first screening. J Natl Cancer Inst2006;98(13):897-903.

12. World Health Organization. Health effects of the Chernobyl accident: an overview. April 2006. Available at: http://www.who.int/ionizing_radiation/chernobyl/backgrounder/en. Last accessed 9 November 2017.

13. Carling T, Udelsman R: Thyroid tumors. In: DeVita VT Jr, Lawrence TS, Rosenberg SA: Cancer: Principles and Practice of Oncology. 9th ed. Philadelphia, Pa: Lippincott Williams & Wilkins, 2011;pp1457-72.

14. Neta G, Rajaraman P, Berrington de Gonzalez A, et al. A prospective study of medical diagnostic radiography and risk of thyroid cancer. Am J Epidemiol 2013;177:800-809.

15. Weber F, Eng C. Update on the molecular diagnosis of endocrine tumors: toward – omics-based personalized healthcare? J Clin Endocrinol Metab 2008;93:1097-1104.

16. Moline J, Eng C. Multiple endocrine neoplasia type 2: an overview. Genet Med 2011;13:755-764.

17. Salvatore G, Giannini R, Faviana P, et al. Analysis of BRAF point mutation and RET/PTC rearrangement refines the fine-needle aspiration diagnosis of papillary thyroid carcinoma. J

ClinEndocrinolMetab2004;89(10):5175-80.

18. Administration of Radioactive Substances Advisory Committee. Notes for guidance on the clinical administration of radiopharmaceuticals and use of sealed radioactive sources. Didoct, Oxon: ARSAC, 2006.

19. International Atomic Energy Agency. Intervention criteria in a nuclear or nuclear radiation emergency. Safety series number 109. Vienna: IAEA, 1991.

20. International Commission on Radiological Protection. ICRP publication 63: Principles for intervention for protection of the public in radiological emergency. Oxford: Pergamon Press, 1991.

21. Cappola AR. How to Look for Thyroid Cancer. JAMA. 2017 May 9;317(18):1840-41.

22. Lin JS, Bowles EJA, Williams SB, et al. Screening for Thyroid Cancer: Updated Evidence Report and Systematic Review for the US Preventive Services Task Force. JAMA. 2017 May 9;317(18):1888-1903.

23. PDQ Screening and Prevention Editorial Board. Thyroid Cancer Screening (PDQ®): Health Professional Version. PDQ Cancer Information Summaries. Bethesda (MD): National Cancer Institute (US); 2002-2017 Aug 29.

24. Cramer JD, Fu P, Harth KC, et al. Analysis of the rising incidence of thyroid cancer using the Surveillance, Epidemiology, and End Results national cancer data registry. Surgery. 2010;148(6):1147-1152.

25. Hughes DT, Haymart MR, Miller BS, et al. The most commonly occurring papillary thyroid cancer in the United States is now a microcarcinoma in a patient older than 45 years. Thyroid. 2011;21(3):231-236.

26. Ahn HS, Kim HJ, Kim KH, et al. Thyroid Cancer Screening in South Korea Increases Detection of Papillary Cancers with No Impact on Other Subtypes or Thyroid Cancer Mortality. Thyroid 2016;26(11):1535-1540.

27. Ahn HS, Kim HJ, Welch HG: Korea's thyroid-cancer "epidemic" - screening and overdiagnosis. N Engl J Med 2014;371(19):1765-7.

28. Park S, Oh CM, Cho H, et al.: Association between screening and the thyroid cancer "epidemic" in South Korea: evidence from a nationwide study. BMJ 2016;355:i5745.

29. Lim H, Devesa SS, Sosa JA, et al. Trends in Thyroid Cancer Incidence and Mortality in the United States, 1974-2013. JAMA 2017;317 (13):1338-1348.

30. Cancer Research UK: Thyroid Cancer Incidence Statistics. London, UK: Cancer Research UK. Available at: http://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/thyroid-cancer/incidence.Last accessed 27 October 2017.

31. Vaccarella S, Franceschi S, Bray F, et al. Worldwide Thyroid-Cancer Epidemic? The Increasing Impact of Overdiagnosis. N Engl J Med 2016;375(7):614-7.

32. Lee YS, Lim H, Chang H-S, Park CS. Papillary Thyroid Microcarcinomas Are Different from Latent Papillary Thyroid Carcinomas at Autopsy. *Journal of Korean Medical Science*. 2014;29(5):676-679.

33. Oda H, Miyauchi A, Ito Y, et al. Incidences of Unfavorable Events in the Management of Low-Risk Papillary Microcarcinoma of the Thyroid by Active Surveillance Versus Immediate Surgery. Thyroid 2016;26(1):150-5.

34. US Preventive Services Task Force, Bibbins-Domingo K, Grossman DC, et al. Screening for Thyroid Cancer: US Preventive Services Task Force Recommendation Statement. JAMA. 2017 May 9;317(18):1882-1887.

35. American Cancer Society. Can thyroid cancer be found early ? https://www.cancer.org/cancer/thyroid-cancer/detection-diagnosis-staging/detection.html.Last accessed 27 October 2017.

36. American Academy of Family Physicians. Clinical preventive service recommendation: thyroid cancer. http://www.aafp.org/patient-care/clinical-recommendations/all/thyroid.html. 1996.Last accessed 27 October 2017.

37. Haugen BR, Alexander EK, Bible KC, et al. American Thyroid Association Guidelines Task Force on Thyroid Nodules and Differentiated Thyroid Cancer. 2015 American Thyroid Association Management Guidelines for Adult Patients With Thyroid Nodules and Differentiated Thyroid Cancer. Thyroid. 2016;26(1):1-133.

38. Gharib H, Papini E, Garber JR, et al. AACE/ACE/AME Task Force on Thyroid Nodules. American Association of Clinical Endocrinologists, American College of Endocrinology, and Associazione Medici Endocrinologi medical guidelines for clinical practice for the diagnosis and management of thyroid nodules - 2016 update. Endocr Pract. 2016;22(5):622-639.

39. Canadian Task Force on Preventive Health Care. Available at: https://canadiantaskforce.ca/guidelines/published-guidelines. Last accessed 27 October 2017.

40. Ridley J, Ischayek A, Dubey V, et al. Adult health checkup: update on the Preventive Care Checklist Form. Can Fam Physician. 2016;62(4): 307-313.

41. Private screening for health conditions: NHS recommendations. Public Health England. Available at: https://www.gov.uk/guidance/private-screening-for-health-conditions-nhs-recommendations. Last accessed 27 October 2017.

42. Perros P, Boelaert K, Colley S, et al. Guidelines for the management of thyroid cancer. British Thyroid Association. Clin Endocrinol (Oxf). 2014 Jul;81Suppl 1:1-122.

43. National Institute for Health and Care Excellence. Available at: https://www.nice.org.uk/guidance/conditions-and-diseases/diabetes-and-other-endocrinal--nutritional-and-metabolic-conditions/thyroid-disorders. Last accessed 27 October 2017.