A-S01

PERSONAL INFORMATION	
Family Name (Last Name)	Chammas
Given Name (First Name)	M. Cristina
Official Title	Director
Position / Department	Ultrasound Division
Institute	Institute of Radiology
E-Mail	Cristina.chammas@hc.fm.usp.br or mcchammas@hotmail.com

Education Background	She was graduated in Medicine from the Catholic University of São Paulo (1989). Master's degree (1998) and doctorate (2002) in radiology from the Faculty of Medicine, University of São Paulo (USP) with a thesis (*Ultrasound evaluation of the endometrium in patients treated with tamoxifen*) and a dissertation (*Contribution of Doppler ultrasound to the study of thyroid nodules*) that would presage her tremendous contributions to the field of medical ultrasound.
Professional Career	She has been the coordinator of the São Paulo Society of Ultrasound Radiology and Diagnostic Imaging (SPR) since 2003, and was president of the Federation of Latin America Ultrasound (FLAUS) for the biennium 2013–2015. A founding member of the International Contrast Ultrasound Society (ICUS), Dr Chammas is also a past coordinator of the Ultrasound Committee of the Brazilian College of Radiology and Diagnostic Imaging. President of (WFUMB).(2021-2023). A radiologist with a broad range of interests, she focuses on ultrasound in internal medical, ultrasound of the head and neck (thyroid, salivary gland, tongue, and lymph nodes), and the use of contrast-enhanced ultrasound to evaluate the liver, focal kidney diseases, organ transplants, the breast, and carotid arteries. As private work, she is coordinator of Ultrasound in the DASA Group – Sao Paulo – Brazil. Medical Director of Alta ExcelenciaDiagnósticos. She has been actively involved in the planning and organizing of 49 local, national, and international conferences; has been a speaker at ~300 events; and has had more than 500 works published in conference proceedings. Dr Chammas has served on the committee evaluating radiology resident candidates for USP and has been involved in overseeing the theses of dozens of individuals fulfilling their doctoral requirements in radiology. She has set the bar high for these medical professionals who will follow in her footsteps. A prolific writer and researcher, she has written more than 60 book chapters,

	published 110 journal articles, and worked on 10 books
Publications (the latest 5 articles)	1. Guidelines and Good Clinical Practice Recommendations for Contrast Enhanced Ultrasound (CEUS) in the Liver – Update 2020 WFUMB in Cooperation with EFSUMB, AFSUMB, AIUM, and FLAUS. Dietrich CF et al. Ultraschall in Med 2020; 41: 1–24 2. Multiparametric Ultrasound Evaluation Of The Thyroid: Elastography As A Key Tool In The Risk Prediction Of Undetermined Nodules (Bethesda Iii And Iv)—Histopathological Correlation. Pedro H.M. Moraes, Marcelo Straus Takahashi, Felipe A.B. Vanderlei, Marcelo V. Schelini, Danielle A. Chacon,Marcos Roberto Tavares, Maria Cristina Chammas. Ultrasound in Med. & Biol., Vol. 00, No. 00, pp. 1 8, 2021. 3. Ultrasound Findings and Laboratory Predictors of Early Mortalityin Patients With Severe Yellow Fever. Yuri C. S. Neves, Victor A. C. Castro-Lima, Davi J. F. Solla, Vivian S. M. Ogata,Fernando L. Pereira, Jordana M. Araujo, Yeh-Li Ho, Maria Cristina Chammas. AJR:216, May 2021 4. Staging liver fibrosis after severe yellow feverwith ultrasound elastography in Brazil: A sixmonthfollow-up study. Yuri Costa Sarno Neves, Victor Augusto Camarinha de Castro-Lima, Davi JorgeFontoura Solla, Vivian Simone de Medeiros Ogata, Fernando Linhares Pereira,Jordana Machado Araujo, Ana Catharina Seixas Nastri, Yeh-Li Ho, MariaCristina Chammas.PLOS Neglected Tropical Diseases | https://doi.org/10.1371/journal.pntd.0009594 July 20, 2021 5. Synthetic Elastography using B-mode Ultrasoundthrough a Deep Fully-Convolutional Neural Network. R. R. Wildeboer, R. J. G. van Sloun, C. K. Mannaerts, P. H. Moraes, G. Salomon, M.C. Chammas, H.Wijkstra, M. Mischi. IEEE Transactions On Ultrasonics, Ferroelectrics, And Frequency Control, VOL. 67, NO. 12, DECEMBER 2020.

