Eurados AM2016 - Milano

IC2015ext Participants' Meeting Special cases

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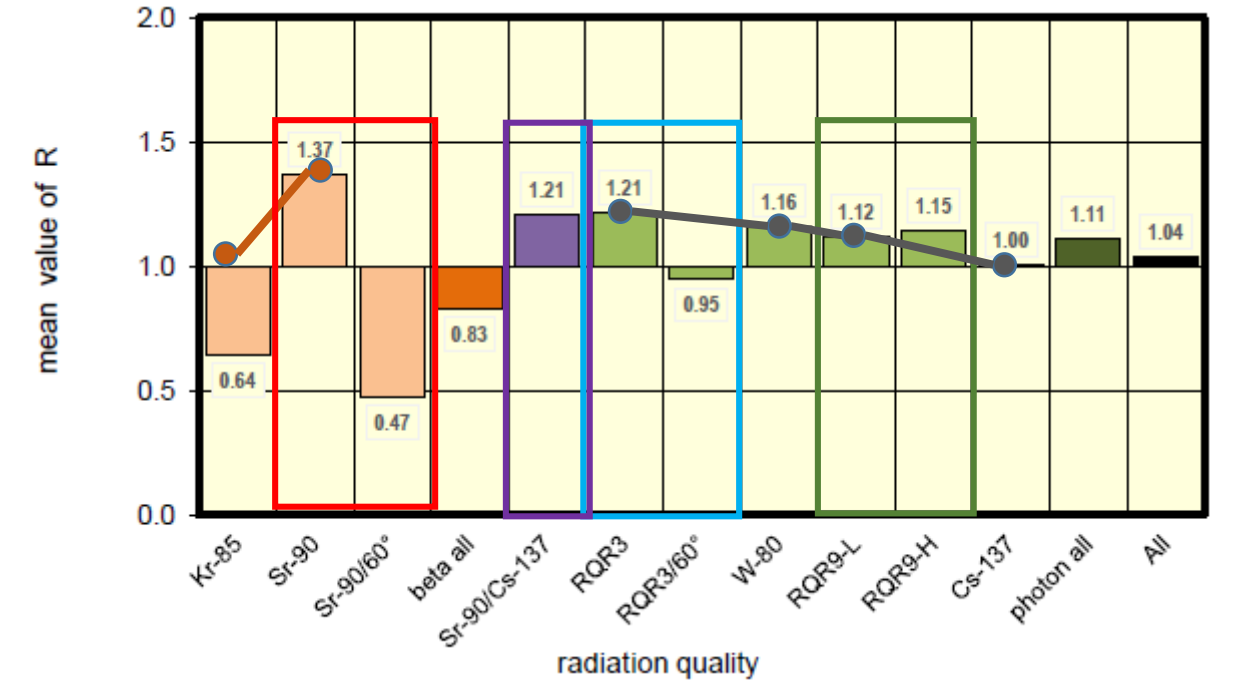
OUTLINE

1. Introduction: design of irradiation plan
2. Examples of general performance
3. Mixed field
4. Angular response
5. Linearity

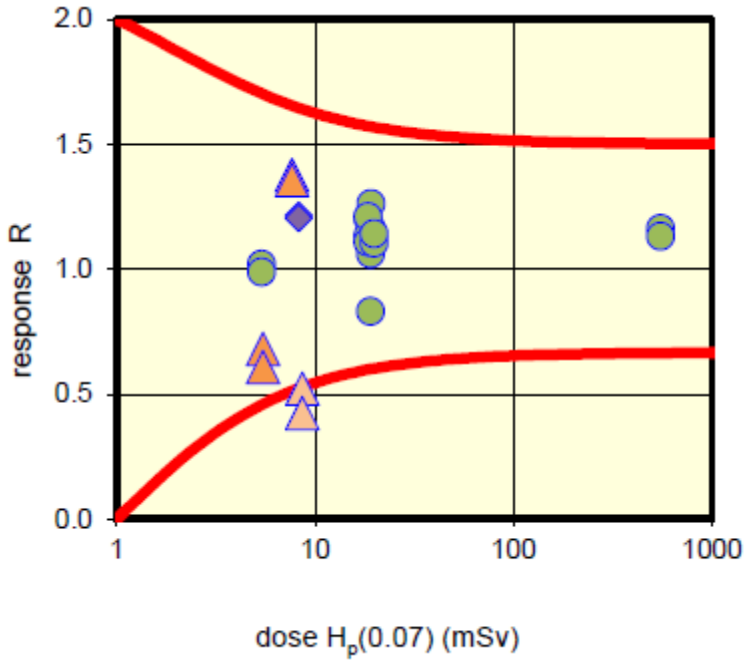
Irradiation plan was designed to check:



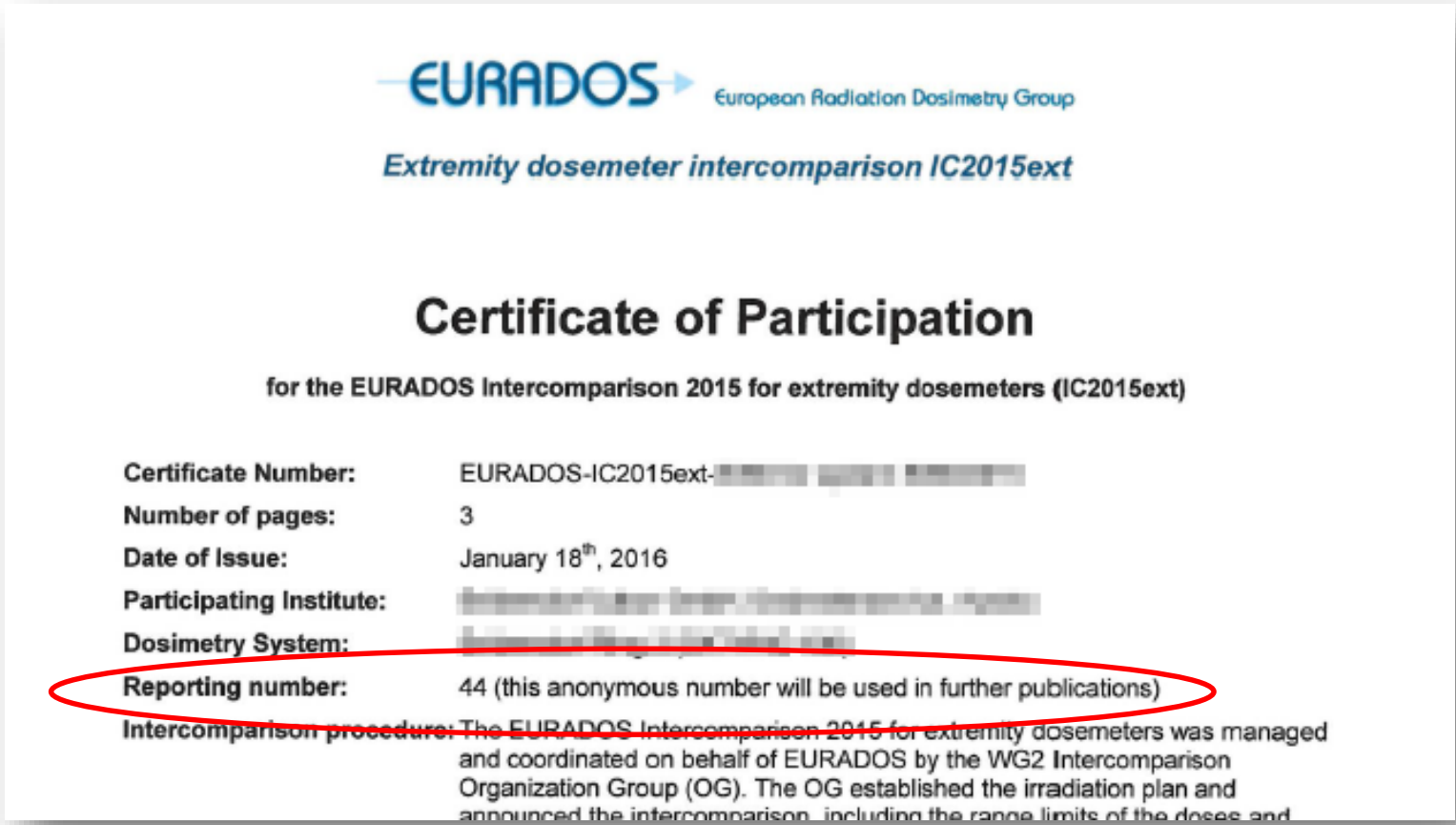
BETA ENERGY RESPONSE **MIXED FIELDS** **PHOTON ENERGY RESPONSE**

