

Christian.Hranitzky@seibersdorf-laboratories.at
Coordinator of IC2021area



EURADOS →
European Radiation Dosimetry Group e. V.

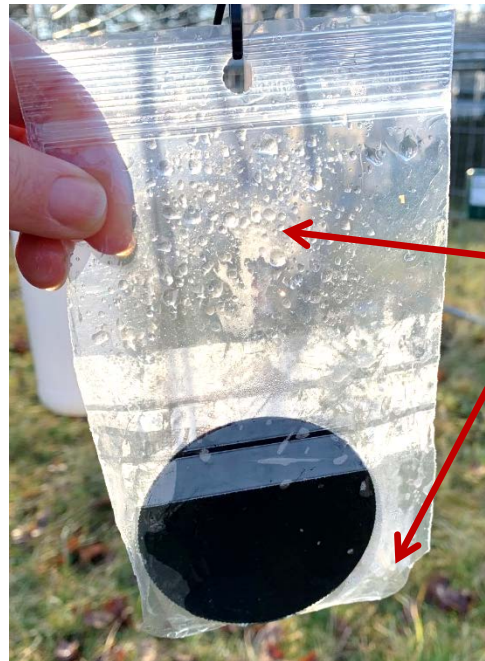
**Feedback and
Conclusions**

Intercomparison IC2021area of passive area dosimetry systems

Christian Hranitzky, Christian Gärtner, Christian Naber,
Julia Aslan, Maria A. Duch, Thomas Haninger,
Željka Knežević