A-S01

US Criteria for Risk of Thyroid Nodules: TI-RADS and Guidelines

M. Cristina Chammas, MD, PhD
Ultrasound Division, Hospital das Clinicas, School of Medicine, University of Sao Paulo, Brazil.

LEARNING OBJECTIVES

1) To become familiar with the incidence and significance of thyroid nodules and differentiated thyroid cancer.
2) To discuss the current classification systems (TI-RADS and Guidelines) and best practice recommendations for imaging evaluation (US) and FNA of the thyroid nodule.

ABSTRACT

Thyroid nodules are common, 4 to 7% of the adult population presents palpable thyroid nodules. However only 5% clinically detected nodules is malignant. Ultrasonography (US) is the most sensitive method, identifying nodules in up to 80% of patients. The use of high frequency US transducers increases of US sensitivity. However, it is still not sufficiently specific to determine malignancy. Thyroid cancer incidence is on the rise without a significant change in mortality rate. There is some evidence that a rising incidence of subcentimeter papillary thyroid cancer results from increased detection on US.

This presentation will review the classification systems (TI-RADS) in the current literature and some practical guidelines to help radiologists decide how to report these nodules.

Besides, US needs to decide which nodules should always undergo to FNA and which those the FNA is inadmissible.

The classic pattern of higher risk of malignancy in thyroid nodule are marked hypoechoic nodule relative to normal parenchyma, presence of microcalcifications, mainly central vascularization; irregular and, ill-defined margin, no halo, higher than wider shape, dimension is a question (> 1.0 cm or 1.5 cm?), concomitant lymph node suspect, inserted in autoimmune disease gland, positive ^{18}FDG, nodule w/ substantial growth ($> 50\%$ of the nodule volume and/or increasing more than 20% of the nodule w/ increasing > 2mm in 2 or more axis in the solid nodules or solid portion of the mixed nodules). When analyzing a thyroid nodule never use a single criterion to predict the risk of malignancy.

Current evidence suggests that a stratification approach, recognizing the nodules w/ high risk of malignancy (US), indicating well FNA (take into account the risk for each patient, avoiding unnecessary FNA). Examine the entire neck (US). To know the US limitations, not to frustrate and know how to take full advantage of the tool (US).

A-S02

PERSONAL INFORMATION	
Family Name (Last Name)	Suzuki
Given Name (First Name)	Shinichi
Official Title	MD., PhD.
Position / Department	Professor/Thyroid and Endocrinology
Institute	Fukushima Medical University Schoolof Medicine
E-Mail	shsuzuki@fmu.ac.jp

Education Background	Graduated from Fukushima Medical University (FMU) School of Medicine in March 1983 and obtained PhD at FMU in 1990. He spent one year from March 2001 to April 2002 as the visiting scientist at the Burnham Institute, CA, in USA.
Professional Career	He became Professor and director of department of Organ Regulatory Surgery and Division of Breast Endocrine and Thyroid SurgeryFukushima Medical University School of Medicine at 2010.From March of 2013, he became of Professor and Chairman, Department of Thyroid and Endocrinology and Director, Division of Thyroid Endocrine Surgery. His specialties are the endocrine surgery, molecular endocrinology and ultrasonography of thyroid. He is the Medical Administrator of Disaster Medical Care Coordination, Fukushima Prefecture after the Fukushima disaster from March 2011. He became the Director of Department of Thyroid Examination, Radiation Medical Science Center for the Fukushima Health Management Survey from 2012 to 2016 and theDeputy Director of Center for Global Exchange & Experience from 2018, Fukushima Medical University. He is also the former President of Japan Association of Endocrine Surgeons (JAES), Japan Association of Breast and Thyroid Sonology (JABTS), the current vice-president of Japanese Society for Hereditary Tumors (JSHT), former council of Japan Society of Ultrasonics in Medicine (JSUM) and current councils of Japan Surgical Society (JSS), Japan Thyroid Association (ATA), JAES, JABTS and Asian Association of Endocrine Surgeons (AsAES).
Publications (the latest 5 articles)	Suzuki S, et al. Comprehensive Survey Results of Childhood Thyroid Ultrasound Examinations in Fukushima in the First Four Years after the Fukushima Daiichi Nuclear Power Plant Accident. THYROID. 26(6); 843-851, 2016. Suzuki S. Childhood and Adolescent Thyroid Cancer in Fukushima after the Fukushima Daiichi Nuclear Power Plant Accident: 5 Years On. Clinical Oncology. 28(4):263-271, 2016. Suzuki S, et al. Histopathological analysis of papillary thyroid carcinoma

