

## Changing trends in the management of well-differentiated thyroid carcinoma in Korea

Yong Sang Lee, Hang-Seok Chang and Cheong Soo Park

*Thyroid Cancer Center, Department of Surgery, Gangnam Severance Hospital, Yonsei University College of Medicine, Seoul, Korea*

**Abstract.** A questionnaire administered in 2009 found that members of the Korean Association of Thyroid-Endocrine Surgeons (KATES) favored more aggressive treatment of well-differentiated thyroid carcinoma (WDTC) than physicians from other countries. This study assessed the changes in practical management of WDTC in Korea from the previous survey. Questionnaires were sent by e-mail to KATES members. A total of 101 members completed the questionnaire. Their responses were compared with response for the 2009 survey. Of the respondents, 53.5% and 80.2% indicated that they would perform fine-needle aspiration cytology on nodules that were <0.5 cm and 0.5-1.0 cm in diameter, respectively. If the cytology was positive, a large number of respondents favored surgical treatment, regardless of tumor size. Compared with the 2009 survey, a slightly higher percentage favored observation for patients with tumors that were <0.5 cm in diameter, and a larger percentage recommended less-than-total thyroidectomy for patients with T1 cancers. Respondents in 2014 favored aggressive lymph node dissection less, irrespective of tumor size, preferring short-term treatment with thyroid stimulating hormone suppressors. The percentage preferring postoperative high-dose radioactive iodine therapy slightly increased, whereas the percentage favoring external irradiation decreased, in 2014 compared with 2009. The management of Korean patients with WDTC changed from 2009 to 2014. In 2009, Korean respondents favored more aggressive treatment of WDTC compared with respondents from other countries. In 2014, however, Korean respondents favored a more conservative approach, especially in patients with microcarcinomas.

*Key words:* Well-differentiated thyroid carcinoma, Practical management, Questionnaire

**SURGICAL** resection is generally regarded as the treatment of choice for patients with well-differentiated thyroid carcinoma (WDTC). However, the practical management of these patients has been found to vary among nations and institutions, with differences observed in the extent of thyroid resection and lymph node dissection, the use of postoperative radioactive iodine (RAI) and thyroid stimulating hormone (TSH) suppression therapy, and the treatment of patients with locally advanced unresectable and recurrent thyroid carcinoma [1].

To determine how WDTC is managed in Korea, a survey was administered in 2009 to members of the

Korean Association of Thyroid-Endocrine Surgeons (KATES) [1]. Comparison of the findings with those of surveys administered to members of the Japanese Society of Thyroid Surgery (JSTS) and the International Association of Endocrine Surgeons (IAES) indicated that members of KATES favored more aggressive treatment of WDTC than did physicians from these other countries [1-3].

Since the previous survey in 2009, there have been many changes in the social and medical environment. For example, the American Thyroid Association (ATA) published revised guidelines for the management of WDTC [4]. These guidelines, however, were regarded as too aggressive for the management of WDTC, especially in patients with microcarcinoma, leading to suggestions for less aggressive treatment of microcarcinomas, including observation and less extensive surgery [5, 6]. Moreover, since 2009, there have been many changes in the healthcare environment, including increases in the number of thyroid cancer patients

Submitted Nov. 10, 2015; Accepted Feb. 4, 2016 as EJ15-0635  
Released online in J-STAGE as advance publication Mar. 9, 2016  
Correspondence to: Hang-Seok Chang, M.D., Ph.D., FACS, Thyroid Cancer Center, Department of Surgery, Gangnam Severance Hospital, Yonsei University College of Medicine, 211 Eonjuro, Gangnam-gu, 135-720 Seoul, Korea.  
E-mail: surghsc@yuhs.ac

and national health care costs. The many governmental restrictions and regulations have resulted in difficulties in aggressive screening for and treatment of thyroid cancer. These changes in the medical environment may have caused changes in the practical management of patients with WDTC in Korea. This study therefore assessed these changes by administering a questionnaire to members of KATES.