BETA ANGULAR RESPONSE **LINEARITY** **PHOTON ANGULAR RESPONSE**

Intercomparison results allow the IMS to test:



Compliance with ISO-14146: “trumpet curves”



EURADOS European Radiation Dosimetry Group

Extremity dosemeter intercomparison IC2015ext

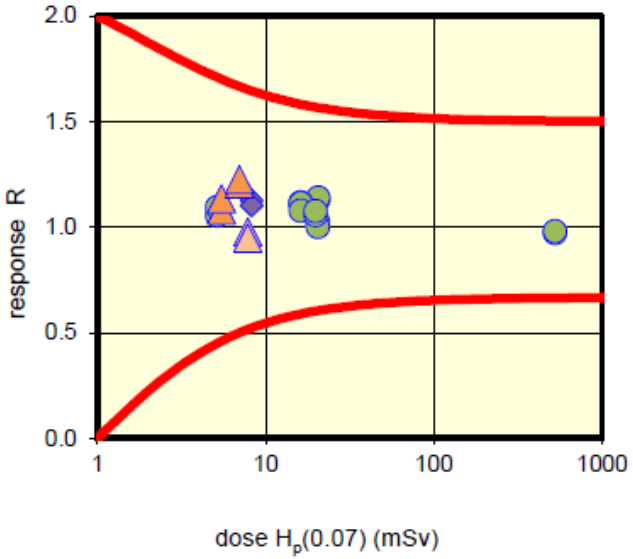
Certificate of Participation

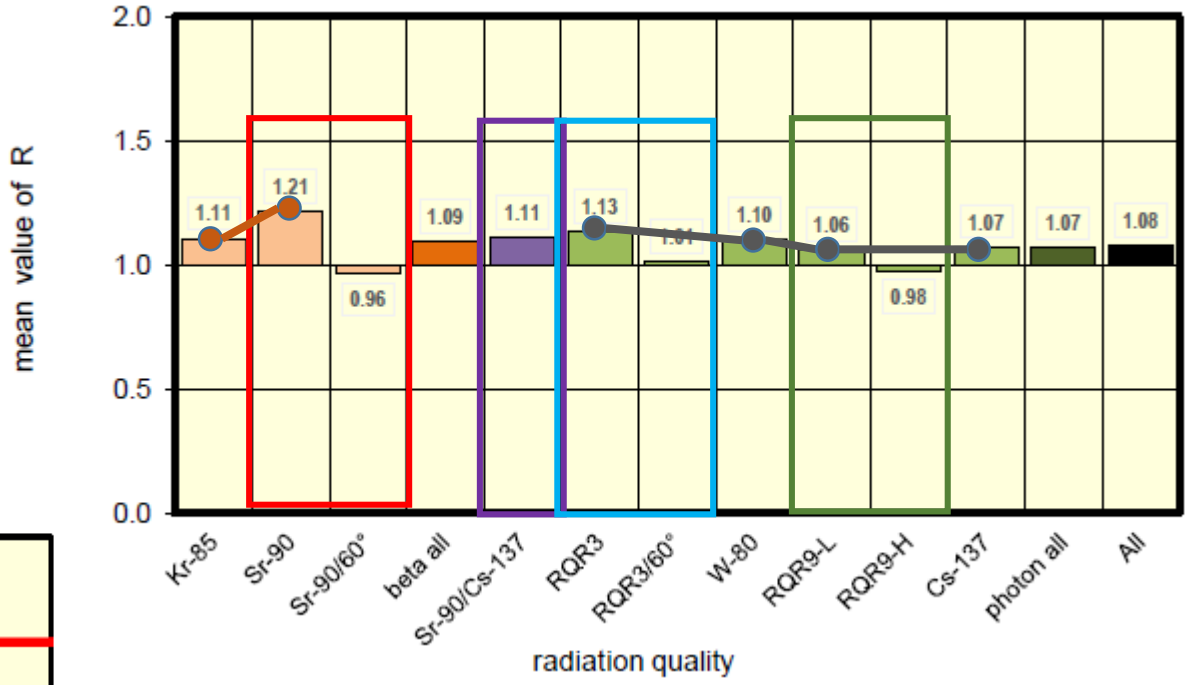
for the EURADOS Intercomparison 2015 for extremity dosemeters (IC2015ext)

Certificate Number:	EURADOS-IC2015ext-[redacted]
Number of pages:	3
Date of Issue:	January 18th, 2016
Participating Institute:	[redacted]
Dosimetry System:	[redacted]
Reporting number:	44 (this anonymous number will be used in further publications)
Intercomparison procedure:	The EURADOS Intercomparison 2015 for extremity dosemeters was managed and coordinated on behalf of EURADOS by the WG2 Intercomparison Organization Group (OG). The OG established the irradiation plan and announced the intercomparison, including the range limits of the doses and