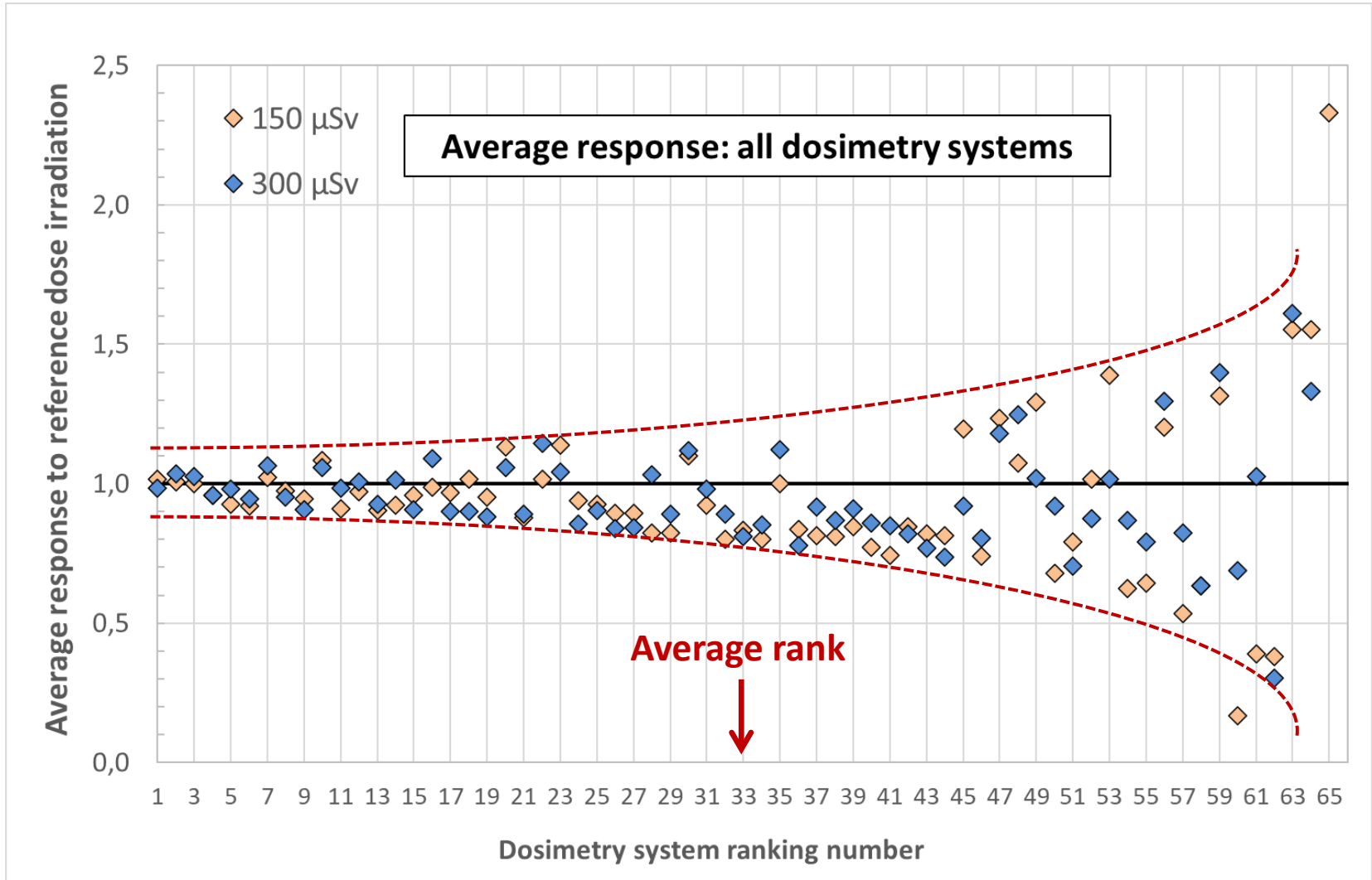
Conclusions I

- ❖ 1 participant could not provide doseimeters to KIT in time
- ❖ 1 participant could not report dose results
- ❖ 7 systems needed a bag for outdoor hanging positions

