Ct hypodense lesion thyroid

1Sechicing medicine department of pulmonary and critical unwanted care, Jeju National University Hospital, School of Medicine, Jeju National University, Jeju, KoreaFind articles by Jong Hoo Lee2Department of Radiology, Jeju National University Hospital, School of Medicine, Jeju National University, Jeju, KoreaFind articles by Sun Young Jeong3Department of Pulmonary and Critical Critical Care Medicine, Kyung Hee University Hospital at Gangdong, School of Medicine, Kyung Hee University, Seoul, KoreaFind articles by Yee Hyung Kim1Department of Pulmonary and Critical Care Medicine, Jeju National University Hospital, School of Medicine, Jeju National University, Jeju, Korea2Department of Radiology, Jeju National University Hospital, School of Medicine, Jeju National University, Jeju, Korea3Department of and Critical Care Medicine, Kyung Hee University Hospital at Gangdong, School of Medicine, Kyung Hee University, Seoul, KoreaCorresponding author. Jong Hoo Lee: moc.lapme@23xafuok; Sun Young Jeong: moc.liamg@8277ys; Yee Hyung Kim: moc.revan@29cmuk 2013 Jan 25; 2013 Jan 25; 2013 2013 Adopted May 31. Random thyroid nodules (ITN) are defined as newly nodules defined in an image performed for an unrelated purpose. In practice, ITN is often detected on compressed chest tomography (CT). We investigated the prevalence and clinical relevance of ITN detected on CT (LDCT) in low doses for lung cancer screening. We reviewed electronic health data on patients without thyroid disease who were at the LDCT controlled national university hospital between March 2009 and February 2012. Of the 1,941 patients who received LDCT, 55(2.8%) found to have ITN. Seven (12.7 %) these cases were malignant. Positive and negative predictive chest LDCT values for the detection of random malignant thyroid nodule were 26.9% and 73.4%, respectively. The factors considered for predictable malignancies on LDCT were 55 HU or more (p =0.036) and the presence of dense calcification values (p = 0.048). The ratio of sex, age, node site, minimum lesion diameter, AP/T ratio (anteroposterior/transverse dimension), margins, density, presence of dotted calcifications and increase of the thyroid gland in discrimination of benign and malignant nodes had no significant foreseeable value. For multivariate analyses, the central attenuation value above 55 was the only statistically significant characteristic (p = 0.048). In distinguishing malignant from benign lesions, a predictable value greater than 55 HU per LDCT may be useful. Therefore, careful assessment of the gland is required for patients who are on LDCT for screening treatment for lung cancer. Keywords: Lung cancer, low dose CT, Screening, Thyroid cancer, thyroid nodules Incidence and prevalence of thyroid cancer have been increasing in recent years in Korea [1]. Although the reason for this increase is uncertain, the accidental detection of thyroid cancer through opportunistic screening may play an important role. Since 2012, the National Cancer Screening Programme in Korea has not supported routine thyroid cancer screening [2]. However, some patients examined thyroid cancer at their own expense. Random thyroid nodes (ITN) are defined as newly nodules defined in imaging, such as ultrasound imaging (USA), calculated tomography (CT) or magnetic resonance imaging (MR) performed for unrelated purpose. In the general population, the prevalence of thyroid nodes is very high [3]. Therefore, the incidence of ITN is expected to increase together with increased examination of various diseases and technical progress of different imaging methods [4,5]. Since the recent publication of the National Lung Screening Screening (NLST) [6], an increase in CT scans (LDCT) for routine lung cancer screening is expected in patients at high risk of the disease. In practice, thyroid nodules are often detected in breast CT studies for the assessment of nonthyroid diseases [7]. However, there have been few reports that have examined ITN using LDCT intended for screening treatment for lung cancer. In addition, there is paucity of data on whether the lesions on LDCT can help separate benign from malignant thyroid nodules. In this study, we sought to determine the prevalence of ITN and the degree of malignancy in patients without thyroid disease who received LDCT for lung cancer screening. In addition, functions that could be useful in distinguishing between benign and malignant thyroid nodules on