Ph-B dosemeters: examples of very good performance

RING





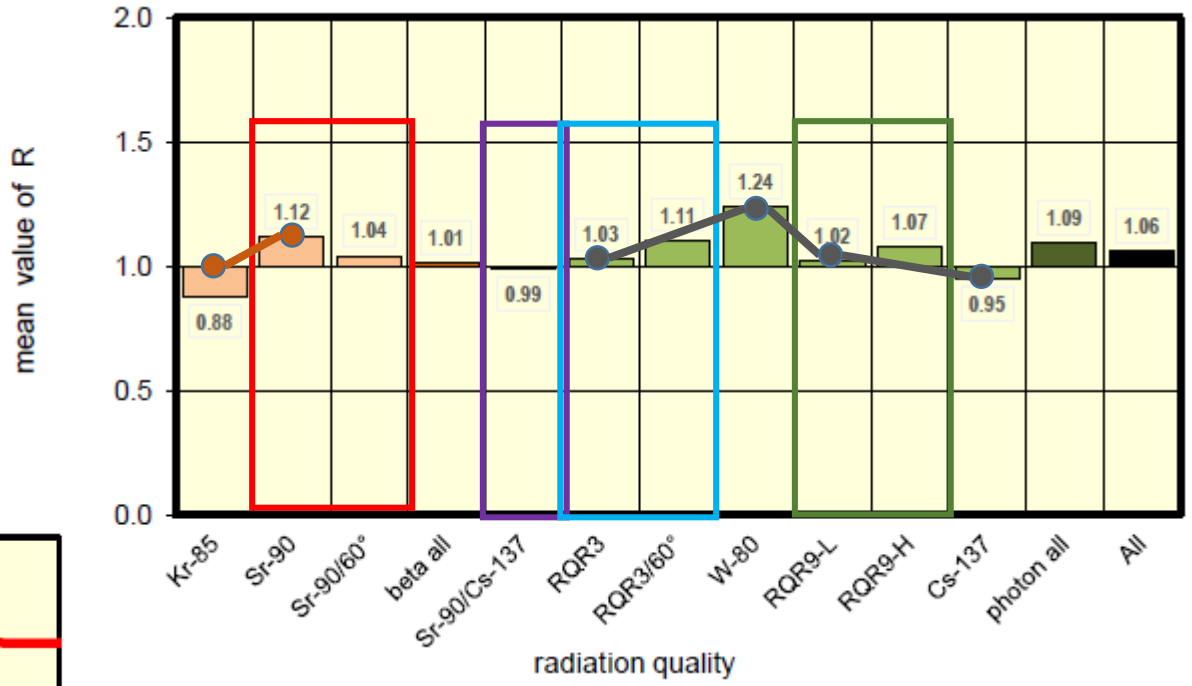
BETA ANGULAR RESPONSE MIXED FIELDS PHOTON ANGULAR RESPONSE

BETA ENERGY RESPONSE LINEARITY PHOTON ENERGY RESPONSE

Reporting number: 14

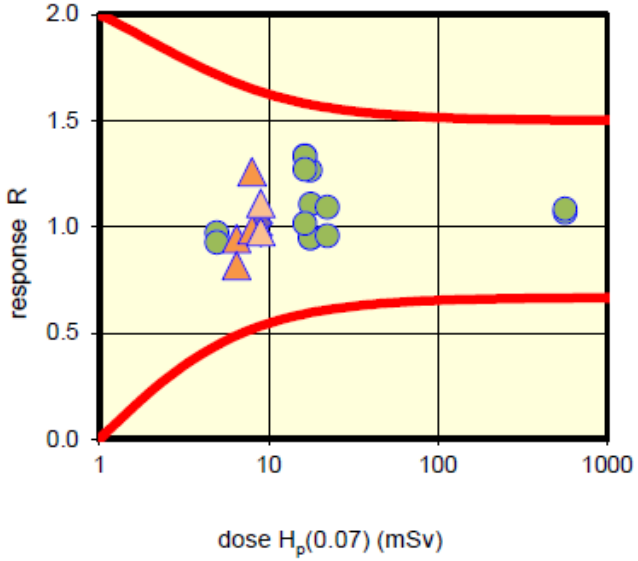
Ph-B dosemeters: examples of very good performance