	detected during ultrasound screening examinations in Fukushima. Cancer Sci. 2019 Feb;110(2):817-827. Shimura H, Suzuki S, et al. Diagnostic strategies for thyroid nodules based on ultrasonographic findings in Japan. Cancers 2021, 13, 4629. Fukushima M, Suzuki S, et al. Reconfirmation of the accuracy of the taller-than-wide sign in multicenter collaborative research in Japan. Endocr J. 2021 Aug 28;68(8):897-904.

A-S02

Japanese Criteria of Thyroid Ultrasound and AI

ShinIchi Suzuki, M.D, PhD
Department of Thyroid and Endocrinology
Fukushima Medical University School of Medicine

Thyroid ultrasound examination (TUE) have become to be first choice for diagnosis of thyroid nodules. Due to the increase of using TUE, the prevalence of thyroid nodules is increasing. On the other hand, it was well known that most of thyroid cancer had good prognosis including of latent cancer and micropapillary cancer. If ultrasound use for thyroid examination with no guideline, occurrence of over diagnosis might be expected. And also, incidental thyroid nodule become to be increasing due to the increasing opportunity of the various medical images such as CT, MRI, PET/CT and ultrasound (US) of carotid artery. So, in Japan, two criteria for US examination of thyroid nodules were made to avoid over-diagnosis and –treatment by the Japan Society of Ultrasonics in Medicine (JSUM) and the Japan Association of Breast and Thyroid Sonology (JABTS). JSUM criteria is prescribed benign and malignancy of the US findings. JABTS criteria are guideline to recommend fine needle aspiration cytology (FNAC) or observational follow up using by JSUM criteria and tumor size. According to guidelines of the JABTS and JSUM, FNAC is recommended for nodules more than 5mm in diameter, if strongly suspicious for thyroid cancer from JSUM diagnostic criteria; those larger than 10mm in diameter and suspicious for cancer from the above criteria; all nodules over 20mm in diameter; and all cystic lesions larger than 20mm in diameter. These guidelines were followed to avoid unnecessary FNAC, especially for nodules larger than 5mm but smaller than 10mm.

This concept in Japan is related with avoiding overdiagnosis and active surveillance for micropapillary thyroid cancer. So, in Japan, thyroid cancer increasing is not so high comparing South Korea and USA.

On the other hand, new alternative methods for improving diagnosis process such as artificial intelligence (AI) is necessary.

In this symposium, I would like to discuss comparing some overseas guidelines such as TI-RADS with our Japanese guidelines, and also to introduce AI study for thyroid nodule.

A-S03

PERSONAL INFORMATION		
	Family Name (Last Name)	Kong
	Given Name (First Name)	Dexing
	Official Title	Professor, Dr.
	Position / Department	Director of the Institute of Applied Mathematics, Zhejiang University / Director of the Zhejiang Qiushi Institute for Mathematical Medicine
	Institute	Institute of Applied Mathematics, Zhejiang University / Zhejiang Qiushi Institute for Mathematical Medicine
	E-Mail	dkong@zju.edu.cn
Education Background	1991.09–1993.12 Fudan University, PhD in Applied Mathematics 1988.09–1991.07 Fudan University, Master in Basic Mathematics 1985.09–1988.07 Henan University, Bachelor in Mathematics	
Professional Career	2019.01–Present Zhejiang University, TheFirst Affiliated Hospital, Joint Appointed Professor 2008.04-Present Zhejiang University, School of Mathematical Sciences, Qiushi Distinguished Professor 2007.04-2008.03 Zhejiang University, Department of Mathematics, Professor 2005.07-2007.03 Shanghai Jiao Tong University, Department of Mathematics, Chair Professor 2004.09-2005.06 Harvard University, Department of Mathematics, Senior Visiting Scholar 2000.04-2004.08 Shanghai Jiao Tong University, Department of Mathematics, Professor 1997.12-1999.12 Japan Society for the Promotion of Science - Kyoto Sangyo University, Department of Mathematics, Postdoctoral Fellowships 1996.01-1997.06 International Centre for Theoretical Physics (Italy), Mathematics Section, Visiting Scientist 1994.01–1995.12 Fudan University, Department of Physics, Postdoctoral Fellowships	
Publications (the latest 5 articles)	1) Dexing Kong et al. Mathematical Medicine (in Chinese), Science Press, Beijing,2020. 2) De-Xing Kong, Yunmei Chen, Fangfang Dong and Qiong Lou, Theory and Methodsin Medical Image Processing (in Chinese), Science Press, Beijing, 2014. 3) Man Tan, Fa Wu,**Dexing Kong***, Xiongwei Mao. Automatic liver	

