

Canadian Nuclear Safety Commission  
Canadian Radiation Protection Association

Webinar # 2 - September 27, 2018

The IRPA logo is a stylized graphic composed of several overlapping, curved lines in shades of teal and blue, forming a shape reminiscent of a radiation shield or a stylized 'R'. The letters 'IRPA' are superimposed on the right side of this graphic in a bold, white, sans-serif font.

IRPA

Dose limit for the lens of the eye:  
results of the survey on the view of the  
IRPA professionals

Marie Claire Cantone  
University of Milan (Italy) and IRPA



## Survey on the limits for the lens of the eye

### TG on the impact of the implementation of Eye Lens Dose Limits

Phase 1 - 2012-2014      Phase 2 - 2015-2017

- To contribute to create a positive and complete awareness about RP at the working places, with attention to exposure of the lens of the eye and the revised dose limit for workers.
- To report the evolution of the RP community
  - the best applied methods for monitoring dose to the lens
  - the ongoing path toward the implementation at the legislative level in the different countries
  - the possible critical points in relation to the eye lens dose limit and its monitoring



# IRPA Task Group on the Impact of the Implementation of the Eye Dose Limits

IOP PUBLISHING JOURNAL OF RADIOLOGICAL PROTECTION  
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## MEMORANDUM

### Report of Task Group on the implications of the implementation of the ICRP recommendations for a revised dose limit to the lens of the eye

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## Memorandum

### Report of IRPA task group on the impact of the eye lens dose limits

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# IGRI

SAGE

### Implications of the implementation of the revised dose limit to the lens of the eye: the view of IRPA professionals

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IRPA14 Proceedings

### 2015 IRPA survey of professionals on the new eye dose limit, and wider issues associated with tissue reactions

Marie Claire Cantone<sup>a\*</sup>, Merce Ginjaume<sup>b</sup>, Saveta Akahane<sup>c</sup>, Louisa Mpete<sup>d</sup>, Severino C Michelin<sup>e</sup>, Dauer<sup>f</sup>, Stephen Balter<sup>g</sup>

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<sup>f</sup> National Nuclear Regulator, Centurion, South Africa.

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<sup>h</sup> US Nuclear Regulatory Commission, Rockville Pike, MD, United States of America.

<sup>i</sup> Memorial Sloan Kettering Cancer Center, Department of Medical Physics, Department of Radiology, New York City, US.

<sup>j</sup> Columbia University Medical Center New York City, US.

**Abstract.** A reduction has been introduced regarding equivalent occupational exposure in the International Basic Safety Standards following the recommendation given by the ICRP in the statement elaborated in the ICRP Publication 118. In January 2015, the IRPA conducted a survey of professionals on the impact of implementing the revised dose limit in the work place. It

Radiation Protection Dosimetry (2015), Vol. 164, No. 1–2, pp. 70–74  
Advance Access publication 24 October 2014

doi:10.1093/rpd/ncu320

### IMPLICATIONS IN DOSIMETRY OF THE IMPLEMENTATION OF THE REVISED DOSE LIMIT TO THE LENS OF THE EYE

ICRP  
Annals of the ICRP

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IRPA

INTERNATIONAL RADIATION PROTECTION ASSOCIATION

### IRPA GUIDANCE ON IMPLEMENTATION OF EYE DOSE MONITORING AND EYE PROTECTION OF WORKERS





# IRPA Task Group on the Impact of the Implementation of the Eye Dose Limits

## Questionnaire

### Topic 1 Implications for Dosimetry

**Q1 – Q8** - implications for monitoring and assessing dose to the lens of the eye and the interpretation of the results.

### Topic 2 Implications for Methods of Protection

**Q9 – Q12** - implications for methods (e.g., procedures or the design phase of equipment, facilities, and protective equipment) used to reduce dose to the eye, in the context of optimization of protection.

### Topic 3 Wider Implications of Implementing the Revised Limit

**Q13 – Q18** - long term impact on working activities; -changes in Health Surveillance; - more claim for compensation

### Topic 4 Legislative and other general aspects

**Q19 – Q22** - guidelines addressing monitoring related to new limit; - consultation for a legislation; -wider issue of tissue reactions, also circulatory disease