FINGER TIP



BETA ANGULAR RESPONSE MIXED FIELDS PHOTON ANGULAR RESPONSE

BETA ENERGY RESPONSE LINEARITY PHOTON ENERGY RESPONSE

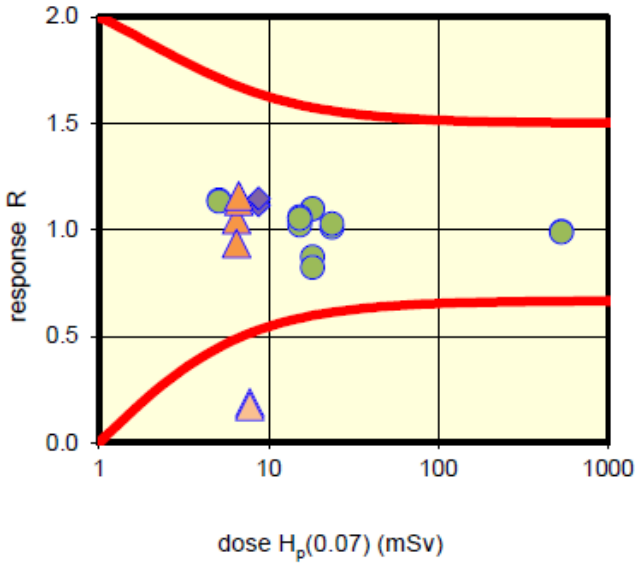


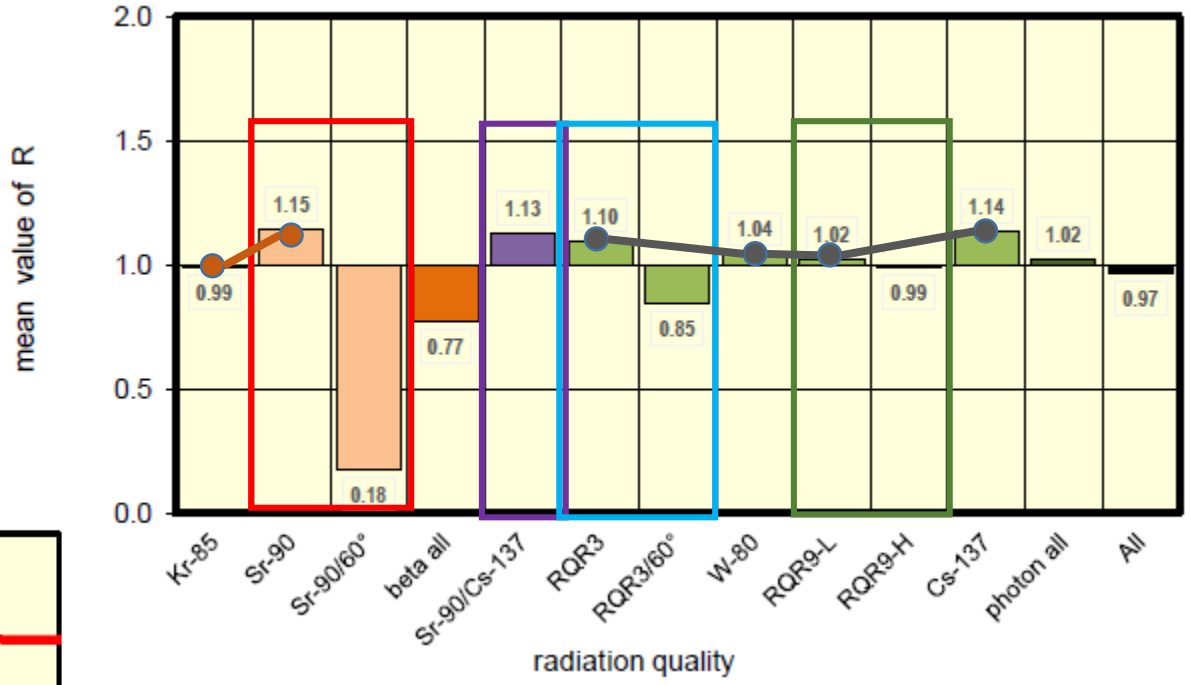
Reporting number: 71

WRIST dosemeters: examples of good performance but…

Ph-B

- All systems with outliers
- Outliers only for beta!





BETA ANGULAR RESPONSE MIXED FIELDS PHOTON ANGULAR RESPONSE

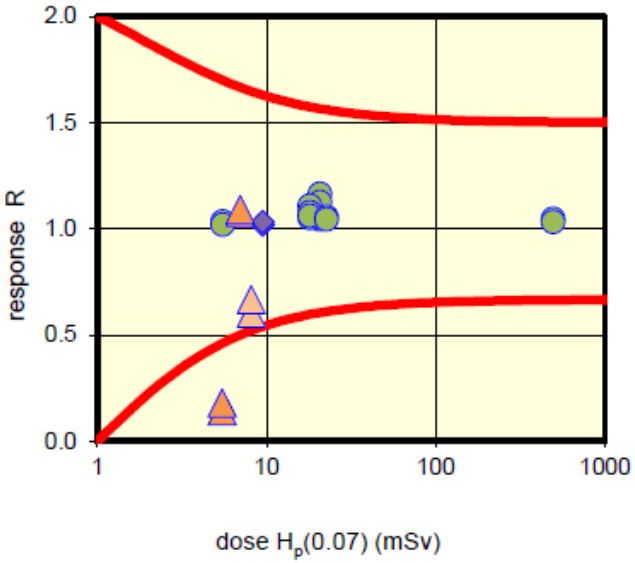
BETA ENERGY RESPONSE LINEARITY PHOTON ENERGY RESPONSE

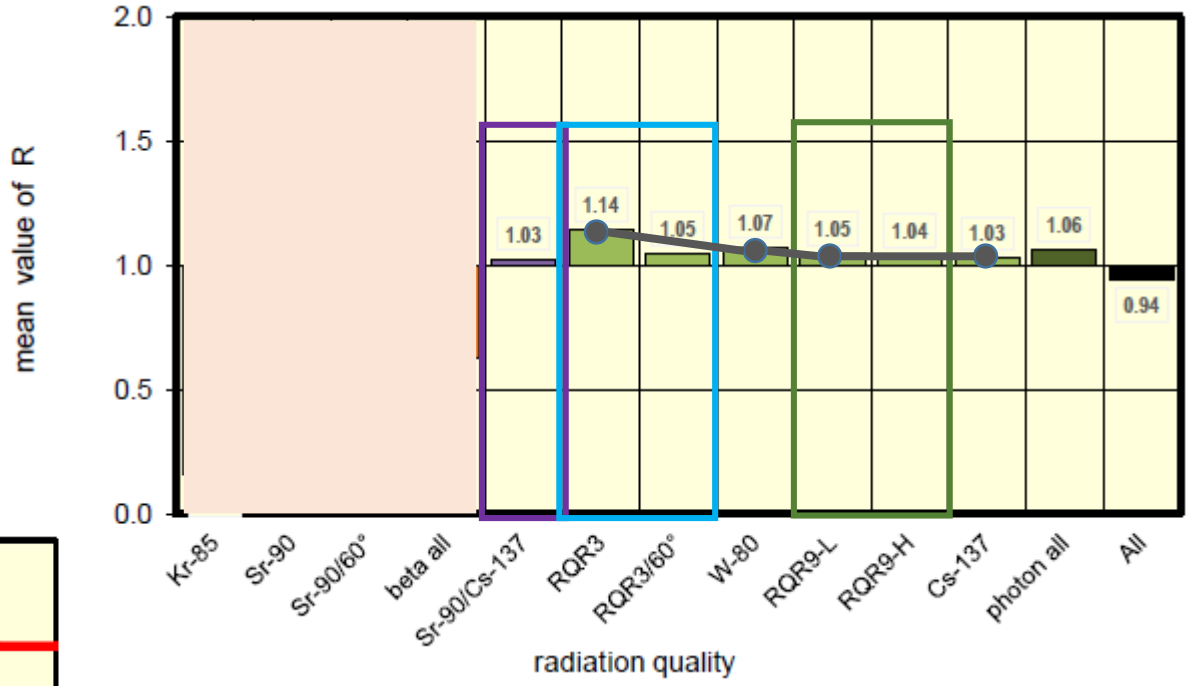
Reporting number: 63

WRIST dosemeters: very good performance for photons

“Ph only”

All wrist systems without outliers





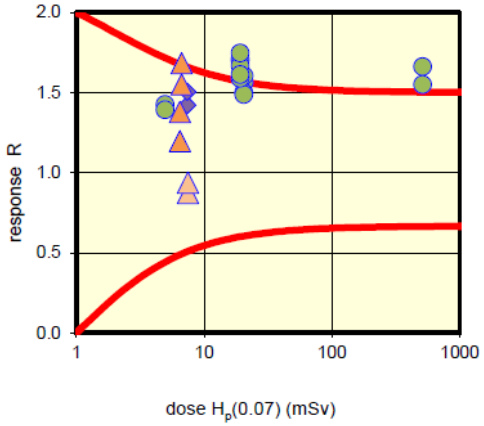
BETA ANGULAR RESPONSE MIXED FIELDS PHOTON ANGULAR RESPONSE