LDCT have been evaluated. There is currently no official guideline for the screening of lung cancer in the Korean population. Therefore, the criteria for identifying an endangered population requiring lung cancer screening have not yet been established. Since March 2009, the National University Health Promotion Centre has conducted LDCT for lung cancer screening based on the results of previous studies, including NLST. The main signs for screening include smoking history, family history of lung cancer and lung cancer care in subjects with no smoking history or a positive family history (voluntary testing). We reviewed the electronic medical records of all patients who reviewed LDCT for lung cancer screening between March 2009 and February 2012 at Jeju National University Hospital for lung cancer screening. In 2011, 126 patients with thyroid cancer performed surgical resection at this 540-bed secondary teaching hospital. All asymptomatic and have not had cancer in the last five years In The medical data of each patient and histopathological thyroid lesions observed on LDCT were evaluated. This study protocol has been approved by the Ethics Review Committee. Due to the retrospective nature of the study, it was decided to release it. All CT scans were performed with a 16-detector line CT scanner (Sensation 16; Siemens, Erlangen, Germany) or dual-source CT scanner (SOMATOM Definition, Siemens Medical Solutions, Forchhein, Germany). CT scans were obtained from 3 cm above the chest seized to the middle of both kidneys without any improvement in contrast. The entire thyroid gland was included in all imaging studies. The acquisition parameters were 120 kVp, reseal 1,375, 0,5 second rotation time, width 40 mm of the snooty and 25-40 mA by adjusting the automatic exposure control. Axial images have been reconstructed with a wafer thickness of 2 mm using both bones and standard algorithms. A single radiologist with seven years of experience in chest CT interpretation reviewed all CT scans. ITN has been defined as a new asymptomatic thyroid nodule detected on LDCT to assess thyroid-related diseases. Benign thyroid nodule was defined as follows: 1) Benign lesion, such as adenomatous hyperplasia or follicular nodule, which was histologically confirmed by fine needle aspiration (FNA) or surgical resection or 2) us lesion, characterised mainly by cystic lesions with small solid components. In contrast, the malignant thyroid nodule was defined as a nodule that was histologically confirmed as cancerous via FNA or surgical resection. The following parameters were evaluated on LDCT for each patient: 1) focal or multiple nodes, 2) the location of the dominant node, 3) the maximum lesion diameter, 4) the ratio of the anteroposteririal dimension and the transverse dimension (ratio AP/T), 5) mean attenuation value (Hounsfield unit, HU), 6) margins (well-cirkumscribed to only poorly defined), 7) density of nodule (hypodense, isodense, hyperdense, heterogeneous, ordensely calcified), 8) calcification (dense calcification, puncture calcification, or calcification circulator), i 9) the presence of thyroid increased. Based on the parameters mentioned above, we investigated the clinical and radiological characteristics of all patients who were diagnosed with LDCT. Data are presented as figures (%) (inter-watercopyl range, IQR), unless otherwise stated. Continuous variables were compared using Student T-Tests for commonly distributed variables and Mann-Whitney U-tests for non-normal distributed variables. The univariate analysis was conducted using Chi-square tests or Fisher's accurate tests for categorical data. The multivariajata analysis was carried out by logistic regression analysis. P< 0.05 was considered statistically significant. Tuner performance feature The curve analysis was made to measure and compare the accuracy of LDCT parameters in distinguishing benign from malignant thyroid nodes. The diagnostic accuracy of the different LDCT parameters was expressed as the area under the corresponding ROC curve (AUC). All analyses were performed using SPSS version 14.0 (SPSS Inc., Chicago, IL, USA). Figure 1 shows patient enrolment and final diagnosis data. 270 of 2211 LDCT were excluded from this study because they were repeated in the same patient. One LDCT study was also excluded due to a previous thyroidectomy. The remaining 1,941 patients were enrolled in this study, of which 1,300 were male and 641 were female. The median age of the study population was 53 years (IQR: 43 to 63). 