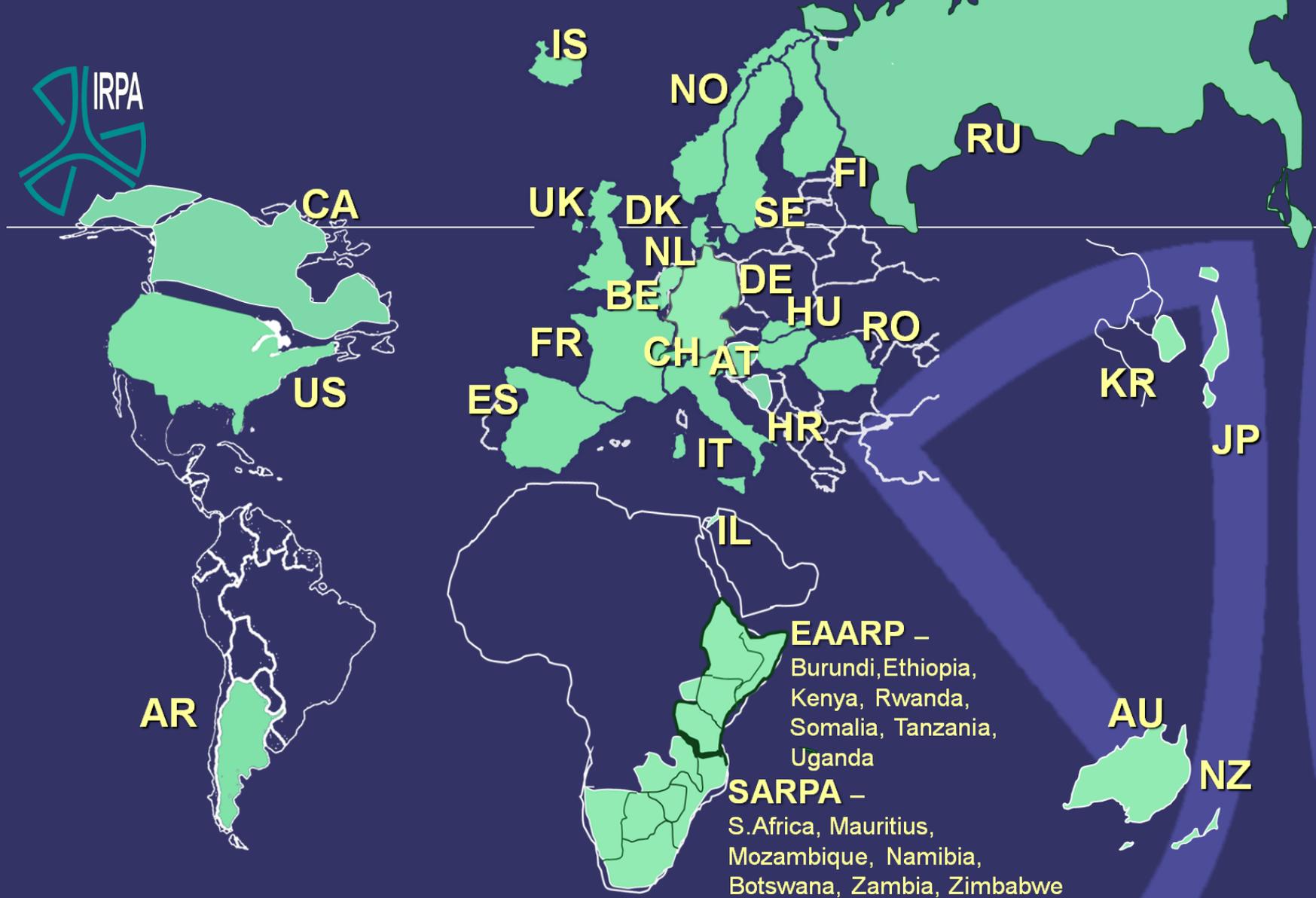
# IRPA Task Group on the Impact of the Implementation of the Eye Dose Limits

22 Associations contributed actively in collecting views and comments from their professionals

## IRPA TG

**Chair:** *Marie Claire Cantone (AIRP, Italy)*  
**Vice-Chair:** *Mercè Ginjaume (SEPR, Spain)*  
**Members:** *Saveta Miljanic (CRPA, Croatia)*  
*Colin J Martin (SRP, UK)*  
*Keiichi Akahane (JHPS, Japan)*  
*Louisa Mpete (SARPA, South Africa)*  
*Severino C Michelin (SAR, Argentina)*  
*Cynthia M Flannery (HPS, US)*  
*Lawrence T Dauer (HPS, US)*  
*Stephen Balter (HPS, US)*

-  1. Argentine
-  2. Australia-New Zealand
-  3. Austria
-  4. Belgium
-  5. Canada
-  6. Croatia
-  7. East Africa
-  8. France
-  9. German-Swiss
-  10. Hungary
-  11. Israel
-  12. Italy
-  13. Japan
-  14. Korea
-  15. Netherland
-  16. Nordic
-  17. Romania
-  18. Russia
-  19. South Africa
-  20. Spain
-  21. UK
-  22. US



Responses from 22 Associations, covering 40 countries reporting from Africa, North and South America, Asia, Australia, Europe