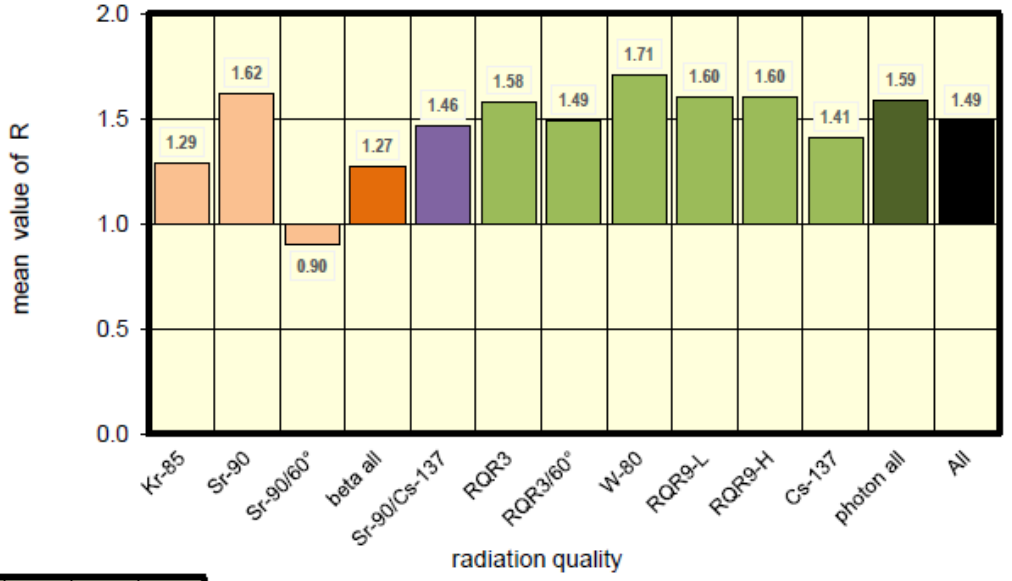
BETA ENERGY RESPONSE LINEARITY PHOTON ENERGY RESPONSE

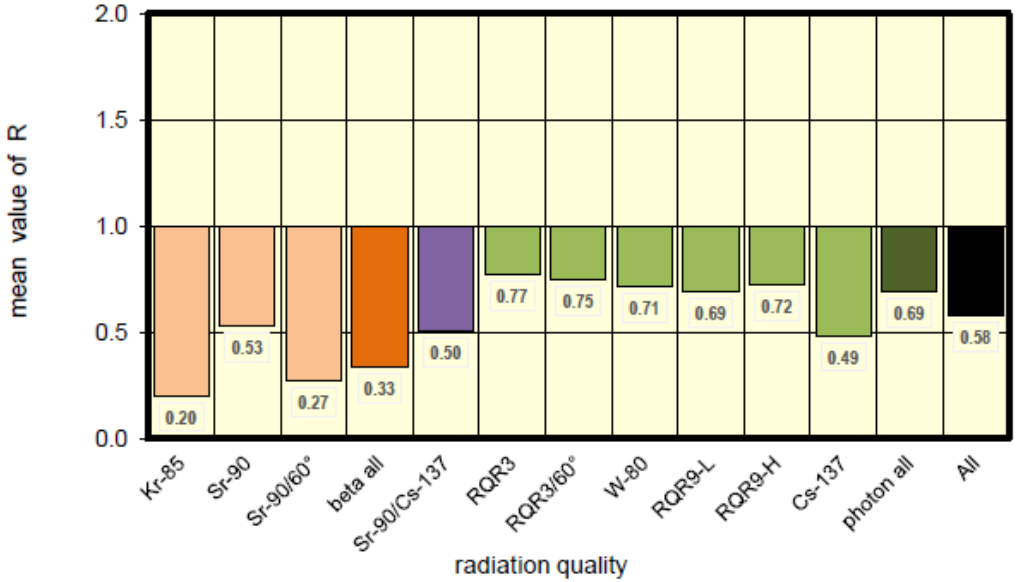
Reporting number: 59

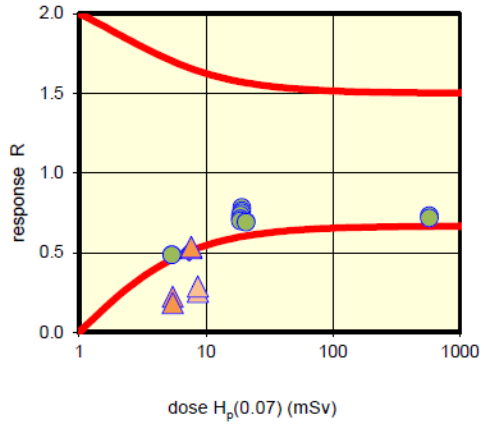
Ph-B dosemeters: examples of calibration problems

Over-response





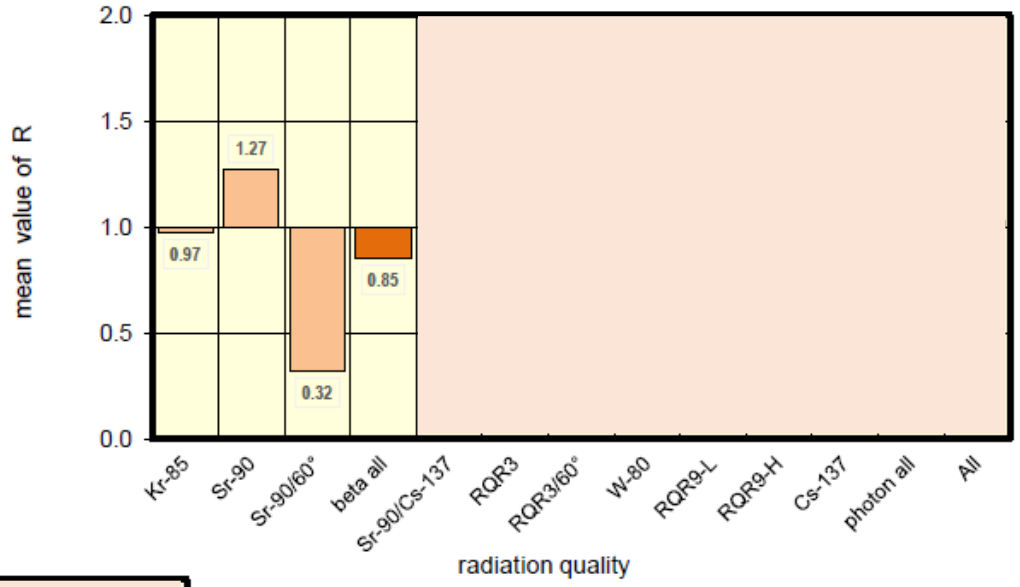


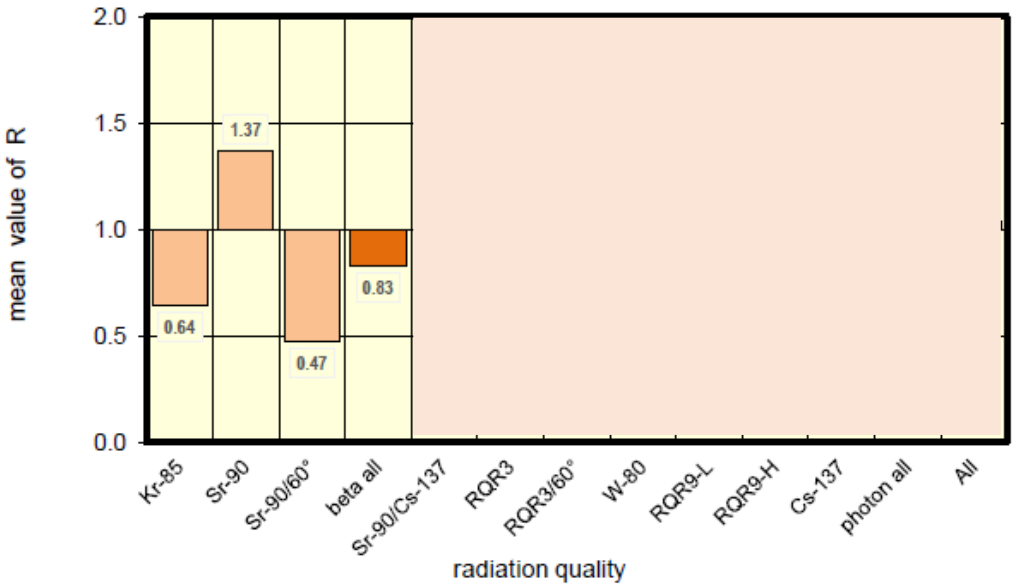


Under-response

Reporting number: 34, 9

B dosemeters





Very good performance for Photon radiation!

