

ERRATUM

Open Access



# Erratum to: Absorption, distribution and excretion of intravenously injected $^{68}\text{Ge}/^{68}\text{Ga}$ generator eluate in healthy rats, and estimation of human radiation dosimetry

Anu Autio<sup>1†</sup>, Helena Virtanen<sup>1†</sup>, Tuula Tolvanen<sup>1</sup>, Heidi Liljenbäck<sup>1,2</sup>, Vesa Oikonen<sup>1</sup>, Tiina Saanijoki<sup>1</sup>, Riikka Siitonen<sup>1</sup>, Meeri Käkälä<sup>1</sup>, Andrea Schüssele<sup>3</sup>, Mika Teräs<sup>1</sup> and Anne Roivainen<sup>1,2\*</sup>

## Erratum

After publishing of the paper [1], substantial errors in Tables 4, 5, 6 and 7 have been noticed. The correct Tables 4, 5, 6 and 7 are presented here. Authors regret any inconvenience.

## Acknowledgements

The study was conducted within the Finnish Centre of Excellence in Cardiovascular and Metabolic Disease, supported by the Academy of Finland, University of Turku, Turku University Hospital and Åbo Akademi University. This study was sponsored by Eckert & Ziegler Radiopharma GmbH, Berlin, Germany (conducted as part of preclinical studies), and further supported by a grant from the Academy of Finland (#258814). Helena Virtanen is a Ph.D. student financially supported by the Drug Research Doctoral Program, University of Turku Graduate School, Finland, and the Finnish Cultural Foundation. Aake Honkaniemi and Jouni Tuisku are thanked for their help in PET imaging.

## Author details

<sup>1</sup>Turku PET Centre, Turku University Hospital and University of Turku, Turku FI-20521, Finland. <sup>2</sup>Turku Center for Disease Modeling, University of Turku, Turku, Finland. <sup>3</sup>Eckert & Ziegler Radiopharma GmbH, Berlin, Germany.

Received: 1 June 2016 Accepted: 2 June 2016

Published online: 13 June 2016

## References

1. Autio A, Virtanen H, Tolvanen T, Liljenbäck H, Oikonen V, Saanijoki T, et al. Absorption, distribution and excretion of intravenously injected  $^{68}\text{Ge}/^{68}\text{Ga}$  generator eluate in healthy rats, and estimation of human radiation dosimetry. *EJNMMI Res.* 2015;5(1):117. doi:10.1186/s13550-015-0117-z.

\* Correspondence: anne.roivainen@utu.fi

†Equal contributors

<sup>1</sup>Turku PET Centre, Turku University Hospital and University of Turku, Turku FI-20521, Finland

<sup>2</sup>Turku Center for Disease Modeling, University of Turku, Turku, Finland

Submit your manuscript to a SpringerOpen<sup>®</sup> journal and benefit from:

- Convenient online submission
- Rigorous peer review
- Immediate publication on acceptance
- Open access: articles freely available online
- High visibility within the field
- Retaining the copyright to your article

Submit your next manuscript at ► [springeropen.com](http://springeropen.com)

**Table 4** Human residence times and radiation dose estimates for  $^{68}\text{Ga}$  radioactivity extrapolated from the rat biodistribution data

| Organ                      | Residence time (h) |               | Dose (mSv/MBq)  |               |
|----------------------------|--------------------|---------------|-----------------|---------------|
|                            | Female rat data    | Male rat data | Female rat data | Male rat data |
| Adrenals                   |                    |               | 0.01140         | 0.00931       |
| Blood                      | 0.2080             | 0.5000        |                 |               |
| Bone                       | 0.6645             | 0.3089        |                 |               |
| Bone marrow                | 0.0907             | 0.0479        |                 |               |
| Brain                      | 0.0348             | 0.0326        | 0.01800         | 0.01340       |
| Breasts                    |                    |               | 0.00587         | 0.00615       |
| Gallbladder wall           |                    |               | 0.00955         | 0.00810       |
| Heart wall                 | 0.0208             | 0.0187        | 0.17400         | 0.30300       |
| Kidneys                    | 0.0196             | 0.0100        | 0.03850         | 0.01970       |
| Liver                      | 0.2526             | 0.2653        | 0.09720         | 0.07660       |
| Lower large intestine wall |                    |               | 0.00319         | 0.00152       |
| Lungs                      | 0.3174             | 0.2770        | 0.18600         | 0.13400       |
| Muscle                     | 0.1014             | 0.1084        | 0.00729         | 0.00510       |
| Osteogenic cells           |                    |               | 0.11600         | 0.04310       |
| Ovaries                    | 0.0004             |               | 0.01880         | 0.00169       |
| Pancreas                   | 0.0019             | 0.0023        | 0.01870         | 0.01870       |
| Red marrow                 |                    |               | 0.02250         | 0.01380       |
| Skin                       |                    |               | 0.000292        | 0.00202       |
| Small intestine            |                    |               | 0.00388         | 0.00222       |
| Spleen                     |                    |               | 0.00554         | 0.00412       |
| Stomach wall               |                    |               | 0.0565          | 0.00477       |
| Testes                     |                    | 0.000028      |                 | 0.00077       |
| Thymus                     |                    |               | 0.01000         | 0.00139       |
| Thyroid                    | 0.0087             | 0.0095        | 0.22100         | 0.19800       |
| Upper large intestine wall |                    |               | 0.00399         | 0.00268       |
| Urinary bladder wall       |                    |               | 0.00232         | 0.00106       |
| Uterus                     | 0.0137             |               | 0.007920        | 0.00142       |
| Whole body                 |                    |               | 0.01770         | 0.01150       |
| Effective dose             |                    |               | 0.0483          | 0.0338        |