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segmentation using 3D convolutional neural networks with a hybrid loss function. Medical Physics, 48(4): 1707-1719, 2021.

4) Rendong Chen, Jianfeng Zhang, **Dexing Kong**, Qiong Lou, Fang Lu*. Fast calculation of 3D radiofrequency ablation zone based on a closed-form solution of heat conduction equation fitted by ex vivo measurements. Physics in Medicine & Biology, 66(5): 055022, 2021.

5) Rendong Chen, Tianan, Fang Lu, Kaifeng Wang, Dexing Kong*, Semiautomatic Radiofrequency Ablation Planning Based on Constrained Clustering Process for HepaticTumors, IEEE Transactions on Biomedical Engineering 65 (2018), 645- 657.

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A-S03

Artificial Intelligent Diagnosis And Precise Radiofrequency Ablation for Thyroid Cancer

Dexing Kong
Zhejiang University
Zhejiang Qiushi Institute for Mathematical Medicine

In spite of being the most widely used medical imaging method for thyroid cancer screening, ultrasound imaging is easily affected by echo artifacts and speckle noises, resulting in mediocre spatial resolution and relatively poor contrast. More importantly, the nodular boundaries and the malignant features are not clear-cut, making subjective interpretations of individual radiologists susceptible to inter-observer variations. Even though using handcrafted features from conventional computer-aided detection or diagnostic approach can generate good results, it is usually quite tedious to manually define a set of useful features for a specific task. Data-driven deep learning models liberate scientists from customizing every single feature and allow automatic feature extractions without explicit definitions following instead the supplied data distribution, making the same architectural designs adaptable to drastically different application scenarios.

For the task of thyroid nodule detection based on ultrasound imaging, we designed, ahead of our peers, Convolutional Neural Networks (CNNs) for fully automatic nodule detection[i]. Based on 10-fold cross-validation experiments using a dataset of 9957 nodules and 465 normal thyroids collected from three hospitals in Hangzhou, we achieved mean Free-response Receiver Operating Characteristic (FROC) value of 98.64%. This was comparable to the result of combining Law's texture energy measures, wavelet features and local binary patterns on top of Support Vector Machine (SVM) classifier (98.49%), while significantly better than the classic ResNet architecture (94.65% with p value of 0.0039),

For the task of thyroid nodule diagnosis, we pioneered in applying CNNs to differentiate benign and malignant nodules by constructing a fused model of two structurally different CNNs pre-trained on ImageNet to improve the performance[ii] and achieved the best Area Under the Curve (AUC) score of 89.30±1.68, higher than its constituent CNNs (88.51±1.96 and 88.64 ± 1.79) and significantly better than classification by applying SVM on features extracted by conventional Gray Level Co-occurrence Matrix (GLCM)-based radiomics method (79.31±3.22).

Once thyroid cancer is confirmed, how to treat it becomes an immediate concern. Thyroid Radio-Frequency Ablation (RFA), being a minimally invasive treatment, is becoming a popular alternative to surgery for patients with thyroid nodules. Precise estimation of heat distribution in real time during the RFA procedure guided by ultrasound is crucial for the success of this treatment for complete cancerous tissue removal and at the same time minimizing unwanted damage to surrounding healthy tissue. The mainstream methods are based on bioheat transfer model using numerical simulations like the finite element method which is computationally expansive and time consuming (typically ≥10 min), and therefore are not applicable to real-time bedside simulation. We proposed a micro-perturbation theory for homogeneous medium considering the heat sink effect of adjacent blood vessels using simplified Pennes bioheat equation and introduced an analytical solution to calculate the temperature distribution around RF probes during RFA with an execution time of 0.05 s[iii]. Our method has been validated to obtain similar temperature distributions to conventional numerical simulation but with computational time orders of

magnitude smaller, permitting interactive RFA and precise ablation at bedside.