### Materials and Methods

A questionnaire used for previous surveys was sent by e-mail to 885 members of KATES [1-3]. The questionnaire consisted of descriptions of five patients with WDTC and several questions related to each. These cases included patients with (1) papillary thyroid carcinoma (PTC) smaller than 2 cm (T1), (2) low-risk PTC larger than 2 cm (T2), (3) high risk, poorly differentiated thyroid carcinoma, (4) high risk, locally advanced well-differentiated thyroid carcinoma, and (5) recurrent PTC. The full text of the questionnaire has been published [1].

Of the 885 members of KATES who were sent questionnaires, 101 (11.4%) responded. Among the respondents, 70 (69.3%) were employed by university hospitals, 18 (17.8%) by general hospitals, and 13 (12.9%) by private clinics. Stratified by district, respondents included 48 from Seoul (47.5%), 21 from Gyeonggi-do (20.8%), two from Gangwon-do (2.0%), six from Chungcheong-do (5.9%), 12 from Gyeongsang-do (11.9%), and 12 from Jeolla-do (11.9%), reflecting an evenly distributed survey area throughout Korea.

### Results

#### Treatment modalities for small papillary carcinomas of the thyroid (T1)

##### Case presentation

An ultrasound examination performed during a routine medical checkup detected a thyroid adenoma in a 35-year-old woman, who sought further examination in the department of surgery at a leading hospital in her district. An aspiration cytology under ultrasonic guidance showed papillary carcinoma, while the ultrasonic imaging revealed that it was localized at the inferior pole of the thyroid lobe with no signs of tumor infiltration. No enlarged lymph nodes were observed.

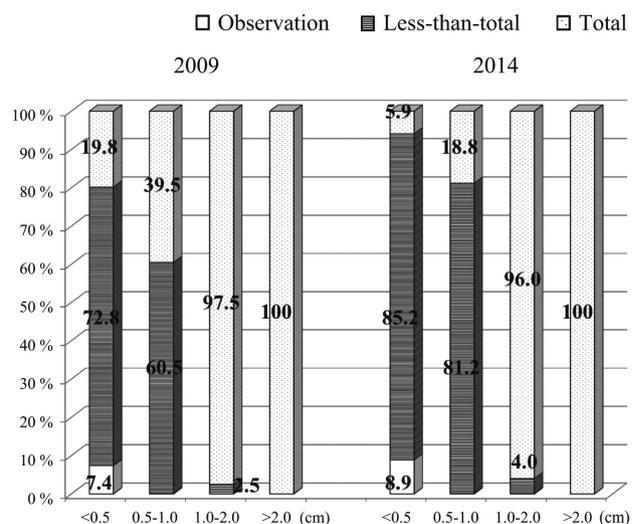
Some changes over time were noted in the respon-

dents' preferences for performing fine-needle aspiration cytology (FNAC) of small thyroid nodules. Although many Korean respondents in 2009 stated that they would perform FNAC of thyroid nodules, regardless of tumor size, some respondents in 2014 stated that they would not perform FNAC of small thyroid nodules. Of the 101 respondents, only 54 (53.5%) stated that they would perform FNAC of nodules <0.5 cm in diameter, whereas 81 (80.2%) would perform FNAC of nodules 0.5-1.0 cm in diameter (Table 1).

If cytology was positive, many respondents favored surgical treatment, irrespective of tumor size. However, the percentage of respondents who favored observation of tumors <0.5 cm in diameter was higher in 2014 (8.9%) than in 2009 (7.4%). Furthermore, the percentage of respondents who recommended less-than-total thyroidectomy rather than total thyroidectomy was higher in 2014 than in 2009 (Fig. 1). In addition, respondents favored less aggressive lymph node dissection in 2014 than in 2009. A lower percentage favored central compartment node dissection (CCND) on both sides, while a higher percentage favored CCND only on the affected side in 2014 (Table 2). Trends in postoperative TSH suppression therapy also changed,

**Table 1** Percentages of respondents recommending FNAC as a function of thyroid tumor size

	2009 (n=90)	2014 (n=101)
<0.5 cm	94.4 %	53.5 %
0.5-1.0 cm	100 %	80.2 %



**Fig. 1** Extent of recommended thyroidectomy stratified by tumor size in patients with low-risk thyroid tumors

with respondents in 2014 more likely to favor short-term treatment (Fig. 2).