**Table 5** Additional dosimetry estimates based on a female rat distribution data

| Organ                      | Absorbed dose per unit radioactivity administered (mSv/MBq) |                     |                    |                    |                |
|----------------------------|---|---------------------|--------------------|--------------------|----------------|
|                            | 15-year-old (50 kg)   | 10-year-old (30 kg) | 5-year-old (17 kg) | 1-year-old (10 kg) | Newborn (5 kg) |
| Adrenals                   | 0.01120   | 0.01640             | 0.02380            | 0.04030            | 0.07820        |
| Brain                      | 0.01590   | 0.01760             | 0.02060            | 0.02920            | 0.06670        |
| Breasts                    | 0.00581   | 0.01100             | 0.01630            | 0.02690            | 0.05450        |
| Gallbladder wall           | 0.00920   | 0.01270             | 0.02010            | 0.03900            | 0.07500        |
| Heart wall                 | 0.19400   | 0.30100             | 0.48300            | 0.87300            | 1.72000        |
| Kidneys                    | 0.04210   | 0.06000             | 0.08880            | 0.16000            | 0.41500        |
| Liver                      | 0.09740   | 0.14800             | 0.22000            | 0.42700            | 0.98900        |
| Lower large intestine wall | 0.00321   | 0.00504             | 0.00771            | 0.01330            | 0.02920        |
| Lungs                      | 0.22400   | 0.31900             | 0.49300            | 0.98400            | 2.71000        |
| Muscle                     | 0.00757   | 0.01310             | 0.03190            | 0.06220            | 0.09540        |
| Osteogenic cells           | 0.11400   | 0.18400             | 0.31000            | 0.73500            | 2.35000        |
| Ovaries                    | 0.02030   | 0.05660             | 0.09880            | 0.22500            | 0.45900        |
| Pancreas                   | 0.002180  | 0.04060             | 0.05470            | 0.11200            | 0.34000        |
| Red marrow                 | 0.02560   | 0.04150             | 0.07770            | 0.17700            | 0.57100        |
| Skin                       | 0.00281   | 0.00435             | 0.00671            | 0.01220            | 0.02710        |
| Small intestine            | 0.00386   | 0.00619             | 0.00986            | 0.01780            | 0.03760        |
| Spleen                     | 0.00562   | 0.00858             | 0.01300            | 0.02380            | 0.04920        |
| Stomach wall               | 0.00559   | 0.00800             | 0.01330            | 0.02500            | 0.05020        |
| Thymus                     | 0.01020   | 0.01330             | 0.01900            | 0.02970            | 0.05700        |
| Thyroid                    | 0.29800   | 0.46000             | 1.02000            | 1.93000            | 2.63000        |
| Upper large intestine wall | 0.00389   | 0.00669             | 0.01040            | 0.01900            | 0.04250        |
| Urinary bladder wall       | 0.00223   | 0.00377             | 0.00625            | 0.01100            | 0.02220        |
| Uterus                     | 0.08020   | 1.34000             | 2.03000            | 3.69000            | 1.47000        |
| Total body                 | 0.01780   | 0.02890             | 0.04680            | 0.09200            | 0.23400        |
| Effective dose (mSv/MBq)   | 0.05740   | 0.12300             | 0.20900            | 0.41000            | 0.71700        |