Reporting number: 15, 17

In general, Ph-B dosemeters, showed a good response to Sr-90 and photon radiation but presented problems with low beta energies (Kr-85) and angular response to beta radiation:

- 1 detector -> only 1 calibration factor for Ph and B
- beta energy response is very dependant of filtration

Only 3 of 19 "Ph only" dosemeters, showed outliers (that could be reduced by changing calibration)

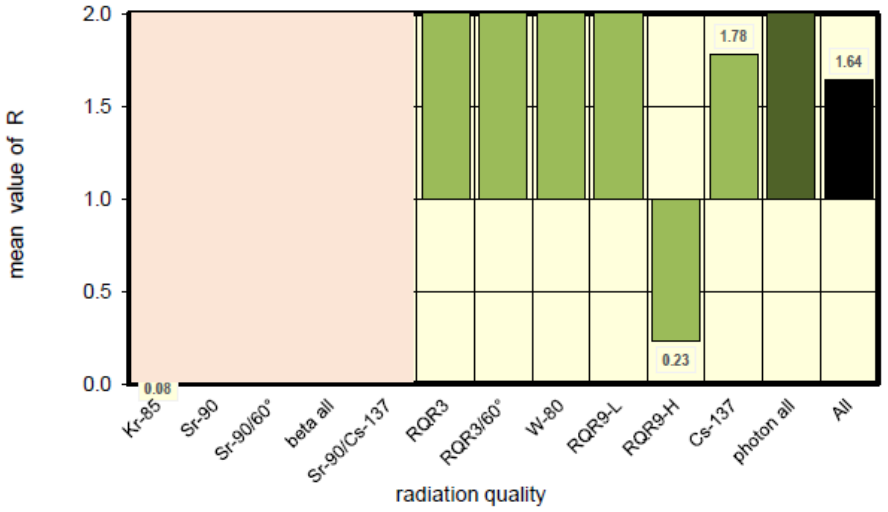
- Good performance, in general, of rings, wrist and finger tip dosemeters

Both "B only" dosemeters presented at least one outlier for beta radiation but, curiously, no outliers for photon radiation!

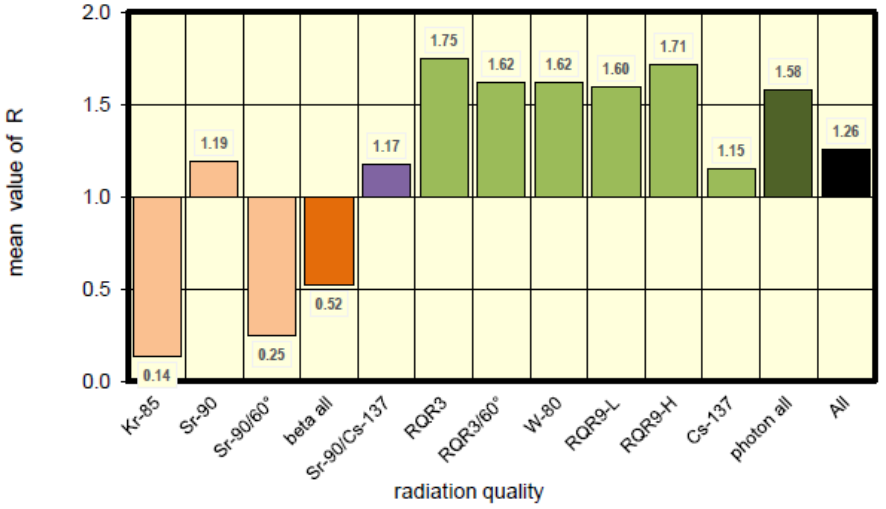
- They could be used as Ph-B dosemeters

But….

… also examples of very poor performance



“Ph only”

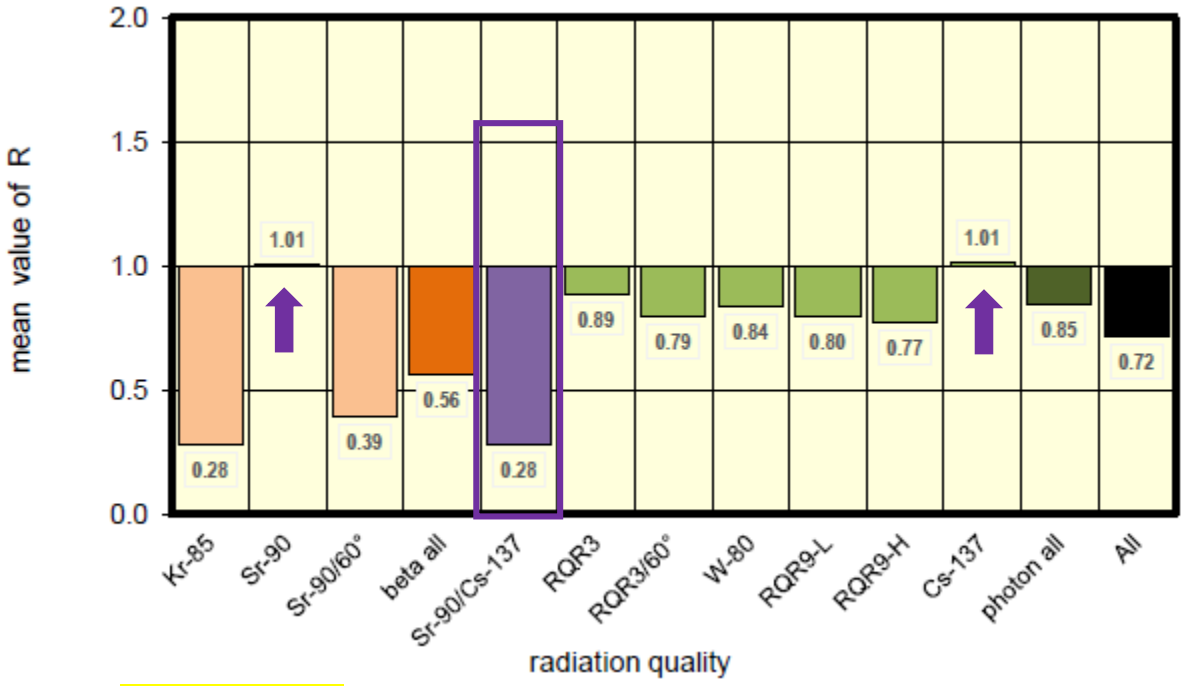


“Ph-B”