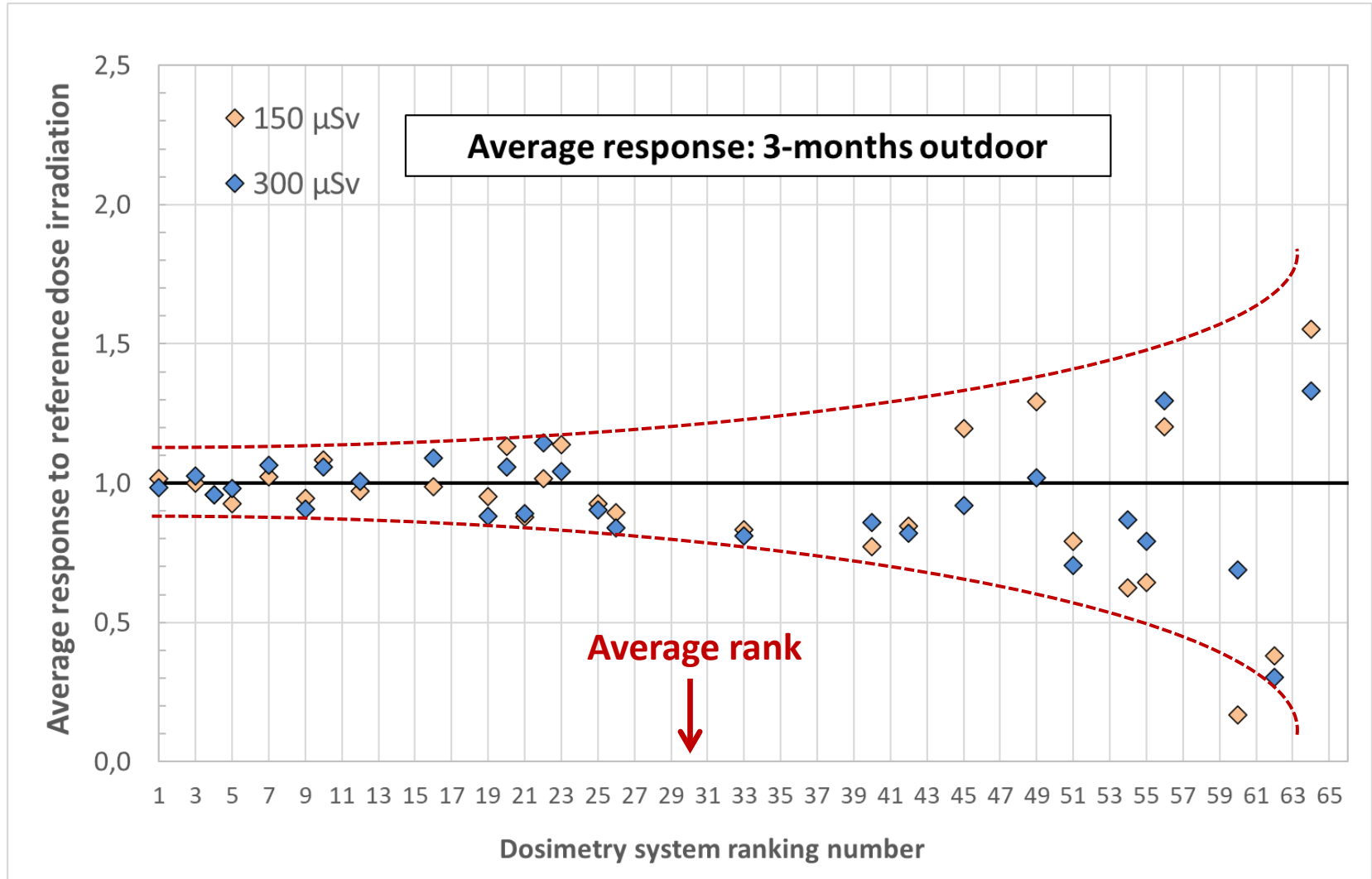


water inside the bag

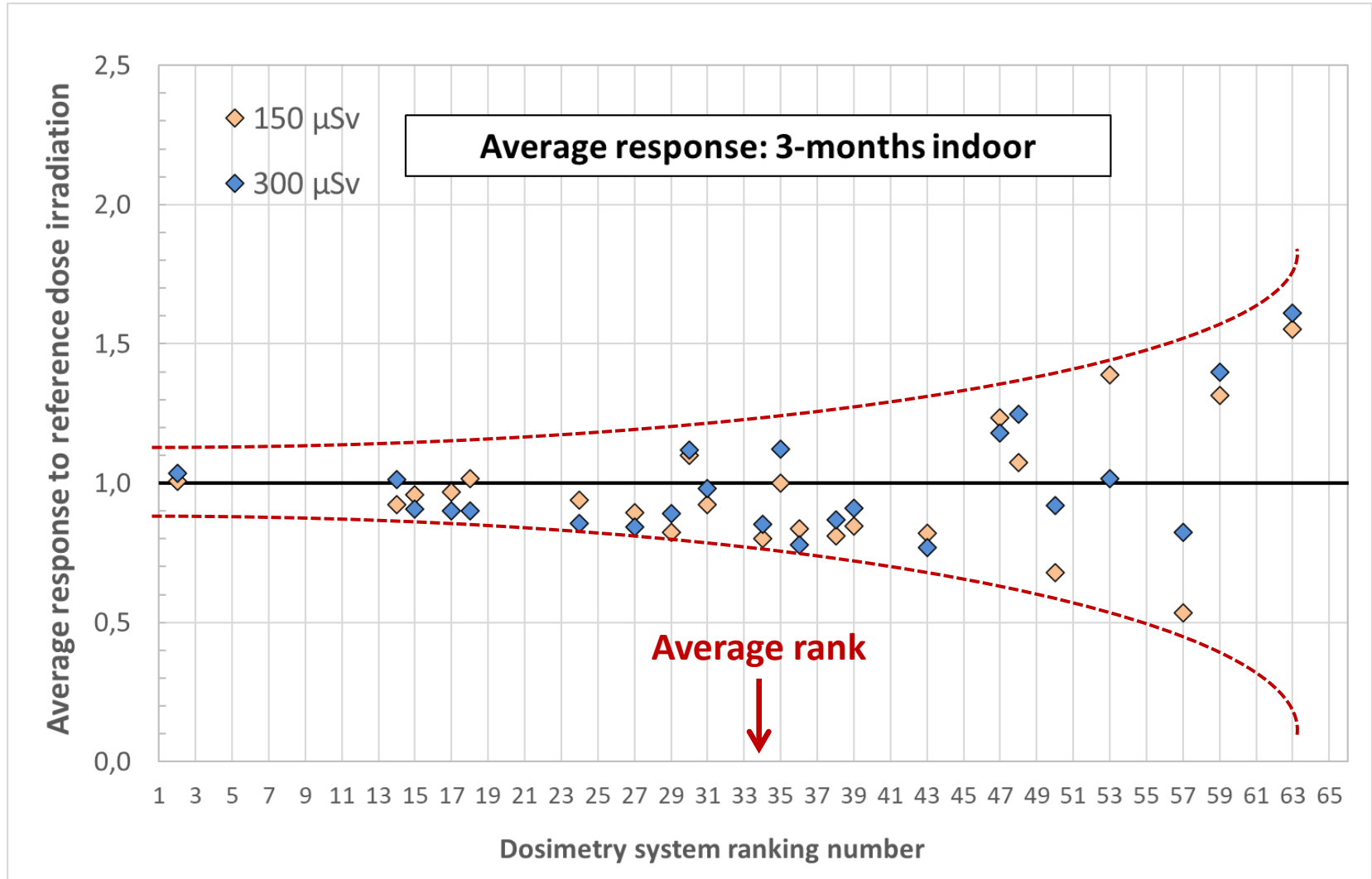
Preliminary average results – 65 systems