## Conclusions from the survey

### Direct implication in dosimetry and protection

- ▶ ASs devoted most attention to the medical area, non uniform exposure (interventional radiology, cardiology)
  - A dosimeter measuring  $H_p(3)$  close to the eye is considered the ideal method and used in pilot studies;
  - Because of the limited availability of  $H_p(3)$  dosimeters,  $H_p(0.07)$  and  $H_p(10)$  are used predominantly;
  - When use a dosimeter close to the eye → it should be on a head band, **suggestions on the position**: the side of the head, the eyebrow ridge, on the forehead, or attached into the protective glasses



# Conclusions from the survey

## Direct implication in dosimetry and protection

- The dosimeter is **worn at the collar** outside the lead apron, but no correction factor is applied;
  - **Protective systems are not always available** and used at different levels, hospital to hospital, even within the same country;
- 
- ▶ **In nuclear installations**, shielding masks, glove-boxes and remote systems were in use before the introduction of the new dose limit, and **no major changes are foreseen**
- 
- ▶ **Regardless of the area of use**, issues emerge, beside the economic ones, about the discomfort associated with using lead glasses, since they are heavy and not being suitably fitted for individuals.



## Conclusions from the survey Legislative processes regarding the new limits

- ▶ **The majority of the countries initiated the legislative processes** of considering the new limits;
  - ▶ **Many ASs are directly involved** in the consultation process regarding the national legislation on RP;
- 
- **A reduction of lens dose in two stages** is one example towards a new regulation: 50 mSv/y for 5 y followed by consideration on a further reduction;
  - **National guidelines are planned** or in the completion phase in the large majority of the countries.
  - **In EC Member States** the processes are well advanced since EURATOM 2013/59 has to be implemented by February 2018



## Conclusions from the survey

### Consideration on effects on tissues other than eye lens

- ▶ The IRPA ASs are informed about the wider issue of tissue reactions, such as circulatory diseases and the related nominal threshold dose (0.5 Gy)
- ▶ The large majority have not yet taken into consideration this issue

#### Views/reasons were expressed:

- the role of uncertainties in the available data supporting the question;
- the lack of resources available to the ASs to conduct independent research on the subject;
- the existence of many potential factors, other than radiation;
- the opportunity to first settle the aspects related to the lens dose and then move the attention on the wider issues



# Recommendations from the IRPA ASs

## Scientific and regulatory aspects

### There is the need :

- ▶ For a greater administrative attention **to prevent staff doses exceeding the limit**, which may have possible legal implications.
- ▶ For **availability of suitable dosimeters**, the presence of calibration facilities for Hp(3), and the associated arrangements for regulatory approval.
- ▶ To define a suitable category under which the eye doses could be **recorded in the National Dose Register**. At present, in some countries the readings of the collar dosimeter are recorded as the eye dose and the use of correlation factors has large uncertainties.



# Recommendations from the IRPA ASs

## Scientific and regulatory aspects

### There is the need :

- ▶ For guidelines on **how to measure the eye dose of personnel wearing protective eyewear**, since now some countries are suggesting the application of a correction factor while others are suggesting measurements under the lead glasses.
- ▶ To establish proper procedures to ensure that **itinerant workers** will have, i) **good and effective measures** taken in cooperation among respective management teams with regard to the choice of the dosimeter and its positioning, and ii) efficient **dose information sharing and recording procedures** thus avoiding under-recording doses.
- ▶ For an **International Dose Passport** for international workers and consultants, in addition to their National Dose Registers.



# Recommendations from the IRPA ASs

## Economic issues

- ▶ The application of **the new limit will generate additional costs** associated with method of protection, additional training, implementing additional dosimetry.
- ▶ **In general any cost** involved in implementing arrangements may be **a further obstacle to implementing** the dose new limits.
- ▶ A proper **preventive risk assessment** and adequate **stratification of workers** are indeed recommended to reduce the cost of dosimetry to an acceptable level.
- ▶ In order to achieve the necessary reduction of dose to the eye, there is a need to **make protective methods**, which are wearable and comfortable, **available in all medical facilities**, where this relevant.



# Recommendations from the IRPA ASs

## Awareness, culture and training

### There is the need :

- ▶ to improve awareness of workers who may be exposed. It is recommended their education and training, and further support from specialists, such as RP services.
- ▶ to establish awareness programs and additional training on the proper use of protective equipment, as well as radiation protection approaches to reduce eye dose. In addition awareness about patient eye lens dose needs to be emphasized.
- ▶ to agree on a standard system for the investigations of lens opacity → organization of specific training in view of a uniform identification, and an agreed standard evaluation of occupational assessments.