Reporting number: 32, 42

MIXED FIELD Sr-90+Cs-137

All Ph-B systems, except one, presented a coherent behaviour among Sr-90, Cs-137 and mixed field (Sr-90 + Cs-137)

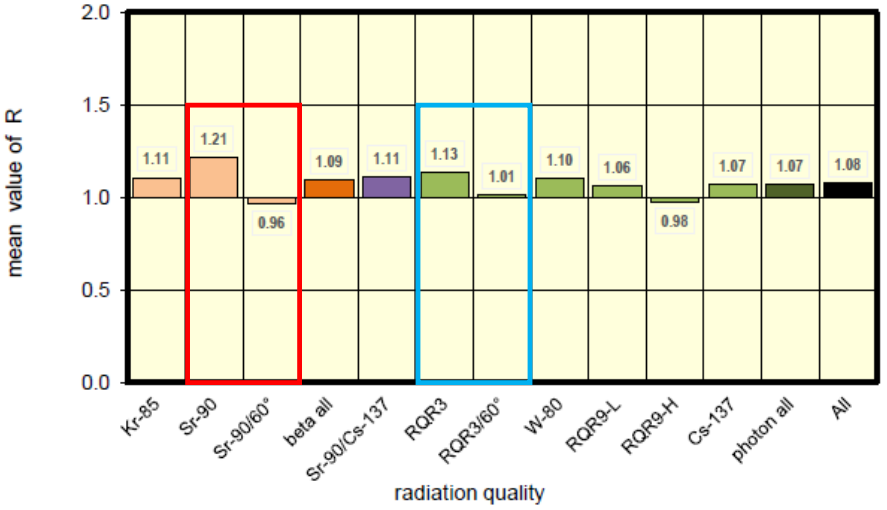


Reasons?

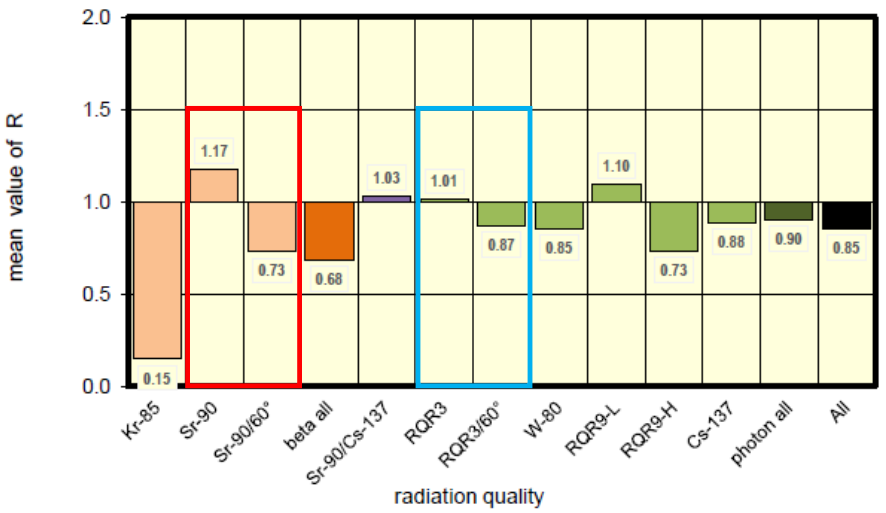
Reporting number: 55

ANGULAR RESPONSE (Ph-B) - 1

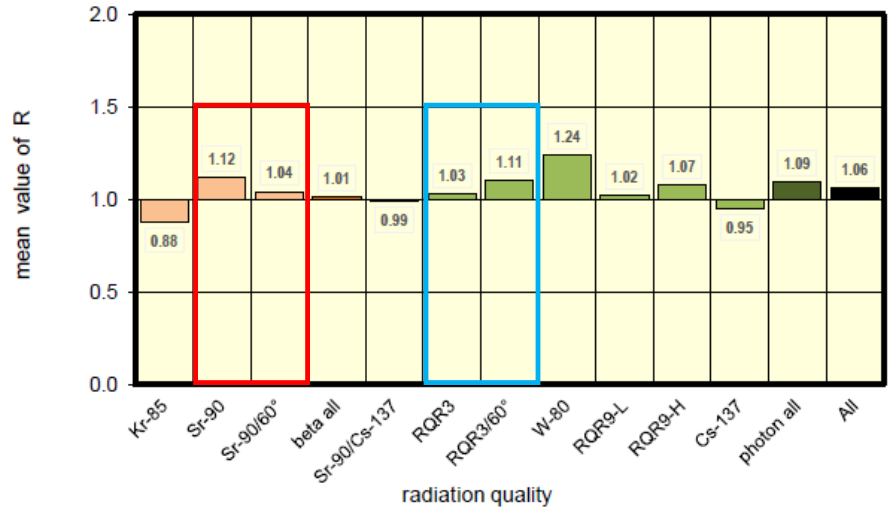
Ring



Wrist



Finger tip

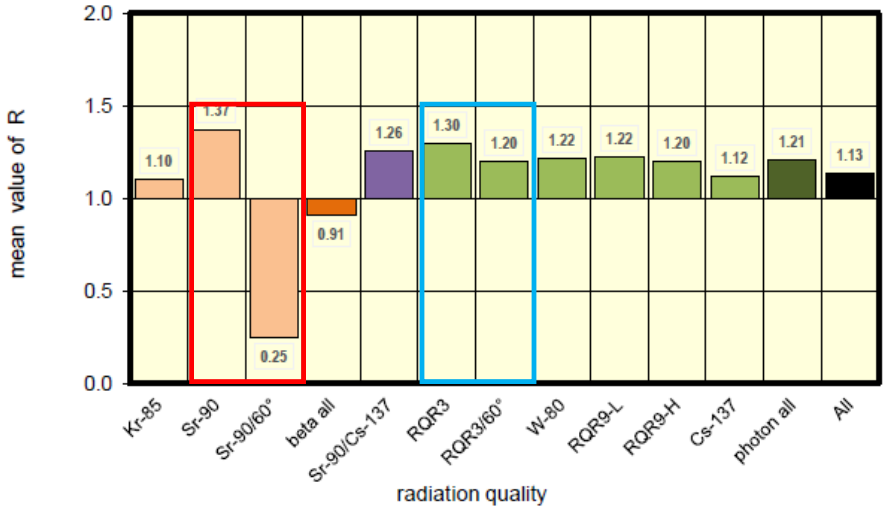


Examples of good performance for ring, wrist and finger tip dosemeters. Better angular response for photon than for beta but…