55 (2,8 %) patients were found to have an ITN on LDCT. Of these, 16 were excluded for refusing further work (n = 7) or lost to follow-up (n = 9). The remaining 39 patients were in the United States. They were found to have 7 benign lesions that did not require FNA (radiological confirmation). Sixty-six patients were sub-controlled by FNA, which revealed 19 benign nodes and 7 malignant nodes (histological confirmation). As a general point, 7(12.7%) malignant nodes were confirmed in 55 ITN patients diagnosed at the LDCT screening and all were identified as papillary carcinoma. Two patients under complete thyroidectomy and one refused surgical resection. The remaining four were either sent to other hospitals or lost to accompany them. Figures 2, 3 and 4 show characteristics on LDCT and corresponding US images in patients with confirmed benign or malignant thyroid nodules. Of the 1,886 patients whose thyroid nodes were not observed on LDCT, 49 patients were controlled by FNA due to nodes detected in the Us. Thirteen (26.5%) thyroid malignancies have been identified. Sensitivity, specificity, erroneous positivity, erroneous negativity, positive predictive value and negative predictive LDCT for the detection of malignant thyroid nodes were 35.0%, 65.4%, 34.5%, 65.0%, 26.9%, and 73.4% respectively (Table 1). Sensitivity, specificity, false positivity, false negativity, positive predictive value, i negative predictive value of incidable thyroid nod Observed on helical CT dose in patients under fine needle tendency for histological confirmation PresentAbsentna or non-safeLow chest dose CTPositive719 Negative1336Table 2 shows clinical characteristics i LDCT characteristics of ITN patients. It was more common in women and the median age of these patients was 58 years (IQR: 53-68). Baseline patient characteristics and CT characteristics with low dose random thyroid nodesCline characteristics Gender (male)21 (38.1%)Age (years)58 (53-68)≥ 60 years2 (47.2%)CT function Lesia Focal44 (80%)Multiple11 (20%): Nodules72Lokacia Right43 (59.7%)Left25 (34.7%)Isthmus4 (34.7%)Isthmus4 Diameter (mm)9.1 (6.2-15.6)≥10 mm31 (ratio 43.1%)AP/T†1.1 (0.9-1.2)AP/T ratio ≥ 151 (70.8%)Mean attenuation value (HU)54 (3) Margin Well- circumscumscribed42 (58.3%)Ill-defined3 (41.7%)Density Hypodense50 (69.4%)Isodense0 (0%)Hyperdense1 (1.3%)Heterogena2 (2.7%)Densely calculated19 (26.3%). %)Any calcifications26 (36.1%)Rimcalcification4 (5.5%)Punctate calcification4 (5.5%)Thyroid enlargement11 (15.2%)Most patients (80%) focal thyroid node. The number of nodes in patients with multiple lesies ranged from 2 to 5. The location of thyroid gland was often the right side of the thyroid gland (59.7%). The median minimum diameter, AP/T ratio and inter-private atenae value was 9.1 mm (IQR: 6.2-15.6), 1.1 (IQR: 0.9-1.2) and 54 HU (IQR: 33-114) and 54 HU (IQR: 33-114). Node boundaries were often well-district (58.3%) and the majority were hypodense (69.4%). In addition, 26 knots (36.1%) calcifications. We analysed differences in clinical characteristics and LDCT characteristics between benign and malignant thyroid nodules. The 26 patients who were finally diagnosed with benign thyroid nodes had a total of 39 nodes. Seven patients found to have malignant nodule had a total of 11 nodes. In the univariate analysis, factors that differentiateed malignant thyroid nodules from benign factors included a decrease of 55 HU or more (p =0.036) and the presence of dense calcification values (p =0.048) (Table 3). Gender, age, node location, most likely lesion diameter, AP/T ratio, edges, density, presence or pattern of calcifications, rim calcification and thyroid enlargement did not differ significantly between benign and malignant thyroid nodules. Multivariautary analysis showed that the statistically significant total attenuation value was 55 HU or higher (p = 0.048, Table 4). Differences in clinical characteristics and low-dose CT features between benign and malignant thyroid nodulesFactorBenign (n = 39)Malignant (n = 11)pSex (men)18 (46.1%)8 (72.7%)0.119Age (≥ 60 years)15 (38.4%)7 (63.6%)0.178Location of nodule Right22 (56.4%)6 (54.5%)1.000Left15 (38.4%)5 (45.4%)0.736Isthmus2 (5.1%)0 (0%)1.000Longest diameter (≥ 10 mm)18 (46.1%)3 (27.2%)0.319AP/T ratio†(≥1)27 (69.2%)6 (54.5%)0.475Mean attenuation value (≥ 55 HU)3 (27.2%)8 (72.7%)0.036Ill-defined margin18 (46.1%)2 (18.1%)0.163Density Hypodense32 (82.0%)6 (54.5%)0.105Isodense0 (0%)0 (0%)NA*Hyperdense0 (0%)0 (0%)NAHeterogeneous1 (2.5%)0 (0%)1.000Densely calcified6 (15.3%)5 (45.4%)0.048Any calcifications10 (25.6%)6 (54.5%)0.140Punctate calcification3 (7.6%)0 (0%)1.000Rim calcification1 (2.5%)1 (9.0%)0.395Thyroid enlargement8 (20.5%)0 (0%)0.174Multivariate analysis for detection of malignant thyroid nodules on low-dose CTVariablesOdds ratio95% Confidence intervalpMale3.6260.638-20.5970.146Mean attenuation value ≥55 HU9.9701.023-97.1790.048AP/T ratio† ≥ 10.3870.074-2.0260.261Longest diameter ≥ 10 mm1.2070.114-12.8200.876Densely margin0.2140.025-1.7980.155A when only 2140 was used in the ROC curve analysis. The area below the crojul (AUC) of LDCT was 0.7238 ± 0.0920 (p = 0.024, Figure 5). Using an analysis of the ROC curve, the attenuation value avoiding the lack of the most malignant thyroid node was cut off and its sensitivity and specificity was 72.7% and 66.6% respectively. Thyroid nodules often meet in clinical practice. However, the prevalence of thyroid nodes depends to a large extent on the method of screening and evaluation of the population. Autopsy data provide a gold standard for determining the true prevalence of thyroid nodes, in which prevalence of 8.2 to 64.6 % [3,8,9] has been reported in previous autopsy studies. On the other hand, several reports based on US data showed a prevalence of 19-46 % [5,10-12]. The risk of these nodules being found to be malignant is relatively low and 1,5 to 17 % is expected [7]. Recently, the NLST research group published results showing that lung cancer screening using LDCT in the chest reduced lung cancer mortality by 20 % [6]. Therefore, the use of LDCT for the screening treatment of lung cancer is expected to increase rapidly. As LDCT chest is becoming much more frequent in the modality of imaging, the incidence of thyroid-thyroid nodes detected by the way is also expected. This may lead to an increase in the number of malignant nodes detected. Few studies have assessed the role of LDCT in detecting outpatient malignancies in a population at high risk of lung cancer [13-18]. In a retrospective study of 5,201 patients receiving LDCT for lung cancer screening, 27(0.5%) diagnosed outside pulmonary malignancy, 3(0.05%) of which were thyroid crustaceans [15]. In the second study, a total of 6 malignancies were detected during a five-year lung cancer screening programme. However, despite the high number of ITN[13], thyroid cancer was not found in this endemic area. Our single-center study, based on LDCT, showed that thyroid nodes were casually detected on LDCT in 2.8% (55/1941) of all subjects without prior evidence of thyroid disease, and 12.7% of these were found to be malignant. The difference in detection rates between our study and previous studies may be due in part to the population evaluated. In contrast, studies based on contrast-enhanced CT scans showed a higher prevalence of ITN. In addition, Yoon et al is a medicine that is used for the use of yoon et al. conducted a study with 16-MDCT contrast-enhanced neck CT in 734 patients without prior thyroid disease [20]. They reported that 16.8% of the BMI were reported and 9% had malignant nodes. The lower itn detection rate LDCT compared to contrast-enhanced CT may result from limitations to the interpretation of without contrast. In addition, the characterisation of nodes of less than 1 cm would not be appropriate, as LDCT is normally carried out with a wafer thickness of 5 mm. To date, the US has generally been the preferred imaging modality for assessing thyroid nodules. Therefore, the US characteristics associated with a higher risk of malignancy are relatively well established and include the presence of fine or strict calciphytes, hypoehogenicity, irregular margins, absence of halo, predominantly solid composition, higher-than-wide lesion and internal vascular flow [20]. However, LDCT characteristics suggesting malignancy have not yet been established as LDCT is not generally used to evaluate thyroid nodules. In this study, we tried to identify itn functions that are predictive of malignancy on LDCT. A previous CT study showed that the diagnostic imaging characteristics associated with malignancy included calcifications of lydeals or rims, an AP/T ratio greater than 1,0 and a storage value greater than 130 HU [7]. The second study reported that CT could not reliably distinguish benign characteristics from malignant thyroid lesions [19]. In our