Reviewer’s report

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

Version: 0 Date: 24 Apr 2017

Reviewer: Ronnie Sebro

Reviewer’s report:

The authors present a fantastic idea to assess in the in vivo concentration of iodine using DECT and tried to compare these values with radioactive iodine uptake.

The idea is a great one and has promise. Unfortunately, the study design, sample size and statistical analyses are major limitations.

First, it was not clear when the DECT was performed (e.g. 0, 5, 10, or 200 days after the RAI study?). It was also not clear if the patients were still on the iodine restricted diet at the time of the DECT. The RAI potentially would interfere with the "baseline" iodine concentration in the thyroid glands.

Second, the authors evaluate 13 women with hyperthyroidism or Graves disease. It would be helpful to know the breakdown and the laboratory values for these patients as well as their clinical symptoms.

Third, the authors "double" their sample sizes by considering each lobe of the thyroid gland as separate. This results in greater similarity because the authors forget that there is a within person correlation (i.e. correlation between the right and left lobes of a gland). Other issues like reliability were not assessed.

Fourth, the correlations (based on 13 individuals), given the small sample size, should use the Spearman's correlation statistic. The sample size is so small a t-test may be unreliable. A permutation test or a sign test may be more informative.

Lastly, a nice biological explanation for the importance should be provided.

Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

No

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

No
Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

No

Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

Quality of written English
Please indicate the quality of language in the manuscript:

Not suitable for publication unless extensively edited

Declaration of competing interests
Please complete a declaration of competing interests, considering the following questions:

1. Have you in the past five years received reimbursements, fees, funding, or salary from an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

2. Do you hold any stocks or shares in an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

3. Do you hold or are you currently applying for any patents relating to the content of the manuscript?

4. Have you received reimbursements, fees, funding, or salary from an organization that holds or has applied for patents relating to the content of the manuscript?

5. Do you have any other financial competing interests?

6. Do you have any non-financial competing interests in relation to this paper?

If you can answer no to all of the above, write 'I declare that I have no competing interests' below. If your reply is yes to any, please give details below.

I have no competing interests

I agree to the open peer review policy of the journal. I understand that my name will be included on my report to the authors and, if the manuscript is accepted for publication, my named report including any attachments I upload will be posted on the website along with the authors' responses. I agree for my report to be made available under an Open Access Creative Commons
CC-BY license (http://creativecommons.org/licenses/by/4.0/). I understand that any comments which I do not wish to be included in my named report can be included as confidential comments to the editors, which will not be published.

I agree to the open peer review policy of the journal