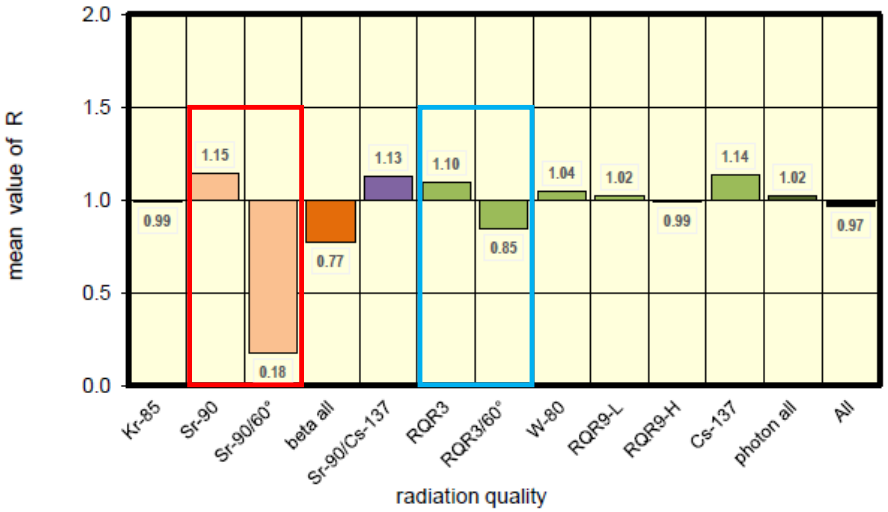
Reporting number: 14 – 57

ANGULAR RESPONSE (Ph-B) - 2

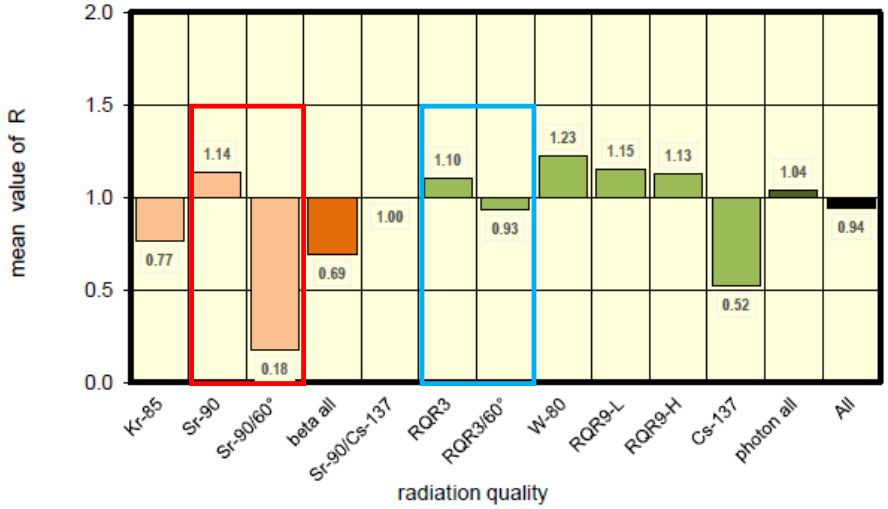
Ring



Wrist



Finger tip



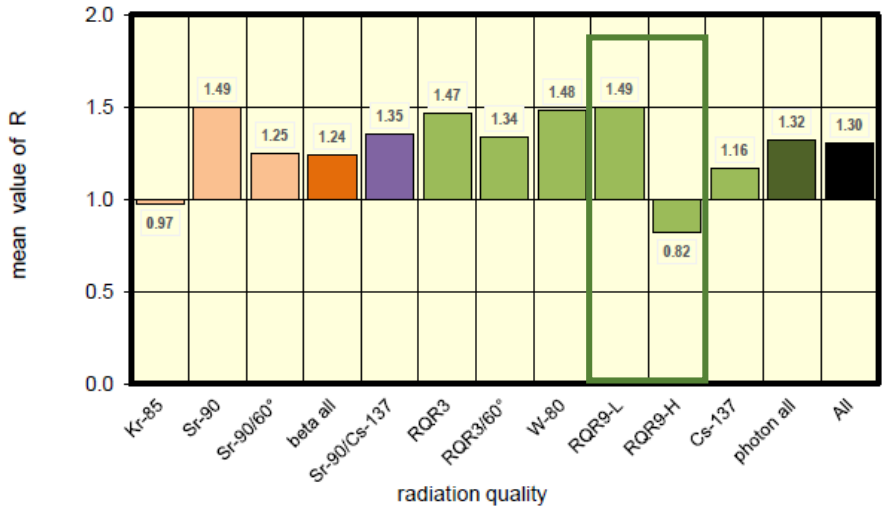
… also examples where the beta angular response is remarkably worse than photon angular response

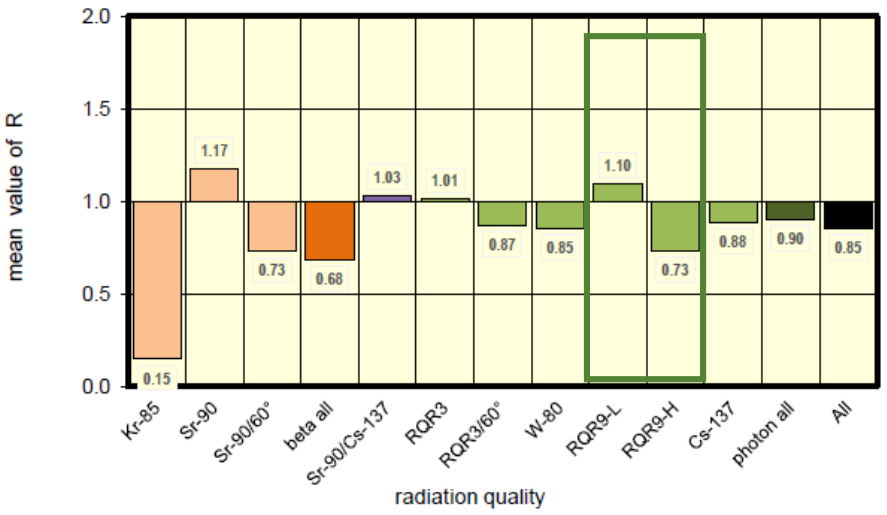
- Higher influence of filtration for beta radiaton

Reporting number: 6 – 63

LINEARITY

High dose to low dose ratio are between 0,90 and 1,10 for most systems. However there are some remarkable under-response to high dose values for some systems:





Possible reasons

- High doses out of range of performance?
- PMT saturation?

Reporting number: 21 – 57

Conclusions:

1. Wide variation of performance for extremity dosemeters
2. Some IMS should consider improving calibration procedures. This could reduce significantly the number of outliers.
3. “Ph-B” systems showed better performance for photon than for beta radiation
4. Most “Ph only” dosemeters presented no outliers
5. Detector material analysis will be performed for the Eurados Report

Thank you for your attention