**Treatment modalities for large papillary carcinomas of the thyroid (T2, low-risk group)**

**Case presentation**

A 40-year-old man presented to the department of surgery of a leading hospital in his district with a complaint of a mass detected at the right thyroid lobe. Ultrasound and CT examinations revealed a mass 3 cm in diameter, localized within the thyroid gland and 2 enlarged lymph nodes each on the paratracheal and the lateral side of the internal jugular vein of the affected site. A cytological examination yielded a well-differentiated papillary carcinoma of the thyroid. Laryngoscopy exhibited normal movement of the vocal cords. Either CT or <sup>99m</sup>Tc bone scanning revealed no evidence of distant metastasis.

All of the respondents recommended total thyroidectomy for T2 tumors, but the extent of lymph node

dissection was less aggressive in 2014 than in 2009. The preference for CCND on the affected side was the same at both times, but the preference for CCND on both sides and lateral neck node dissection (LND) was lower in 2014 than in 2009 (Table 2).

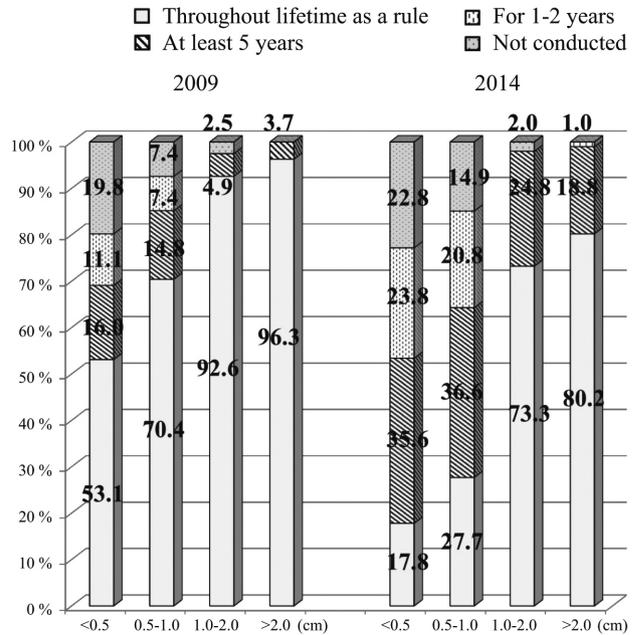
Short-term postoperative TSH suppression therapy was also favored, as in the treatment of T1 tumors. In 2009, all respondents recommended postoperative TSH suppression therapy, with most (96.3%) recommending continuing suppression therapy throughout life. In 2014, however, only 80.2% of respondents recommended life-long TSH suppression therapy. Overall, a higher percentage of respondents in 2014 than in 2009 favored short-term treatment (Fig. 2).

Preference for postoperative high-dose RAI therapy was slightly increased in 2014, with 94.1% of respondents recommending RAI therapy (Table 3).

**Table 2** Extent of lymph node dissection according to tumor size recommended by respondents

	2009 (n=90)	2014 (n=101)
<b>&lt;0.5 cm</b>		
no	30.9 %	15.8 %
CCND on the affected side	56.8 %	79.2 %
CCND on both side	12.3 %	5.0 %
LND on affected sides	0 %	0 %
LND on both sides	0 %	0 %
<b>0.5-1.0 cm</b>		
no	11.1 %	6.9 %
CCND on the affected side	60.5 %	81.2 %
CCND on both side	23.5 %	11.9 %
LND on affected sides	4.8 %	0 %
LND on both sides	0 %	0 %
<b>1.0-2.0 cm</b>		
no	4.9 %	1.0 %
CCND on the affected side	40.8 %	52.5 %
CCND on both side	46.9 %	42.6 %
LND on affected sides	7.4 %	3.0 %
LND on both sides	0 %	1.0 %
<b>&gt;2.0 cm</b>		
no	0 %	0 %
CCND on the affected side	98.8 %	100 %
CCND on both sides	80.2 %	54.5 %
LND on the affected side	88.9 %	40.6 %
LND on both sides	4.9 %	1.0 %