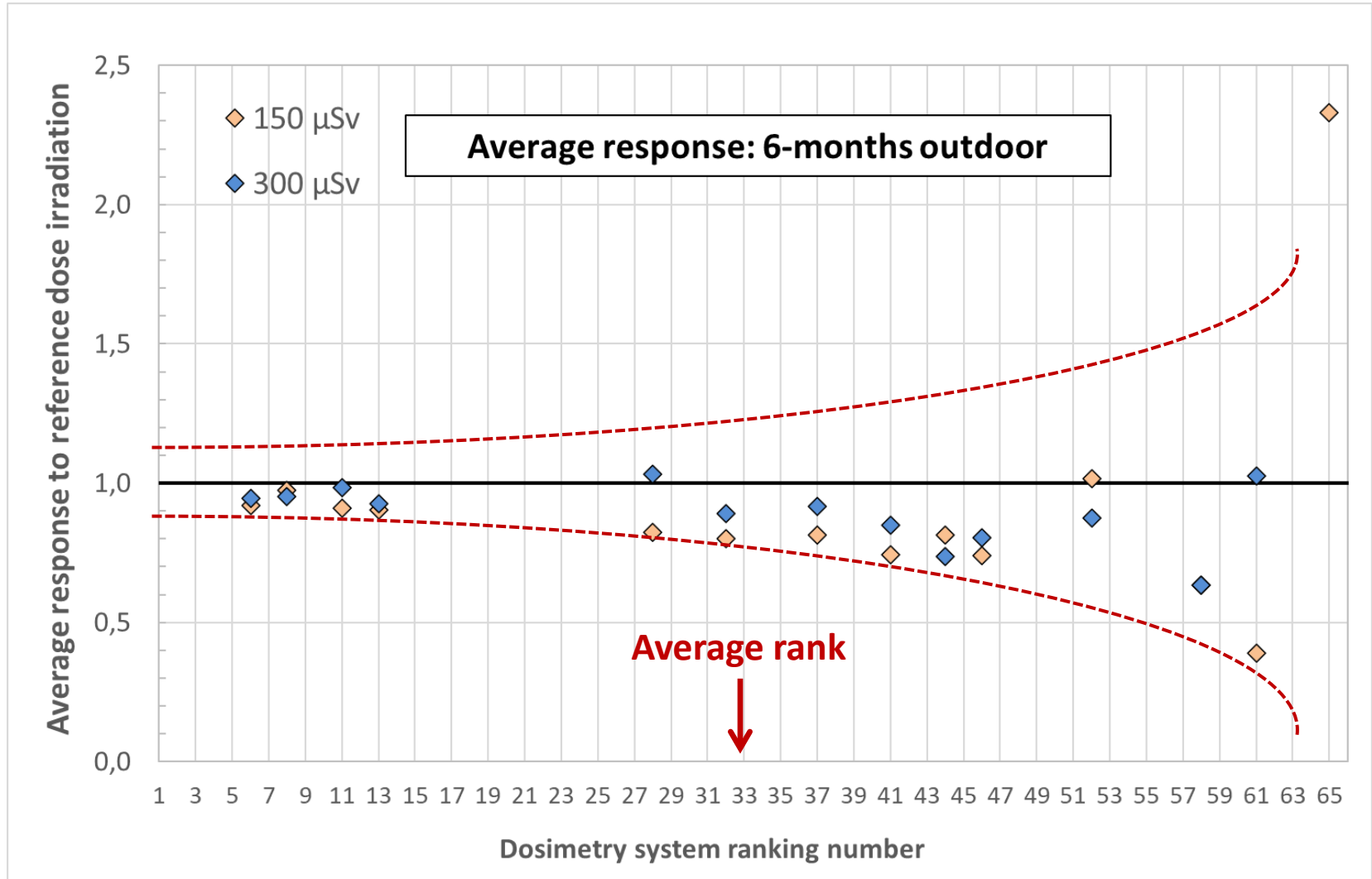
Preliminary average results – 28 systems: 3-months outdoor



Preliminary average results – 23 systems: 3-months indoor



Preliminary average results – 14 systems: 6-months outdoor



❖ **Most participating dosimetry systems performed well:**

93 % of the response results within the ISO limits
Similar overall results for the 3 measurement conditions
Similar average response for 150 μSv and 300 μSv

❖ **Radiation quality Cs-137 was used to focus on:**

Low dose measurements: 150 μSv and 300 μSv
Background dose values: 200 μSv - 1600 μSv

❖ **KIT calibration laboratory performed well:**

1 irradiation was necessary to repeat
Photo documentation of all irradiations was perfect

Response Limits Criteria – ISO 14146

Radiological protection — Criteria and performance limits for the periodic evaluation of dosimetry services

7.1.1 Personal and area dosimeters

For each irradiated dosimeter, the quotient R between the measured dose value G and the conventional quantity value H_{ref} , given by the response, as in [Formula \(1\)](#):

$$R = \frac{G}{H_{\text{ref}}} \quad (1)$$

shall meet the following criteria between H_0 and H_{top} (see [6.3](#)):

- Criterion 1) For photon radiation with a mean energy of $\bar{E}_{\text{ph}} > 10$ keV and for beta radiation with a mean energy of $\bar{E}_{\text{beta}} > 0,2$ MeV (easier-to-measure):

$$0,71 \cdot \left(1 - \frac{2 \cdot H_0 / 1,33}{H_0 / 1,33 + H_{\text{ref}}} \right) \leq R \leq 1,67 \cdot \left(1 + \frac{H_0}{4 \cdot H_0 + H_{\text{ref}}} \right) \quad (2)$$

❖ **Current revision of ISO 14146 triggered by IC2021area:**

appropriate response limits

useful requirements e.g. for reference conditions

...