1. Jinlian Ma, Fa Wu, Tian'an Jiang, Jiang Zhu, Dexing Kong*. Cascade convolutional neural networks for automatic detection of thyroid nodules in ultrasound images. Medical Physics, 44(5): 1678-1691, 2017.

2. Jinlian Ma, Fa Wu, Jiang Zhu, Dong Xu, Dexing Kong*. A pre-trained convolutional neural network based method for thyroid nodule diagnosis. Ultrasonics, 73: 221-230, 2017.

3. Rendong Chen, Fang Lu, Fa Wu, Tian'an Jiang, Liting Xie and Dexing Kong. An analytical solution for temperature distributions in hepatic radiofrequency ablation incorporating the heat-sink effect of large vessels. Physics in Medicine & Biology, 63(23): 235026, 2018.

A-S04

PERSONAL INFORMATION		
	Family Name (Last Name)	Wei-Che
	Given Name (First Name)	Lin
	Official Title	Professor
	Position / Department	Department of Diagnostic Radiology
	Institute	Kaohsiung Chang Gung Memorial Hospital
	E-Mail	alex@cgmh.org.tw
Education Background	1993-2000 M.D. Department of medicine, Kaohsiung Medical University, Taiwan 2008-2012Ph.D. Department of Biomedical Imaging and Radiological Sciences National Yang-Ming University, Taipei, Taiwan	
Professional Career	2020/07 Vice Director, Department of Radiology, Kaohsiung Chang Gung Memorial Hospital. 2019/07 Professor, Kaohsiung Chang Gung Memorial Hospital, Chang Gung University College of Medicine, Taiwan. 2019/03 Executive member of the council, Radiological society Republic of China (RSROC-) 2019/02 Executive member of the council, Taiwan Academy of Tumor Ablation (TATA-) 2017/12 Executive member of the council, Taiwan society of Interventional Radiology (TSIR) 2016/03 Executive member of the council, Neuroradiological society of Taiwan (NRST-) 2015/07 Chief, Division of Neuroradiology, Kaohsiung Chang Gung Memorial Hospital, Taiwan. 2014/05 Associate Professor, Kaohsiung Chang Gung Memorial Hospital, Chang Gung University College of Medicine, Taiwan. 2013/05 Deputy Secretary-General of the Radiological Society of the Republic of China. 2009/08 Lecturer in Kaohsiung Chang Gung Memorial Hospital, Chang Gung University College of Medicine, Taiwan. 2005/08 Department of Diagnostic Radiology, Division of Neuroradiology, Kaohsiung Chang Gung Memorial Hospital, Taiwan.	
Publications (the latest 5 articles)	1. Lin WC, Tai YF, Chen MH, Luo SD, Huang F, Chen WC, Chiang PL, Chen HL, Chen MH, Baek JH.Ultrasound-Guided Moving Shot Radiofrequency Ablation of Benign Soft Tissue Neoplasm.Medicina (Kaunas). 2021 Aug 17;57(8):830.	

2. Ha EJ, Baek JH, Che Y, Chou YH, Fukunari N, Kim JH, Lin WC, My LT, Na DG, Hwee Quek LH, Wu MH, Yamakado K, Zhou J. Radiofrequency Ablation of Benign Thyroid Nodules: Recommendations from the Asian Conference on Tumor Ablation Task Force - Secondary Publication. J Med Ultrasound. 2021 Jun 21;29(2):77-83.

3. Cha CH, Luo SD, Chiang PL, Chen WC, Tung YC, Su YY, Lin WC*. Long-Term Outcomes of Radiofrequency Ablation for Treatment of Cystic Warthin Tumors versus Solid Warthin Tumors. Int J Environ Res Public Health. 2021 Jun 21;18(12):6640.

4. Chiang PL, Lin WC*, Chen HL, Luo SD, Chen MH, Chen WC, Chang YH, Chou CK, Su YY, Tung YC, Chen WC, Chi SY, Baek JH. Efficacy and safety of single-session radiofrequency ablation for intrathoracic goiter: preliminary results and short-term evaluation. Int J Hyperthermia. 2021;38(1):976-984.