CCND, central compartment node dissection; LND, lateral neck node dissection



**Fig. 2** Frequency of TSH suppression therapy recommended after surgery stratified by tumor size

**Table 3** Radioactive iodine treatment for large papillary thyroid carcinoma (T2, low-risk group)

	2009 (n=90)	2014 (n=101)
Adopted	71.5 %	83.2 %
Desirable, if available	11.2 %	10.9 %
Not adopted	17.3 %	5.0 %

### ***Treatment modalities for high-risk papillary carcinomas of the thyroid (poorly-differentiated)***

#### **Case presentation**

On ultrasound and CT scanning, a 60-year-old man was found to have a thyroid tumor measuring 6 cm in diameter. Extra-thyroidal invasion was observed but there was no evidence of distant metastases. An elevated serum thyroglobulin level (negative thyroglobulin antibody) was noted. A cytological examination revealed poorly differentiated papillary carcinoma, which was considered to be a high-risk cancer, and the patient underwent total (near-total) thyroidectomy. Following surgery, the base level of serum thyroglobulin was reduced to below the detectable threshold. If you do not favor total (near-total) thyroidectomy as a surgical option, you need not reply to the following questions.

A higher percentage of respondents in 2014 (95.0%) than in 2009 (79.3%) recommended postoperative high-dose RAI therapy for patients with high-risk, poorly-differentiated thyroid carcinoma. Although a higher percentage recommended RAI therapy regardless of serum thyroglobulin level in 2014 (78.2%) than in 2009 (60.3%), a lower percentage in 2014 (16.8%) than in 2009 (19%) recommended RAI therapy for patients with high serum thyroglobulin levels (Table 4).

### ***Treatment modalities for high-risk well-differentiated thyroid carcinomas (locally advanced)***

#### **Case presentation**

A 70-year-old man was found to have a thyroid tumor measuring 6 cm in diameter. Ultrasound and CT scanning revealed that the tumor had infiltrated the larynx and esophagus. If surgery is considered to be the treatment of choice, total laryngectomy and esophageal extirpation appeared unavoidable. A cytological examination found the cancer to be papillary carcinoma. CT scanning of the neck revealed that several lateral cervical lymph nodes on both sides were enlarged. There was no evidence of distant metastasis.

In assessing treatments for patients with locally advanced, well-differentiated thyroid carcinoma, 73.3% of respondents favored surgery alone, 16.8% favored external irradiation, and 6.0% favored surgery plus external irradiation. Compared with the results of 2009, a similar percentage recommended surgery (79.3% vs. 79.0%), but a lower percentage favored external irradiation in 2014 (22.8%) than in 2009 (64.2%) (Table 5).

**Table 4** Recommended indications for high-dose radioiodine treatment after total or near-total thyroidectomy for patients with high-risk poorly-differentiated thyroid carcinoma

	2009 (n=90)	2014 (n=101)
No	20.7 %	5.0 %
Yes, if elevated serum thyroglobulin level	19 %	16.8 %
Yes, regardless of serum thyroglobulin level	60.3 %	78.2 %

**Table 5** Treatments recommended for patients with high-risk well-differentiated thyroid carcinoma (high-risk group, locally advanced)

	2009 (n=90)	2014 (n=101)
No treatment	0 %	4.0 %
Surgery alone	35.8 %	73.3 %
External irradiation	21 %	16.8 %
Surgery plus External irradiation	43.2 %	6.0 %

### ***Treatment modalities for recurrent papillary thyroid carcinomas after surgery***

#### **Case presentation**

A 60-year-old woman had been subjected to total thyroidectomy and bilateral neck dissection for papillary thyroid carcinoma 5 years previously. Since then, the tumor recurred repeatedly at the cervical lymph nodes and on each occasion, the involved lymph nodes were extirpated. At the latest examination, she was suffering from fifth recurrence that involves the right cervical lymph nodes.