❖ **Necessary information about the type of application:**

environmental monitoring

workplace monitoring

environmental & workplace monitoring

Online Platform

<https://www.eurados-intercomparison.org>



EURADOS Intercomparison Platform

[Start page](#)

[Extremity & eye lens dosimeter intercomparison
IC2019exteye](#)






[Whole body dosimeter intercomparison IC2020ph](#)

[Passive area dosimeter intercomparison IC2021area](#)

[Neutron dosimeter intercomparison IC2022n](#)

[Whole body dosimeter intercomparison IC2022ph](#)

Online Platform – Dosimetry System

System Identification:	<input type="text" value="TLD-700"/> 
	Please describe the Dosimetry System (e.g. model, reader system, accreditation number, ...). This text will be included in the certificate.
Measurement Quantity:	<input type="text" value="H*(10)"/> 
	Please specify the measurement quantity in which you will report the dose values of the irradiated dosimeters.
Detector Type / Materials:	<input type="text" value="TLD-700 (LiF: Mg, Ti)"/> 
	Please specify the detector type (e.g. TLD, OSL, ...) and materials (e.g. LiF:Mg,Ti, TLD700, ...) of your dosimeter system for statistical analysis.
Number of Detectors:	<input type="text" value="4"/> 
	Please specify the number of detector elements within your dosimeter for statistical analysis.
Reference Energy / Calibration Radiation Quality:	<input type="text" value="Cs-137"/> 
	Please specify the reference energy / calibration radiation quality of your dosimeter system.
Measurement Condition:	<input type="text" value="outdoor, 6 months"/> 
	Please choose one of three measurement conditions for your dosimeter system to be used for the IC2021 area intercomparison (indoor or free-field outdoor measurement position, 3 months or 6 months measurement period).
Lower Measurement Limit:	<input type="text" value="36–70 μSv"/> 
	Please choose the lower measurement limit (alternatively the lower detection limit) of your dosimeter system for statistical analysis.

Online Platform - Survey



European Radiation Dosimetry Group

Passive area dosimeter intercomparison IC2021area

[Start page](#) ♦ [Documents](#) ♦ [Feedback](#) ♦ [Logout \(christian.hranitzky@seibersdorf-laboratories.at\)](#)
[Status](#) ♦ [Monitoring Service](#) ♦ [Contact Person](#) ♦ [Dosimetry Systems](#) ♦ [Change password](#) ♦ [Tools](#)

♦ Online Survey ♦

Please take a few minutes and complete the survey below. Your feedback is appreciated and helps us to improve the next intercomparison.

Questions

Participant ID:

01. Has the intercomparison organisation fulfilled your expectations?

02. Have your own intercomparison results fulfilled your expectations?

yes

partly

no

Online Platform - Survey



European Radiation Dosimetry Group

Passive area dosimeter intercomparison IC2021area

[Start page](#) ♦ [Documents](#) ♦ [Feedback](#) ♦ [Logout \(christian.hranitzky@seibersdorf-laboratories.at\)](#)
[Status](#) ♦ [Monitoring Service](#) ♦ [Contact Person](#) ♦ [Dosimetry Systems](#) ♦ [Change password](#) ♦ [Tools](#)

♦ Online Survey ♦

Please take a few minutes and complete the survey below. Your feedback is appreciated and helps us to improve the next intercomparison.

Question

18 Participants answered:

Participant ID:

01. Has the intercomparison organisation fulfilled your expectations?

02. Have your own intercomparison results fulfilled your expectations?

+

x

-

17

1

0

14

4

0

Online Platform - Survey

03. Any comments on the price of participation?	<input type="text"/>	...
04. Any comments on the usage of the online platform or the communication with the coordinator?	<input type="text"/>	...
05. Any comments on the 'Instructions for Participants' or 'Terms and Conditions'?	<input type="text"/>	...
06. Any comments on the time schedule (registration, sending/receiving of dosimeters, measurement periods, dose reporting, draft/final certificates, EURADOS report)?	<input type="text"/>	...
07. Any comments on the irradiated low dose values (compared to the natural background + transport dose contribution)?	<input type="text"/>	...
08. Any comments on the measurement conditions (indoor and outdoor, 3 and 6 months), number of dosimeters or dosimeter positioning?	<input type="text"/>	...
09. Any comments on the 'Certificates of Participation' or the EURADOS Report?	<input type="text"/>	...

