University of Groningen

Erratum: Time-resolved dosimetry for validation of 4D dose calculation in PBS proton therapy (vol 65, 125015, 2020)

Kostiukhina, N.; Palmans, H.; Stock, M.; Knopf, A.; Georg, D.; Knaeusl, B.

Published in:
Physics in Medicine and Biology

DOI:
[10.1088/1361-6560/abaaba](https://doi.org/10.1088/1361-6560/abaaba)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2020

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Kostiukhina, N., Palmans, H., Stock, M., Knopf, A., Georg, D., & Knaeusl, B. (2020). Erratum: Time-resolved dosimetry for validation of 4D dose calculation in PBS proton therapy (vol 65, 125015, 2020). *Physics in Medicine and Biology*, 65(20), [209601]. <https://doi.org/10.1088/1361-6560/abaaba>

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

ERRATUM

Erratum: Time-resolved dosimetry for validation of 4D dose calculation in PBS proton therapy (2020 *Phys. Med. Biol.* [65 125015](#))

To cite this article: N Kostiukhina *et al* 2020 *Phys. Med. Biol.* **65** 209601

View the [article online](#) for updates and enhancements.

IPEM | IOP

Series in Physics and Engineering in Medicine and Biology

Your publishing choice in medical physics,
biomedical engineering and related subjects.

Start exploring the collection—download the
first chapter of every title for free.

ERRATUM

ACCEPTED FOR PUBLICATION
30 July 2020PUBLISHED
7 October 2020Erratum: Time-resolved dosimetry for validation of 4D dose calculation in PBS proton therapy (2020 *Phys. Med. Biol.* 65 125015)N Kostiukhina^{1,2}, H Palmans^{3,4}, M Stock³, A Knopf⁵, D Georg^{1,2} and B Knäusel^{1,2}¹ Division of Medical Radiation Physics, Department of Radiation Oncology, Medical University of Vienna/AKH Vienna, Vienna, Austria² Christian Doppler Laboratory for Medical Radiation Research for Radiation Oncology, Medical University of Vienna, Vienna, Austria³ Medical Physics, EBG MedAustron GmbH, Wiener Neustadt, Austria⁴ Medical Radiation Science, National Physical Laboratory, Teddington, United Kingdom⁵ Department of Radiation Oncology, University Medical Center Groningen, University of Groningen, Groningen, The NetherlandsE-mail: barbara.knaeusl@meduniwien.ac.at

In the publication of this article (Kostiukhina *et al* 2020) the parameters for equations (1) and (2) should be read as:

t_i —irradiation time of the energy layer (both obtained from the BD log-files), E —number of energy layers, and M —number of repeated measurements for a given scenario.

In table 1 the spot weight range should be read as $0.9\text{--}47.5 \times 10^6$ protons/spot; and the rows of the total dose for PP1–PP5 for different motion scenarios need to be separated in a way that always five values are grouped together as shown in the table below.

Table 1. Treatment plan specifications, beam delivery parameters, beam intensity variation and results of dose measurements by five PPs for various motion scenarios. All uncertainties are type A standard uncertainties; the overall uncertainty of the dose determination with the PPs also combines 2.6% (Carlino et al 2018).

Treatment plan specification		Energy layers: 46 (67.5–115.0 MeV) Number of spots: 7735 Spot weight range ^a : 0.9–47.5 × 10 ⁶ protons/spot							
		Primary: 2 Gy, deg. 20		4 Gy, deg. 20	2 Gy, deg. 10	2 Gy, deg. 50			
		9 (4, 44)		8 (2, 49)	7 (2, 39)	9 (5, 56)			
Delivery type: prescribed physical single-fraction dose, beam transmission degradation									
Beam intensity variation (<i>RSD_i</i>), mean (min, max) [%]									
Total treatment delivery time, mean ± <i>SD</i> [min]		5.79 ± 0.09		8.99 ± 0.22		14.02 ± 0.47		4.89 ± 0.05	
Phantom static		1.90 ± 0.00		3.78 ± 0.00		1.89 ± 0.01		1.90 ± 0.00	
		1.94 ± 0.00		3.88 ± 0.00		1.95 ± 0.01		1.96 ± 0.00	
		1.96 ± 0.00		3.90 ± 0.00		1.95 ± 0.01		1.96 ± 0.00	
		0.78 ± 0.00		1.58 ± 0.00		0.81 ± 0.00		0.82 ± 0.00	
		1.96 ± 0.00		3.91 ± 0.00		1.97 ± 0.01		1.97 ± 0.00	
Target motion—0.6 cm amplitude		1.94 ± 0.02		3.85 ± 0.07		1.94 ± 0.01		1.94 ± 0.01	
		1.98 ± 0.00		3.87 ± 0.05		1.94 ± 0.01		1.94 ± 0.01	
		1.83 ± 0.01		3.76 ± 0.06		–		1.89 ± 0.01	
		0.48 ± 0.01		1.12 ± 0.05		0.61 ± 0.03		0.61 ± 0.03	
		1.97 ± 0.02		3.91 ± 0.06		2.01 ± 0.02		2.01 ± 0.02	
Total dose for PP1–PP5, mean ± <i>SD</i> [Gy]		1.89 ± 0.11 ^b		3.70 ± 0.19		1.89 ± 0.09		1.90 ± 0.04	
		1.91 ± 0.14 ^b		3.85 ± 0.04		1.78 ± 0.25		1.86 ± 0.04	
		1.06 ± 0.23 ^b		2.03 ± 0.12		1.05 ± 0.31		1.12 ± 0.03	
		0.26 ± 0.02 ^b		0.54 ± 0.07		0.28 ± 0.01		0.28 ± 0.07	
		1.96 ± 0.05 ^b		3.79 ± 0.12		2.09 ± 0.11		1.93 ± 0.05	
Target motion—2.0 cm amplitude									

^aThe spot weight range is shown for 2 Gy prescribed physical single-fraction doses; the values will be doubled for 4 Gy prescribed doses.
^bAverage value for scenarios with various breathing phases at the delivery start: 0%, 25%, 75% of the breathing cycle; for unmarked values only the scenario with 0% start breathing phase was performed.

Reference

- Carlino A, Stock M, Zagler N, Marrale M, Osorio J, Vatnitsky S and Palmans H 2018 Characterization of PTW-31015 PinPoint ionization chambers in photon and proton beams *Phys. Med. Biol.* **63** 185020
- Kostiukhina N, Palmans H, Stock M, Knopf A, Georg D and Knäusl B 2020 Time-resolved dosimetry for validation of 4D dose calculation in PBS proton therapy *Phys. Med. Biol.* **65** 125015