Of the 101 respondents in 2014, 4 (4%) recommended not treating patients with recurrent PTCs after surgery, compared with 0% in 2009. The most common treatment modalities favored in 2014 were limited and selective node dissection (77.3%), with 6.9% favoring modified radical neck dissection. The percentage favoring external irradiation was lower in 2014 (8.9%) than in 2009 (30.4%). Although 95.8% of the respondents in 2009 favored high-dose RAI therapy, only 47.5% of those in 2014 recommended RAI for patients with recurrent PTCs (Table 6).

## **Discussion**

A survey in 2009 assessing the practical management of WDTC in Korea found that members of

**Table 6** Treatment modalities recommended for patients with recurrent papillary thyroid carcinoma

	2009 (n=90)	2014 (n=101)
Only observation	0 %	4.0 %
Extirpation of metastatic nodes		
Berry picking	22.8 %	21.8 %
Selective level dissection	48.1 %	55.5 %
Modified neck dissection	6.3 %	6.9 %
External irradiation	30.4 %	8.9 %
PEI treatment	2.5 %	6.0 %
High-dose RAI treatment	95.8 %	47.5 %

PEI, percutaneous ethanol injection; RAI, radioactive iodine

KATES favored more aggressive treatment of this disease than did physicians from other countries, as illustrated by surveys of the members of the JSTS and IAES [1-3].

Since then, however, changes have occurred in the treatment of thyroid tumors. The 2006 ATA guidelines were regarded as too aggressive for the management of WDTC. For example, these guidelines recommended that thyroid nodules up to 1 cm in diameter be evaluated by additional invasive diagnostic methods and that total thyroidectomy be performed, regardless of tumor size. Revised ATA guidelines were therefore published in 2009 and revised Korean Thyroid Association (KTA) guidelines were published in 2010 [4, 7]. Although the revised ATA guidelines are less aggressive than the previous ATA guidelines, they are still considered by some to be too aggressive.

In addition, there have been many changes in the healthcare environment. The increased number of thyroid cancer patients has resulted in increases in national healthcare costs. Thus, the Korean government has begun to manage thyroid cancer treatment and thyroid screening costs. Because of the many restrictions and regulations by the government, it has become more difficult to aggressively screen for and treat thyroid cancer. Because of these changes, this study was performed to determine whether there have been changes in thyroid cancer treatments between 2009 and 2014.

The guidelines of the ATA and KTA recommend that thyroid nodules larger than 0.5 cm in diameter be evaluated by invasive diagnostic methods such as FNAC [4, 7]. Although 94.4% of the respondents in 2009 recommended FNAC of thyroid nodules smaller than

0.5 cm in diameter, that percentage had decreased to 53.5% in 2014. Furthermore, 19.8% of respondents in 2014 would not perform FNAC of thyroid nodules 0.5-1.0 cm in diameter. These changes may be related to overall social conditions, including patients' desires, impact of the media, interest in disease and fear of cancer, and advanced knowledge of thyroid cancer by clinicians, resulting from the formulation of management guidelines and clinical research.

Although many respondents in 2014 did not recommend FNAC, most favored surgical treatment, irrespective of tumor size, following the confirmation of malignancy. However, two other policies have changed. First, there was a slight increase in the percentage of respondents favoring observation of tumors <0.5 cm in diameter, from 7.4% in 2009 to 8.9% in 2014. In addition, a higher percentage in 2014 than in 2009 favored less aggressive thyroidectomy and lymph node dissection.

Classically, thyroid carcinomas have been treated by surgical intervention. As thyroid carcinomas were subdivided diversely and the biological characteristics of thyroid carcinomas were identified, nonoperative management of thyroid carcinomas were introduced and suggested [13]. Although nonoperative management of thyroid carcinoma can be an alternative to the classical surgical treatment of thyroid carcinoma, selection of patients for nonoperative management should be clarified [13].