study, the factors predicted for thyroid nodule malignancy meant > 55 HU and the presence of dense calcification values. In the analysis of multivariates, only 55 HU attenuation was shown in statistical terms. Despite this significant difference in the levels of difficulty between benign and malignant nodules, it can be difficult to separate these lesions only on the basis of the value of the sniping. In this study, the auc of the roc crousters was 0.7238 ± 0.0920 (Figure 5). This indicates that 72.7%) relatively low sensitivity (72.7%) and specificities (66.6%), therefore, there may be a significant overlap between benign and malignant nodules as already mentioned, the use of LDCT for lung cancer screening will lead to an increase in the number of ITN detected. The management of ITN has been controversial and despite an increase in the frequency of operations to treat small thyroid cancer, thyroid cancer-related mortality has not improved [21]. In addition, more than 70 % of tumours were reported to remain stable or reduced in size in patients with papillary microcarcinoma followed without surgery, even after > 5 years [22]. This suggests that overdiagnosis with LDCT in healthy subjects with ITN can lead to overnight treatment, thus increasing the cost of treatment. Interestingly, malignant nodules were histologically confirmed in our study of all papillary carcinomas. We are aware that this study has several limitations. Firstly, we were not able to establish an accurate indication for review by reviewing the medical records of individual persons. The criteria for patients who would benefit from lung screening have not yet been identified in Korea. Therefore, it is possible that the percentage of the population in the study is not truly at risk for malignancy, along with those who received voluntary testing. Therefore, our cohort of patients may differ from those used in previous LDCT-based studies. Secondly, at the time of the study, we were unable to obtain data on smoking status. Since most cancers are related to smoking, it is important to know how many smokers were included in the population in the study. In addition, there may be radiological characteristics of ITN that are related to the history of smoking. In conclusion, although thyroid nodules on LDCT are detected casually in a small percentage of the population, some of these lesions may be malignant. Therefore, careful observation of the thyroid and other intra-thoracic organs is required when assessing LDCT. A high medium value of atenas of 55 HU or higher, especially instead of margins, size, calcification or density, can be a useful predictable factor for distinguishing malignant from benign lesions. The authors did not report significant conflicts of interest with any companies/organisations that could be discussed in this manuscript about products or services. JHL contributed to the design and design of the study and prepared the original manuscript. JHL and SYJ collected clinical and radiological data and carried out a statistical analysis. YHK participated in the interpretation of the data, the review of the study and the final revision of the original manuscript. All authors have read and approved the final manuscript. This work was supported by a research grant from the National University Hospital Jeju. The authors thank Dr. Seong Joo Koh for their cooperation in collecting laboratory data and images. Jung KW, Park S, Kong HJ, Won YJ, Lee JY, Seo HG, Lee JS. Cancer statistics in Korea: incidence, mortality, survival and prevalence in 2009. Cancer treatment. 2012;44:11-24. doi: 10.4143/crt.2012.44.1.11. [PMC free article] [PubMed] [CrossRef] [Google Scholar] Han MA, Choi KS, Lee HY, Kim Y, Jun JK, EC Park. Current status of thyroid cancer screening in Korea: nationwide survey results. Asian Pac J Cancer Prev. 2011;12:1657-1663. [PubMed] [Google Scholar] Dean DS, Gharib H. Epidemiology of Thyroid Nodes. Best Pract Res Clin Endocrinol Metab. 2008;22:901-911. doi: 10.1016/j.beem.2008.09.019. [PubMed] [CrossRef] [Google Scholar] Harach HR, Franssila KO, Wasenius VM. Occult thyroid papillary carcinoma. Normal conclusion in Finland. It's a systematic autopsy study. Cancer. 