Online Platform - Survey

03. Any comments on the price of participation?	4	0	0
04. Any comments on the usage of the online platform or the communication with the coordinator?	10	0	0
05. Any comments on the 'Instructions for Participants' or 'Terms and Conditions'?	6	0	1
06. Any comments on the time schedule (registration, sending/receiving of dosimeters, measurement periods, dose reporting, draft/final certificates, EURADOS report)?	8	0	0
07. Any comments on the irradiated low dose values (compared to the natural background + transport dose contribution)?	3	1	1
08. Any comments on the measurement conditions (indoor and outdoor, 3 and 6 months), number of dosimeters or dosimeter positioning?	4	1	0
09. Any comments on the 'Certificates of Participation' or the EURADOS Report?	7	0	0

Online Platform - Survey

“These doses are so low that it becomes difficult to determine precisely their value. This is why the whole exercise is interesting”

“The graph (figure 5.5) with the ranking number is a good idea”

“We had irradiation during the transit, so the range doses (150-300 μ Sv) were very low for us”

“It's not clear if a distinction is made to 'transport dose' and 'natural background dose' subtraction. Look at point 7. So if a service as a way of determining natural background it was subtracted from the results and only 'transport dose' was 'left' on the non-exposed dosimeters. But if transport dose was considered as the sum of both no correction at all was done”