5. Lin WC, Tung YC, Chang YH, Luo SD, Chiang PL, Huang SC, Chen WC, Chou CK, Su YY, Chen WC, Chi SY, Baek JH. Radiofrequency ablation for treatment of thyroid follicular neoplasm with low SUV in PET/CT study. Int J Hyperthermia. 2021;38(1):963-969.

A-S04

New Chapter of Minimal Intervention in Thyroid Cancer Treatment

Wei-Che Lin, MD, PhD
Vice Director, Department of Radiology, Kaohsiung Chang Gung Memorial Hospital

Over the past decade, the incidence of thyroid cancer has rapidly increased worldwide, and thyroid surgery has become one of the most common performed surgical procedure. Even though conventional open thyroidectomy remains the gold standard, this approach leaves a neck scar which could be worrying mainly for young women. The recent progress in minimal intervention, as well as patient cosmetic requests, have led to the development of alternative access to the thyroid lodge. Thus, alternative techniques have been established in order to potentially provide a more appealing cosmetic result. However, the introduction of these new techniques was initially approached with caution due to technical challenges, skepticism about the oncologic effectiveness. The purpose of this article is to provide an overview of the current main alternative minimal intervention for the treatment of thyroid cancer with particular focus on the currently effectiveness of the procedures.

A-S05

PERSONAL INFORMATION	
	Family Name (Last Name) BAEK
	Given Name (First Name) Jung Hwan
	Official Title President, Korean Society of Thyroid Radiology
	Position / Department Professor / Radiology
	Institute Asan Medical Center
	E-Mail radbaek@naver.com

Education Background	BS/MD, Hanyang University, College of Medicine, Seoul, Korea MS, University of Ulsan College of Medicine, Ulsan, Korea PhD, University of Ulsan College of Medicine, Ulsan, Korea
Professional Career	1997.3-2008.9: Department of Radiology and Intervention, Daerim St. Mary's Hospital 2000.2-2008.9: Chief of Department of Radiology, Daerim St. Mary's Hospital 2005.4-2008.9: Chief of Thyroid Center and Department of Radiology, Daerim St. Mary's Hospital 2008.10~2015.2: Associate professor, Department of Radiology and Research Institute of Radiology, University of Ulsan College of Medicine, Asan Medical Center 2015.3~: Professor, Department of Radiology and Research Institute of Radiology, University of Ulsan College of Medicine, Asan Medical Center 2015.3~2018.2: Chief of Guideline committee, Korea Society of Radiology 2015.3~: Professor, Department of Radiology and Research Institute of Radiology, University of Ulsan College of Medicine, Asan Medical Center 2015.10~2016.9: Chief of Neuroradiology/Head & Neck/Thyroid Section, Department of Radiology and Research Institute of Radiology, University of Ulsan College of Medicine, Asan Medical Center 2016.3~2018.2: Chief of Center for Bioimaging of New Drug Development, Asan Institute for Life Sciences, Asan Medical Center, University of Ulsan College of Medicine 2016~2017: Vice President, Korean Society of Thyroid Radiology 2018~2021: President, Korean Society of Thyroid Radiology 2021: Hosting Chair, Asian Conference on Tumor Ablation
Publications (the latest 5 articles)	1. Efficacy and safety of thermal ablation for autonomously functioning thyroid nodules: a systematic review and meta-analysis. EurRadiol. 2021 Feb;31(2):605-615.

	2. Diagnostic Algorithm for Metastatic Lymph Nodes of Differentiated Thyroid Carcinoma. Cancers (Basel). 2021 Mar 16;13(6):1338. 3. Efficacy of radiofrequency ablation for recurrent thyroid cancer invading the airways. EurRadiol. 2021 Apr;31(4):2153-2160. 4. Thermal Ablation for Small Papillary Thyroid Cancer: A Potential Game Changer. Radiology. 2021 Jul;300(1):217-218. 5. Radiofrequency ablation of benign thyroid nodules: recommendations from the Asian Conference on Tumor Ablation Task Force. Ultrasonography. 2021 Jan;40(1):75-82.

