Author's response to reviews

Title: Iodine concentration calculated by dual-energy computed tomography (DECT) as a future parameter to evaluate thyroid metabolism in patients with hyperthyroidism

Authors:

Duong Binh (ddbinhtm@gmail.com)
Takahito Nakajima (sojin@gunma-u.ac.jp)
Hidenori Otake (jonque773@gmail.com)
Tetsuya Higuchi (tetsuyah92md@gmail.com)
Yoshito Tsushima (tsushimaradgunma@gmail.com)

Version: 3 Date: 11 Jun 2017

Author’s response to reviews:

Jianping Dai (Reviewer 1):

Reviewer, Jianping Dai: Please pay attention to the words with highlights in the attached manuscript.

# Page 5 line 14 to 17 In my opinion, please rewrite the title, the title should be brief and accuracy.

We agree with your suggestion.

To clarify the statement, we have revised our title. To emphasize the assessment of the thyroid function, we used a “functional” parameter.

# Page 6 line 14 The purpose of the study you did not express in the background section.

However, in the manuscript, you wrote The objective was to assess the potential use of DECT for functional assessment of the thyroid gland.

Page 6 line 11 (in the abstract)

We have already described it as “we hypothesized that DECT could be applied for the functional assessment of the thyroid gland.” However, to be more specific, we have revised the abstract.

# Page 6 line 33 and line 38 and line 53
How could you acquired the CT values and iodinated concentrations of the thyroid glands? Please write the material and methods specifically and accurately.

We revised the materials and methods section in the abstract.

# Please rewrite the results section, Because we can not found the subjects and participants.

We mentioned the subjects in the materials and methods section as follows: “Thirteen patients with Grave’s disease treated at our hospital from May to September 2015 were included in this retrospective study.”

# In the conclusion section, you confirmed that The negative correlation of 123I uptake at 3h with iodine concentration evaluated by DECT was better than that observed with simple CT value. I can not understand the meaning of this sentence. Please rewrite this conclusion. What is the relationship between the 123I uptake and iodine concentration? What is the relationship between iodine concentration and simple CT values? Better or worse of this kind of correlation comes from what evidences or results?

We changed our conclusion section as below:

A significant negative linear correlation between 123I uptake at 3h and iodine concentration calculated by DECT was observed. This result suggests that iodine concentration could predict thyroid function as thyroid scintigraphy does. Iodine concentration measurement by DECT could be used for evaluating iodine turnover in the thyroid gland. Further studies with larger number of patients are required to confirm these results.

# In addition, can you tell us the normal iodine concentration and CT values of the thyroid gland in normal people?

What is the iodine turnover? In the results, we can not found the iodine turnover. Thank you.

We strictly prohibited a diet including iodine materials during 2 weeks before radioisotope ablation therapy in our patients. We have no data on the normal iodine concentration in patients’ thyroid gland.

We use the term, “turnover” in the introduction: “Patients with Graves’ disease typically show high iodine turnover and reduced iodine storage in the thyroid tissues, which results in decreased CT values of the thyroid glands.” Iodine turnover has a similar meaning to thyroid metabolism, but it appears more appropriate in the context of this study. Thyroid metabolism includes not only turnover but also accumulation and distribution. Turnover means the repetition of uptake and release and would be more specific than metabolism. Thyroid scintigraphy can assess uptake but not the release in this “turnover” process. As a result of our research, DECT can predict the release ability of iodine in thyroid gland.
The participants only female, Is there gender discrimination or other reasons? And why did you not discussed in the discussion section?

Our patient population did not differ from a natural incidence because incidence of Graves’ disease is well known that the ratio of male to female is 1:9.

What does this sentence refer to? What meaning of this sentence here? Why does thyroid uptakes compared with DECT parameters? See the attached manuscript.

In clinical situation, thyroid scintigraphy is a gold standard to evaluate the thyroid function. In this study, we wanted to evaluate the feasibility of DECT as a functional parameter. With this aim in mind, we compared thyroid uptakes measured by scintigraphy and iodine concentration measured by DECT, respectively. This paragraph explains to the ways to measure the uptake ratio of the thyroid gland.

In my opinion, this software and methods for measuring iodine concentrations and CT values should be described in the abstract section.

Measuring iodine concentrations is one of DECT’s functions. Every user of DECT scanner can calculate iodine concentration using this software on the scanner console. I think it is not essential to provide this explanation in the abstract.

The sentence means: The total 26 ROIs included two ROIs of the thyroid gland in every patient. One ROI was placed in the left lobe and another ROI was placed in the right lobe. This sentence was corrected by a native English editing service.

Because Fig. 5a and 5b had opposite meanings, a conjunction, “while” would be required. For Fig. 5c and 5d, we don’t want to repeat the same phrase, “There was no correlation between...”.


Thank you for your advice.

However, this article discussed the “in vitro” correlation.

There is no other report investigating this correlation in a human study.

We revised our conclusion according to your advice.
Ronnie Sebro (Reviewer 2): Revisions are appropriate

# Considering dose radiation should be given serious concern in current CT imaging. Some latest papers on low dose CT imaging should be analyzed in the paper:

Radiation dose is a serious concern in CT imaging. We should argue about the difference of radiation dose between conventional CT scanner and DECT scanner. If we acquire dual energy images by conventional scanners, radiation exposure doses would be twice due to twice CT acquisitions. DECT scanners acquire dual energy images at the same time and do not increase radiation dose for patients. According to one of the references as below, CTDIvol is either 6 mGy or 7.3 mGy for chest examinations, but not higher than that of conventional CT.