The ATA and KTA guidelines for microcarcinomas recommend total thyroidectomy for patients <15 and >45 years of age; those with a personal history of radiation exposure to the head and neck regions; patients with cervical lymph node or distant metastases, contralateral thyroid nodules, or extrathyroidal extension; and those with a first-degree family history of well-differentiated thyroid carcinoma. Less-than-total thyroidectomy was regarded as sufficient for low-risk patients with small, isolated, intrathyroidal papillary carcinomas, and an absence of cervical nodal metastases [4, 7].

In 2009, the percentage of KATES respondents recommending lymph node dissection for small thyroid cancers was higher than the percentage of IAES and JSTS respondents. In 2014, lower percentages of KATES respondents recommended contralateral CCND and combined LND than in 2009. Nevertheless, most respondents in 2014 favored CCND of the affected side.

The trend of TSH suppression therapy was also changed. Life-long TSH suppression therapy was recommended by a high percentage of the 2009 respondents, whereas, in 2014, a higher percentage recommended no or only short-term TSH suppression therapy. It is unclear whether TSH suppression therapy reduces the recurrence rate or is therapeutically ineffective [8-10]. In summary, for small PTC, most respondents favored less-than-total thyroidectomy plus ipsilateral CCND and short-term TSH suppression therapy.

All respondents in both 2009 and 2014 recommended total thyroidectomy for patients with T2 cancers, although the recommended lymph node dissection was less aggressive in 2014 than in 2009. In contrast, RAI was more favored in 2014 than in 2009. Most respondents recommended postoperative TSH suppression therapy, although, somewhat surprisingly, a small percentage did not. TSH suppression therapy is regarded as generally necessary following total thyroidectomy.

A higher percentage of respondents in 2014 (95.0%) than in 2009 (79.3%) favored high-dose RAI treatment for patients with poorly differentiated thyroid carcinoma. High-dose RAI treatment has been recommended for patients with suspected or documented microscopic residual disease and those with aggressive histologic variants including tall cell, insular and columnar cell tumors [4, 7].

Serum thyroglobulin concentration following TSH stimulation is useful for detecting recurrence or distant metastasis [11]. More than half of the respondents in 2009 and 2014, however, recommended high-dose RAI treatment for patients with poorly-differentiated thyroid carcinoma, regardless of serum thyroglobulin concentration.

Korean respondents in 2009 favored more aggressive treatments of patients with locally advanced thyroid carcinoma than respondents from other countries [1]. Many respondents in 2014 also favored aggressive treatment modalities, such as surgical resection. Interestingly, external irradiation was less favored in 2014 (22.8%) than in 2009 (64.2%).

Because PTCs are relatively insensitive to external irradiation therapy, treatment outcomes may not be improved by conventional radiation therapy. Methods that can deliver a high dose of radiation to a certain area, such as stereotactic radiation therapy or tomotherapy, may be more beneficial [1]. Limited and selec-

tive neck node dissection was more favored than modified radical neck dissection for patients with recurrent PTC, with the preference for RAI treatment and external irradiation lower in 2014 than in 2009. Although the latter methods were more preferred by respondents from Korea than from other countries in 2009 [1], that difference was no longer observed in 2014.

Although the preference for percutaneous ethanol injection (PEI) treatment was slightly higher in 2014 than in 2009, PEI is not currently a prevalent treatment option in Korea. However, PEI treatment may be an alternative treatment option for carefully selected patients with locally recurrent thyroid carcinomas [1, 12].

Although not included in this survey, with increasing knowledge of the molecular pathogenesis of thyroid carcinoma, several targeted therapies are developed for advanced thyroid carcinomas [14].

Multikinase inhibitors (Sorafenib, Lenvatinib, Sunitinib, Pazopanib, Motesanib, Vandetanib, and Cabozantinib), selective BRAF inhibitors (Vemurafenib and dabrafenib), and mTOR inhibitors (Everolimus) are the most promising compounds for patients with advanced thyroid carcinoma [14].