A-S05

Radiofrequency Ablation of Airway Invading Recurrent Thyroid Cancers

Jung Hwan BAEK, MD, PhD
Department of Radiology, Asan Medical Center, Korea

Thyroid cancer is the most common type cancer in endocrine organ. The prognosis well differentiated thyroid carcinoma is usually excellent; however, the recurrence rate has been reported up to 30%. Surgical removal is the standard treatment for recurrent thyroid cancer. However, reoperation can be challenging because of the distortions of the normal tissue planes and severe fibrosis caused by scar tissue. Therefore percutaneous US-guided procedures, including radiofrequency ablation (RFA), are considered nonsurgical therapeutic options for recurrent thyroid cancers. A recent meta-analysis of the efficacy and safety of RFA for treating locally recurrent thyroid cancer reported treatment success rates, defined as a > 50% reduction in tumor volume, of 89.5–100%, and a complete disappearance rate of 68.8%. Moreover complication rate is relatively low than surgery.

In term of death by recurrent thyroid cancer, a recent review suggested that most common cause of death is airway invasion by recurrent tumor, especially in elderly patients. Therefore active management of airway involving tumor is necessary. However surgical management of airway is still challenging. Surgical morbidity and mortality is high. Chemotherapy (TKI) and external bean radiotherapy (EBRT) are another treatment option; however fistula formation is one of the critical complications.

In Asan Medical Center, our thyroid team has discussed the treatment of airway invading tumors. We have applied radiofrequency ablation (RFA) to recurrent thyroid cancers and have achieved good results. Based on the results, out team published article about "RFA of airway invading recurrent thyroid cancers". Therefore in this lecture, I will introduce the indications, methods and results of RFA for airway involving recurrent thyroid cancers by comparing the results of airway non-invading tumors (only abutting). In addition, I will suggest the management algorithm and combination therapy of RFA and other treatment options (Radioactive iodine therapy, TKI and EBRT)

A-S06

PERSONAL INFORMATION	
	Family Name (Last Name): Mauri
	Given Name (First Name): Giovanni
	Official Title: Assistant professor
	Position / Department: Division of Interventional Radiology
	Institute: European Institute of Oncology/University of Milan
	E-Mail: Giovanni.mauri@ieo.it

Education Background		
	2007	Graduation in Medicine at University of Milan School of Medicine with full marks and honor.
	2008	Licensure at Medical Board of Milan, Italy
	2008-May 2012	Resident in Radiology at University of Milan School of Medicine
	July-Dec. 2010	Fellow in Interventional Radiology at St George's Hospital, University of London, Interventional Radiology department, Tooting, London, United Kingdom, chief: Prof Anna-Maria Belli
	Jan.-June 2011	Fellow in Interventional Oncology at General Hospital of Busto Arsizio, Interventional Oncology Department, Busto Arsizio, Italy, chief: Dr Luigi Solbiati
	July-Dec. 2011	Research fellow in Interventional Radiology at Brigham and Women's Hospital, Harvard Medical School, department of Abdominal Imaging and Intervention, Boston, United States, chief: Prof. Stuart G. Silverman
	2012	Board Certification in Radiology, University of Milan

Professional Career		
	2012-2017	Consultant Radiologist at IRCCS Policlinico San Donato (San Donato Milanese, Milano, Italy) Unit of Radiology, chief: Prof. Francesco Sardanelli
	June '14-May '15	Cosultant in interventional oncology at General Hospital of Busto Arsizio, Interventional Oncology Department, Busto Arsizio, Italy, chief: Dr Luigi Solbiati
	2015-2019	Cosultant in interventional radiology at European Institute of Oncology, Division of Interventional Radiology, Milan, Italy, chief Dr. Franco Orsi.
	From Nov '19	Assistant Professor, Department of Oncology and Hemato-Oncology, University of Milan, Cosultant in interventional radiology at European Institute of Oncology, Division of Interventional Radiology, Milan, Italy, chief Dr. Franco Orsi

| Publications (the | 1. Mauri G,Hegedüs L, Bandula S, Cazzato RL, Czarniecka A, Dudeck O, |