Questionnaire 2016

EURADOS Report 2021-02

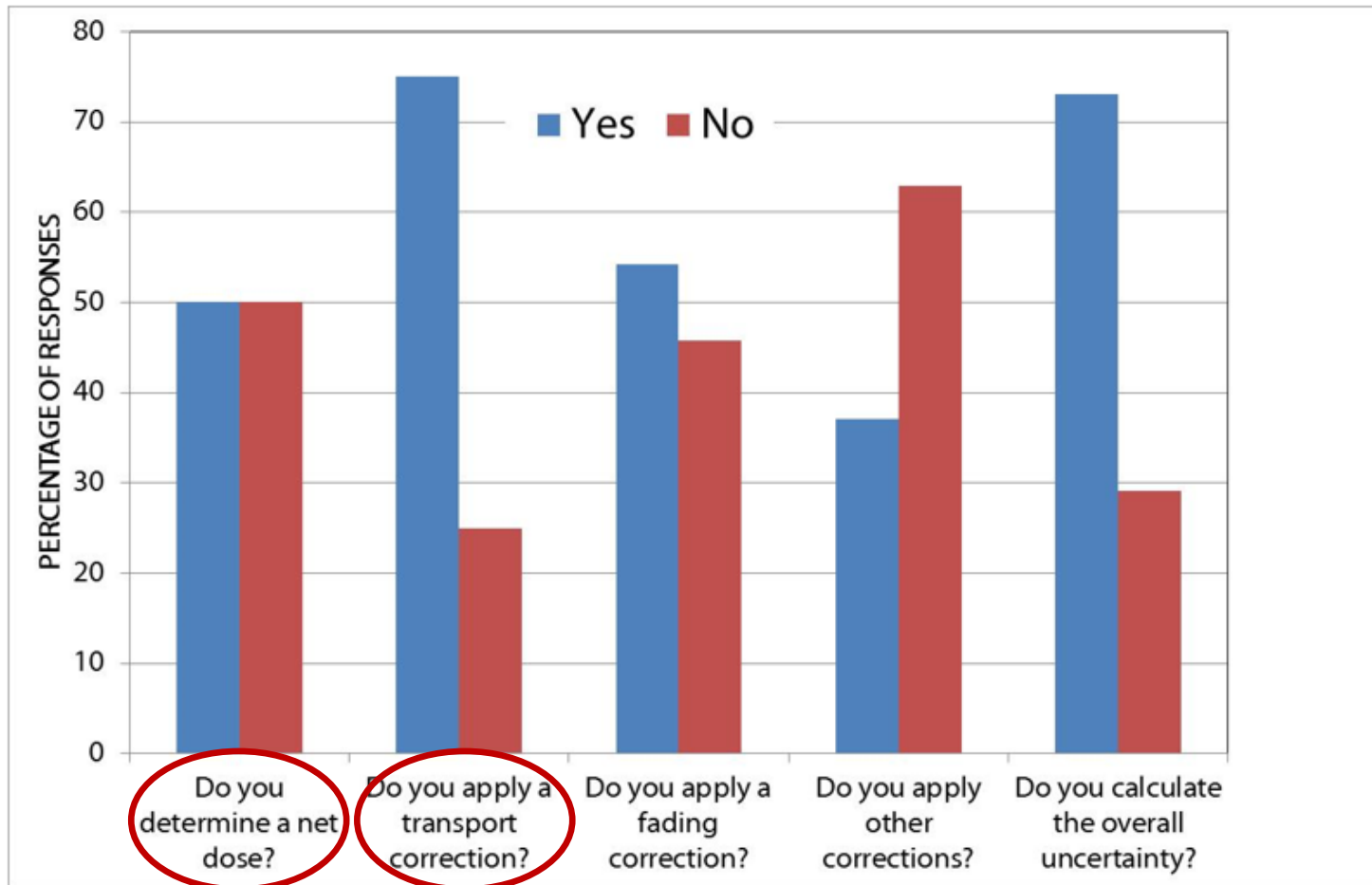
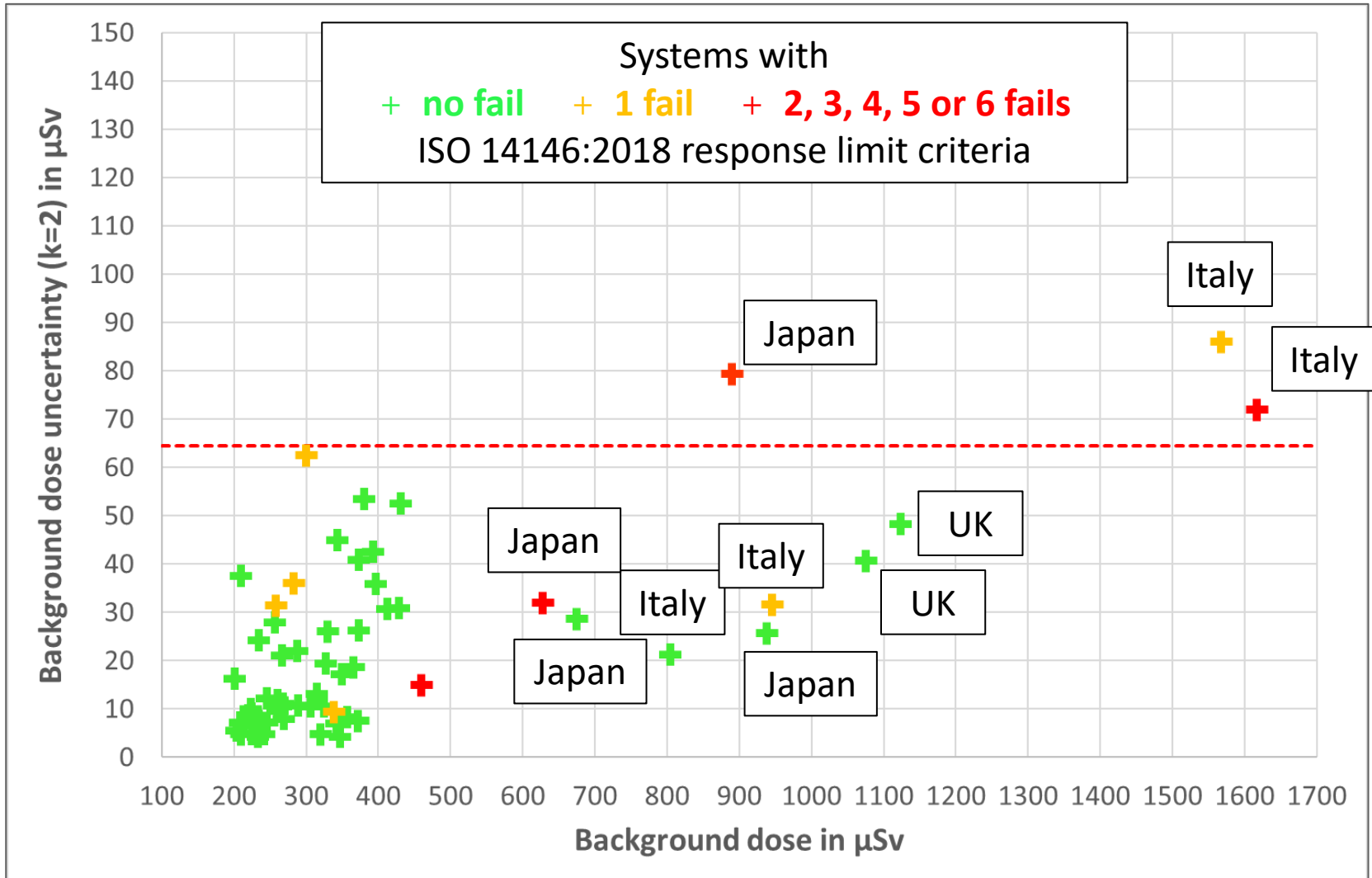


Figure 16: Dose calculation methods.