## Conclusion

This study showed that the practical management of Korean patients with WDTC changed between 2009 and 2014. In 2009, Korean respondents favored more aggressive treatment of WDTC than did respondents from other countries. However, 5 years later, Korean respondents have become slightly more conservative in their treatment of WDTC, especially in patients with microcarcinoma.

## Declaration of Interest

The authors declare that there is no conflict of interest that could be perceived as prejudicing the impartiality of the research reported.

## Acknowledgement

We would like to express our sincere appreciation to the members of the Korean Association of Thyroid-Endocrine Surgeons (KATES) who took the time to respond to our questionnaire despite their busy schedules.

## References

1. Lee YS, Nam KH, Chung WY, Chang HS, Shigematsu N, et al. (2008) Practical management of well differentiated thyroid carcinoma in Korea. *Endocr J* 55: 1015-1024.
2. Shigematsu N, Takami H, Ito N, Kubo A (2005) Nationwide survey on the treatment policy for well-differentiated thyroid cancer – Results of a questionnaire distributed at the 37th meeting on the Japanese Society of Thyroid Surgery. *Endocr J* 52: 479-491.
3. Shigematsu N, Takami H, Kubo A (2006) Unique treatment policy for well-differentiated thyroid cancer in Japan: results of a questionnaire distributed to members of the Japanese Society of Thyroid Surgery and the International Association of Endocrine Surgeons. *Endocr J* 53: 829-839.
4. American Thyroid Association (ATA) Guidelines Taskforce on Thyroid Nodules and Differentiated Thyroid Cancer. Cooper DS, Doherty GM, Haugen BR, Kloos RT, Lee SL, et al (2009) Revised American Thyroid Association management guidelines for patients with thyroid nodules and differentiated thyroid cancer. *Thyroid* 19: 1167-1214.
5. Ito Y, Miyauchi A, Inoue H, Fukushima M, Kihara M, et al. (2010) An observational trial for papillary thyroid microcarcinoma in Japanese patients. *World J Surg* 34: 28-35.
6. Lee CR, Son H, Lee S, Kang SW, Jeong JJ, et al. (2014) Lobectomy and prophylactic central neck dissection for papillary thyroid microcarcinoma: do involved lymph nodes mandate completion thyroidectomy? *World J Surg* 38: 872-877.
7. Yi KH, Park YJ, Koong SS, Kim JH, Na DG, et al. (2010) Revised Korean Thyroid Association management guidelines for patients with thyroid nodules and thyroid cancer. *J Korean Thyroid Assoc* 3: 65-96 (in Korean).
8. Mazzaferri EL, Jhiang SM (1994) Long-term impact of initial surgical and medical therapy on papillary and follicular thyroid cancer. *Am J Med* 97: 418-428.
9. McGriff NJ, Csako G, Gourgiotis L, Lori CG, Pucino F, et al. (2002) Effects of thyroid hormone suppression therapy of adverse clinical outcomes in thyroid cancer. *Ann Med* 34: 554-564.
10. Vickery AL, Wang CA, Walker AM (1987) Treatment of intrathyroidal papillary carcinoma of the thyroid. *Cancer* 60: 2587-2595.
11. Pacini F, Lari R, Mazzeo S, Grasso L, Taddei D, et al. (1985) Diagnostic value of a single serum thyroglobulin determination on and off thyroid suppressive therapy in the follow-up of patients with differentiated thyroid cancer. *Clin Endocrinol (Oxf)* 23: 405-411.
12. Lim CY, Yun JS, Lee J, Nam KH, Chung WY, et al. (2007) Percutaneous ethanol injection therapy for locally recurrent papillary thyroid carcinoma. *Thyroid* 17: 347-350.
13. Ito Y, Miyauchi A (2015) Nonoperative management of low-risk differentiated thyroid carcinoma. *Curr Opin Oncol* 27: 15-20.
14. Carneiro RM, Carneiro BA, Agulnik M, Kopp PA, Giles FJ (2015) Targeted therapies in advanced differentiated thyroid cancer. *Cancer Treat Rev* 41: 690-698.