**Table 6** Additional dosimetry estimates based on a male rat distribution data

| Organ                      | Absorbed dose per unit radioactivity administered (mSv/MBq) |                     |                    |                    |                |
|----------------------------|---|---------------------|--------------------|--------------------|----------------|
|                            | 15-year-old (50 kg)   | 10-year-old (30 kg) | 5-year-old (17 kg) | 1-year-old (10 kg) | Newborn (5 kg) |
| Adrenals                   | 0.01120   | 0.01650             | 0.02350            | 0.03770            | 0.07490        |
| Brain                      | 0.01370   | 0.01480             | 0.01700            | 0.02410            | 0.05630        |
| Breasts                    | 0.00743   | 0.01420             | 0.02130            | 0.03500            | 0.07250        |
| Gallbladder wall           | 0.00960   | 0.01370             | 0.02130            | 0.04090            | 0.08030        |
| Heart wall                 | 0.39300   | 0.61100             | 0.98300            | 1.78000            | 3.4900         |
| Kidneys                    | 0.02410   | 0.03450             | 0.05100            | 0.09110            | 0.23100        |
| Liver                      | 0.10300   | 0.15700             | 0.23300            | 0.45000            | 1.04000        |
| Lower large intestine wall | 0.00197   | 0.00308             | 0.00506            | 0.00907            | 0.02040        |
| Lungs                      | 0.20000   | 0.28500             | 0.43900            | 0.87200            | 2.38000        |
| Muscle                     | 0.00739   | 0.01290             | 0.03260            | 0.06360            | 0.09610        |
| Pancreas                   | 0.02570   | 0.04800             | 0.06460            | 0.13100            | 0.40300        |
| Red marrow                 | 0.01540   | 0.02430             | 0.04410            | 0.09800            | 0.31100        |
| Osteogenic cells           | 0.05580   | 0.09010             | 0.15100            | 0.35600            | 1.13000        |
| Skin                       | 0.00244   | 0.00362             | 0.00572            | 0.01030            | 0.02320        |
| Small intestine            | 0.00287   | 0.00483             | 0.00796            | 0.01460            | 0.03090        |
| Spleen                     | 0.0327  | 0.0503              | 0.0801             | 0.1460             | 0.3780         |
| Stomach wall               | 0.000657  | 0.00988             | 0.01530            | 0.02870            | 0.05600        |
| Testes                     | 0.00178   | 0.00745             | 0.00935            | 0.01380            | 0.02390        |
| Thymus                     | 0.01580   | 0.01940             | 0.02760            | 0.04170            | 0.07940        |
| Thyroid                    | 0.32500   | 0.50200             | 1.12000            | 2.1100             | 2.88000        |
| Upper large intestine wall | 0.00327   | 0.00581             | 0.00935            | 0.01820            | 0.03850        |
| Urinary bladder wall       | 0.00129   | 0.00224             | 0.00393            | 0.00699            | 0.01520        |
| Total body                 | 0.01470   | 0.02370             | 0.03830            | 0.07480            | 0.19000        |
| Effective dose (mSv/MBq)   | 0.05060   | 0.07560             | 0.13400            | 0.26000            | 0.55500        |

**Table 7** Human effective doses of  $^{68}\text{Ga}$  radiopharmaceuticals and  $^{18}\text{F}$ -FDG

| Radiopharmaceutical           | Effective dose (mSv/MBq)                  | Reference                  |
|-------------------------------|---|----------------------------|
| $^{68}\text{Ga}$ -DOTANOC     | 0.025                                     | Pettinato 2008 [10]        |
| $^{68}\text{Ga}$ -DOTATOC     | 0.023                                     | Hartmann 2009 [11]         |
| $^{68}\text{Ga}$ -DOTATATE    | 0.021                                     | Sandström 2013 [12]        |
| $^{68}\text{Ga}$ -NOTA-2Rs15d | 0.0218 <sup>a</sup>                       | Xavier 2013 [13]           |
| BAY86-7548                    | 0.051                                     | Roivainen 2013 [14]        |
| $^{18}\text{F}$ -FDG          | 0.0190                                    | ICRP Publication 1998 [15] |
| $^{68}\text{Ga}$ -eluate      | 0.0483 <sup>b</sup> , 0.0338 <sup>c</sup> | Present study              |

<sup>a</sup>Extrapolated from tumour xenograft mice; <sup>b</sup>Obtained by using female rat data; <sup>c</sup>Obtained by using male rat data