latest 5 articles)	Fugazzola L, Netea-Maier R, Russ G, Wallin G, Papini E.European Thyroid Association and Cardiovascular and Interventional Radiological Society of Europe 2021 Clinical Practice Guideline for the Use of Minimally Invasive Treatments in Malignant Thyroid Lesions.Eur Thyroid J. 2021 Jun;10(3):185-197. Schiaffino S, Serpi F, Rossi D*, Ferrara V, Buonomenna C, Alì M, Monfardini L, Sconfienza LM, Mauri G Inter- and Intraobserver Agreement Assessing Radiofrequency Ablated Volume of Benign Thyroid Nodules: CEUS vs B-Mode. J. Clin. Med 2020 May 16;9(5):1504.
	2. Mauri G, Monfardini L, Garnero A, Zampino MG, Orsi F, Della Vigna P, Bonomo G, Varano GM, Busso M, Gazzera C, Fonio P, Veltri A, Calandri M.Optimizing Loco Regional Management of Oligometastatic Colorectal Cancer: Technical Aspects and Biomarkers, Two Sides of the Same Coin.Cancers (Basel). 2021 May 26;13(11):2617.
	3. Bernardi S, Giudici F, Cesareo R, Antonelli G, Cavallaro M, Deandrea M, Giusti M, Mormile A, Negro R, Palermo A, Papini E, Pasqualini V, Raggiunti B, Rossi D, Sconfienza LM, Solbiati L, Spiezia S, Tina D, Vera L, Stacul F, Mauri G.Benign Thyroid Nodules: A Multicenter Study from the Italian Minimally Invasive Treatments of the Thyroid Group.Thyroid. 2020 Jul 24. doi: 10.1089/thy.2020.0202.
	4. Mauri G, Solbiati L, Orsi F, Monfardini L.Thermal Ablation of Liver Tumours: The Crucial Role of 3D Imaging.Cardiovasc Intervent Radiol. 2020 Sep;43(9):1416-1417. doi: 10.1007/s00270-020-02560-z.
	5. Mauri G, Rossi D, Bonomo G, Camisassi N, Della Vigna P, Maiettini D, Varano GM, Monfardini L, Mascagni L, Orsi F.Image-guided thermal ablation of central renal tumors with retrograde cold pyeloperfusion technique: a monocentric experience.Int J Hyperthermia. 2020;37(1):660-667. doi: 10.1080/02656736.2020.1778801.

A-S06

US and US-guided Intervention of Parathyroid Lesions

Giovanni Mauri, MD, PhD
Division of Interventional Radiology, European Institute of Oncology/University of Milan

Parathyroid glands are generally not visible at ultrasound (US). However, in case of pathological gland enlargement, parathyroid glands can be detected at US. In this case, precise US localization of the gland can be of clinical relevance to establish the following therapeutic approach. Also, it is important to know the potential non-classical localization of the thyroid glands for a correct US evaluation and identification.

Hyperparathyroidism (HPT) is the most commoncause of chronic hypercalcemia, with its incidence increasingwith age. Single-gland adenoma is the most commoncause (75–85%), and in most patients, it can be clearly identi-fied by ultrasound. Surgery is the recommended treatment for patients with symptomatic primary HPT (pHPT) due to its highlong-term cure rate. However, potentially both radical neckexploration and associated procedural general anesthesia canbe associated with morbidity. This is even further increasedin elderly patients and/or patients with comorbidities thatare contraindications to surgery under general anesthesia. Furthermore, pHPT patients with few or no symp-toms, most often detected during screening programs, maydecline surgery. For these reasons, it is often difficult toadvise individual patients about the correct balance betweenlong-term advantages and disadvantages of surgery.

Initially, minimally invasive image-guided therapy forpHPT was performed with chemical ablation, using ethanolas the sclerosing agent . However, over time thisapproach aroused progressively reduced enthusiasm, particu-larly as the success rate of percutaneous ethanol instillationwas found to be inversely correlated with the size of theparathyroid tumor and duration of follow-up. Moreover, side effects were not uncommon, and includedpain, vocal cord affection and extra-parathyroid fibrosis,which could hamper subsequent surgery, if needed.Some of these issues have been directly attributed to poorcontrol of the diffusion of the chemical agent. Thus, the useof thermal ablation sources could potentially overcome thesechallenges–if adequate precision and safety could be achieved. Different ablative techniques have been used for the treatment of patients with HPT, including laser, radiofrequency and microwave. All these techniques showed promising results in achieving improvement of hypercalcemia, but a not negligible recurrence rate has been reported. So, the actual indication to termal ablation in patients with HPT is still debated, and further studies are necessary to better investigate this topic.