1985;56:531-538. doi: 10.1002/1097-0142(19850801)56:3<531:::AID-CNCR2820560321>3.0.CO;2-3. [PubMed] [CrossRef] [Google Scholar] Tan GH, Gharib H. Thyroid incidentalomas: management approaches to nepalese nodules that were detected casually in thyroid imaging. Ann Intern Med. 1997;126:226-231. doi: 10.7326/0003-4819-126-3-199702010-00009. [PubMed] [CrossRef] </531::AID-CNCR2820560321>Scholar]Aberle DR, Adams AM, Berg CD, Black TOILET, Clapp JD, Fagerstrom RM, Gareen IF, Gatsonis C, Marcus PM, Sick JD. National Lung Screening Research Team. Reduced mortality of lung cancer with a low dose of calculated tomographic examination. N Engl J Med. 2011;365:395-409. [PMC free article] [PubMed] [Google Scholar] Ahmed S, Horton KM, Jeffrey RB Jr, Sheth S, Fishman EK. Random nodules of the thyroid gland on the chest CT. Review of literature and management proposals. AJR Am J Roentgenol. 2010;195:1066-1071. doi: 10.2214/AJR.10.4506. [PubMed] [CrossRef] [Google Scholar] Hull OH. Critical analysis of two hundred and one-third thyroid gland; thyroid study obtained from a necropsy in Colorado. AMA Arch Pathol. 1955;59:291–311. [PubMed] [Google Scholar] Mortensen JD, Woolner LB, Bennett WA. Coarse and microscopic findings in clinically normal thyroid gland. J Clin Endocrinol Metab. 1955;15:1270-1280. doi: 10.1210/jcem-15-10-1270. [PubMed] [CrossRef] [Google Scholar] Brander A, Viikinkoski P, Nickels J, Kivisaari L. Thyroid: US screening in random adult population. Radiology. 1991;181:683–687. [PubMed] [Google Scholar] Wiest PW, Hartshorne MF, Inskip PD, Crooks LA, Vela BS, Telepak RJ, Williamson MR, Blumhardt R, Bauman JM, Tekkel M. Thyroid palpation compared to high resolution thyroid ultrasonography in the detection of noduls. J Ultrasound Med. 1998;17:487–496. [PubMed] [Google Scholar] Carroll BA. Asymptomatic thyroid nodes: random sonographic detection. AJR Am J Roentgenol. 1982;138:499-501. doi: 10.2214/ajr.138.3.499.

[PubMed] [CrossRef] [Google Scholar] Priola AM, Priola SM, Giaj-Levra M, Basso E, Veltri A, Fava C, Cardinale L. Clinical consequences and added costs of random findings in an early study of lung cancer detection using low-dose spiral tomography. Lung cancer Clin. 2013;14:139-148. doi: 10.1016/j.cllc.2012.05.005. [PubMed] [CrossRef] [Google Scholar] Kucharczyk MJ, Menezes RJ, McGregor A, Paul NS, Roberts HC. Assessment of the effect of random findings in a study of lung cancer screening using calculated low-dose tomography. Can Assoc Radiol J. 2011;62:141-145. doi: 10.1016/j.carj.2010.02.008. [PubMed] [CrossRef] [Google Scholar] Rampinelli C, Preda L, Maniglio M, Sirica L, Travaini LL, Veronesi G, Bellomi M. Extrapulmon malignancies detected in lung cancer screening. Radiology. 2011;261:293-299. doi: 10.1148/radiol.11102231. [PubMed] [CrossRef] [Google Scholar] Swensen SJ, Jett JR, Hartman TE, Midthun DE, Sloan JA, Sykes AM, Aughenbaugh GL, Clemens MA. Lung cancer screening with CT: Mayo Clinic experience. Radiology. 2003;226:756-761. doi: 10.1148/radiol.2263020036. [PubMed] [CrossRef] [Google Scholar] MacRedmond R, Logan PM, Lee M, Kenny D, Foley C, Costello RW. Lung cancer screening with a small CT scan of the dose. Chest. 2004;59:237-241. doi: 10.1136/thx.2003.008821. [PMC free article] [PubMed] [CrossRef] Scholar]van de Wiel JC, Wang Y, Xu DM, van der Zaag-Loonen HJ, van der Jagt EJ, van Klaveren RJ, Oudkerk Oudkerk Negligible benefit of finding random findings in Dutch-Belgian lung screening screening (NELSON) using a low-dose CT multidetector. Eur Radiol. 2007;17:1474-1482. doi: 10.1007/s00330-006-0532-7. [PubMed] [CrossRef] [Google Scholar] Shetty SK, Maher MM, Hahn PF, Halpern EF, Aquino SL. Meaning of random thyroid lesions detected on CT: correlation between CT, sonography and pathology. AJR Am J Roentgenol. 2006;187:1349-1356. doi: 10.2214/AJR.05.0468. [PubMed] [CrossRef] [Google Scholar] Yoon DY, Chang SK, Choi CS, Yun EJ, Seo YL, Nam ES, Cho SJ, Rho YS, Ahn HY. Prevalence and relevance of random thyroid nodus identified in calculated tomography. J Help with input Tomogr. 2008;32:810-815. doi: 10.1097/RCT.0b013e318157fd38. [PubMed] [CrossRef] [Google Scholar] Davies L, Welch HG. Increase in the incidence of thyroid cancer in the United States, 1973-2002. Cave. 2006;295:2164-2167. doi: 10.1001/cave.295.18.2164. [PubMed] [CrossRef] [Google Scholar] Ito Y, Uruno T, Nakano K, Takamura Y, Miya A, Kobayashi K, Yokozawa T, Matsuzuka F, Kuma S, Kuma K, Miyauchi A. Observation without surgical treatment in patients with papillary microcarcinoma of the thyroid gland. Thyroid. 2003;13:381-387. doi: 10.1089/105072503321669875. [PubMed] [CrossRef] [Google Scholar] Articles from multidisciplinary respiratory medicine are available here courtesy PAGEPress PAGEPress