# IRPA GUIDANCE on implementation of eye dose monitoring and eye protection of workers



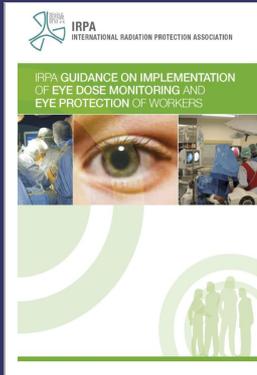
IRPA GUIDANCE ON IMPLEMENTATION  
OF EYE DOSE MONITORING AND  
EYE PROTECTION OF WORKERS



The IRPA TG was working, in consultation with Ass, for preparing a practical recommendations about **when and how eye lens dose should be monitored** and of guidance on **use of protective tools** depending on the exposure levels.



# IRPA GUIDANCE on implementation of eye dose monitoring and eye protection of workers

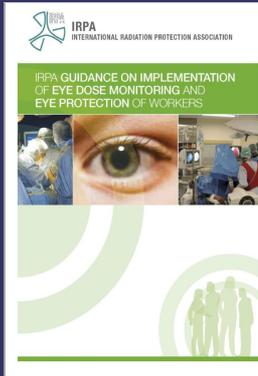


## Contents

1. Introduction
2. When lens of the eye monitoring might be needed
3. Proposed dose levels for implementation of dose monitoring
4. Eye lens monitoring procedures
5. Guidance on use of eye protective devices
  - 5.1. In the medical field
    - 5.1.1 Ceiling suspended screens
    - 5.2.2 Protective eyewear
6. References



# IRPA GUIDANCE on implementation of eye dose monitoring and eye protection of workers

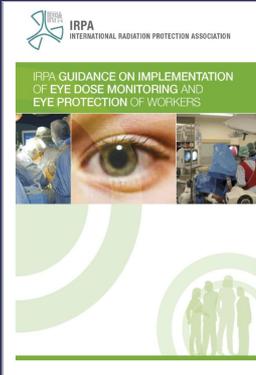


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6. References



# IRPA GUIDANCE on implementation of eye dose monitoring and eye protection of workers



**Table 1. Proposed dose levels for implementation of dose monitoring**

| Tissue | Dosimeter position | Dose quantity* | Annual dose (mSv) | Monthly dose (mSv) | Dose monitoring recommendations   |
|--------|--------------------|----------------|-------------------|--------------------|---|
| Eyes   | Collar or headband | $H_p(3)$       | 1-6               | 0.2 – 0.5          | Initial monitoring with collar or head dosimeter to establish dose level. Regular monitoring recommended. |
| Eyes   | Collar or headband | $H_p(3)$       | > 6<br>(15)**     | > 0.5              | Regular monitoring with collar or head dosimeter is required.   |

\* In photon fields, characteristics of fluoroscopically guided procedures  $H_p(0.07)$  or  $H_p(10)$  may also be used

\*\* dose constraint in brackets



# A third phase is launched in 2018

## Objectives

- To continue to contribute in creating a positive and complete awareness about radiation protection at the workplace regarding exposure of the lens of the eye.
- To promote a wide exchange of experiences, at an international level and among the IRPA ASs, and to determine the approaches to assessment of eye dose that are emerging in the RP community, at seven years after the ICRP proposal that a new dose limit for the lens of the eye should be introduced.



### *IRPA TG, phase 3 2018-2020*

*Marie Claire Cantone, chair (AIRP, Italy)*  
*Mercè Ginjaume, vice-chair (SEPR, Spain)*  
*Colin J Martin (SRP, UK)*  
*Nobuyuki Hamada (JHPS, Japan)*  
*Sumi Yokoyama (JHPS, Japan)*  
*Jean-Marc Bordy (SFRP, France)*  
*Lawrence T Dauer (HPS, US)*  
*Cameron Jeffries (ARPS, Australia & NZ)*  
*Olga Kashirina (SRGR, Russia)*  
*Severino C Michelin (SAR, Argentina)*  
*Arthur Omondi Koteng (EAARP, East Africa)*  
*Ariel Duran (AUR, Uruguay)*  
*Waraporn Sudchai (TINT, Thailand)*

## among the key tasks

To make available a collection of documents and publications, produced and/or suggested by IRPA ASs, through the open IRPA area on 'Lens of the Eye', and to disseminate the education material, offered by the ASs, on this subject.



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The radiation protection community is facing a real challenge with the new dose limit and ASs should take charge and strongly promote developments in line with **IRPA Guiding Principles for Establishing a Radiation Protection Culture.**

This encompasses the development of a pattern of knowledge and behaviors as a combination of **science, values and ethics.**

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*The Reports of the IRPA TG, and the IRPA Guidance are available on the IRPA website*  
<http://www.irpa.net/page.asp?id=54696>