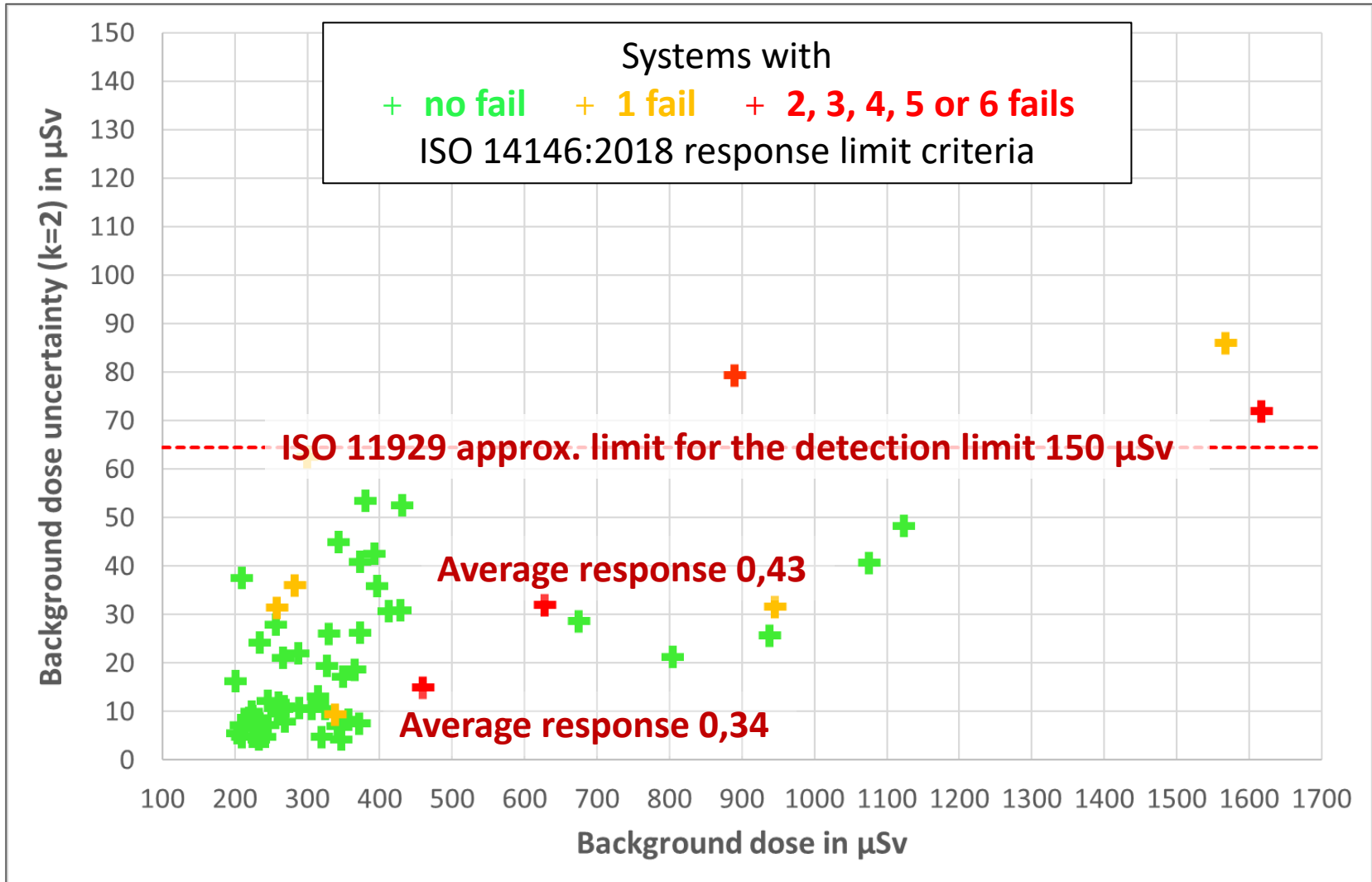
Background dose

Average of 6 not-irradiated dosimeters



Background dose

Average of 6 not-irradiated dosimeters



EURADOS Report 2022-01

<http://eurados.org>

<https://eurados.sckcen.be>



EURADOS Report 2022-01

Neuherberg, May 2022

Thank you !

**Intercomparison IC2021 area
of passive area dosimetry systems**

Christian Hranitzky, Christian Gärtner, Christian Naber,
Julia Aslan, Maria A. Duch, Thomas Haninger,
Željka Knežević