IRPA

IRPA14, Cape Town, May 2016

Open Meeting

Discussion on:
Report of the IRPA TG on the impact of the Eye Lens Dose Limits

Marie Claire Cantone (AIRP), Mercè Ginjaume (SEPR)

The IRPA TG *phase 1, 2012-2013*

- **ToR** approved on December 2012
- **ASs** were asked to provide views and comments on the basis of a questionnaire
- Received answers referred to January-March 2013
- **Topic experts** nominated by ASs involved to assist with collation of responses
- **Report** was approved by the IRPA E.C. on July 2013 and published on October 2013

Chair: *John Broughton (SRP)*

Members: *Vice-Chair, Marie Claire Cantone (AIRP)*
Mercè Ginjaume (SEPR), Binika Shah (SRP)

Topic Experts:

José Miguel Fernández-Soto, Mercè Ginjaume, (Spain)
Steven King, USA, Denisa Nikodemová, (Slovakia) Keiichi Akahane, Sumi Yokoyama, (Japan) Bela Csakany, (Hungary)

The IRPA TG *phase 2, 2015-2016*

- **ToR** approved on January 2015
- **ASs** were asked to provide views and comments on the basis of a questionnaire
- Received answers referred to May-October 2015
- **Report** was sent to the ASs by the IRPA on April 2016

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**)*

A questionnaire sent to all the IRPA ASs

on April 23rd, 2015

International Radiation Protection Association

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

Questionnaire

April 2015

This questionnaire is distributed to all the IRPA ASs with the objective to collect and report the evaluation of the IRPA community about: the best applied methods for monitoring dose to the lens of the eye; the methods of protection and the on ongoing path toward the implementation, at the legislative level, in the different countries. At the same time this is an opportunity to have the view of the professionals of the IRPA ASs about wider issues, including the issue of tissue reactions. In the compilation of the answers, please state specifically the scope to which you refer: medical applications (including radiology, interventional radiology and cardiology, nuclear medicine, etc.); nuclear applications and industrial applications in general.

Topic 1 Implications for Dosimetry:

This topic concerns the implications for monitoring and assessing dose to the lens of the eye and the interpretation of the results.

Q1. Since there is already a requirement to assess doses to the eye, what is/are the current best method(s) in use for the measurement of Hp(3)? Consider and specify in terms of the location, the types of dosimeters and the use of correction factors.

Q2. What systems under consideration or further development are you aware of or are you using for improved measurement of Hp(3)? Please consider and specify the different dosimetry methods: from the use of double dosimetry (over-apron at neck and under-apron at chest) to the use of a single collar dosimeter, outside apron, to obtain an indication of both eye lens and body doses, to the use of a supplementary dosimeter placed in a position adjacent to the eye. Consider both passive and active dosimeters. Provide cost implications where possible.

Q3. Are these measurement methods dependent (or likely to be dependent) on the level of the dose being measured on the type of work or on any other conditions?

A questionnaire sent to all the IRPA ASs

on April 23rd, 2015

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

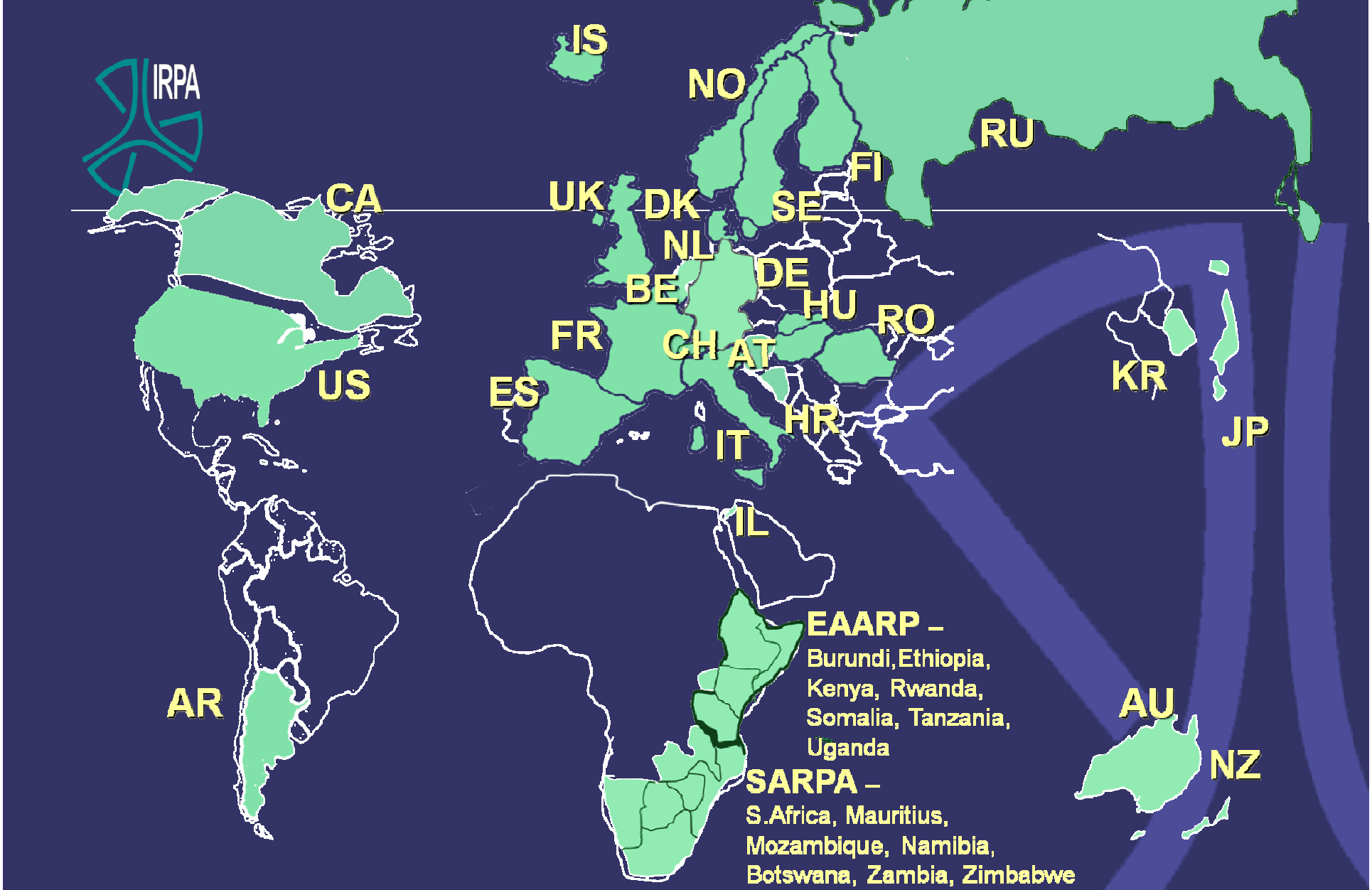
Q13 – Q18 - long term impact on working activities; - changes in Health surveillance; - more claims for compensation

Topic 4 Legislative and other general aspects

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

22 IRPA ASs contributed actively in collecting views and comments from their professionals

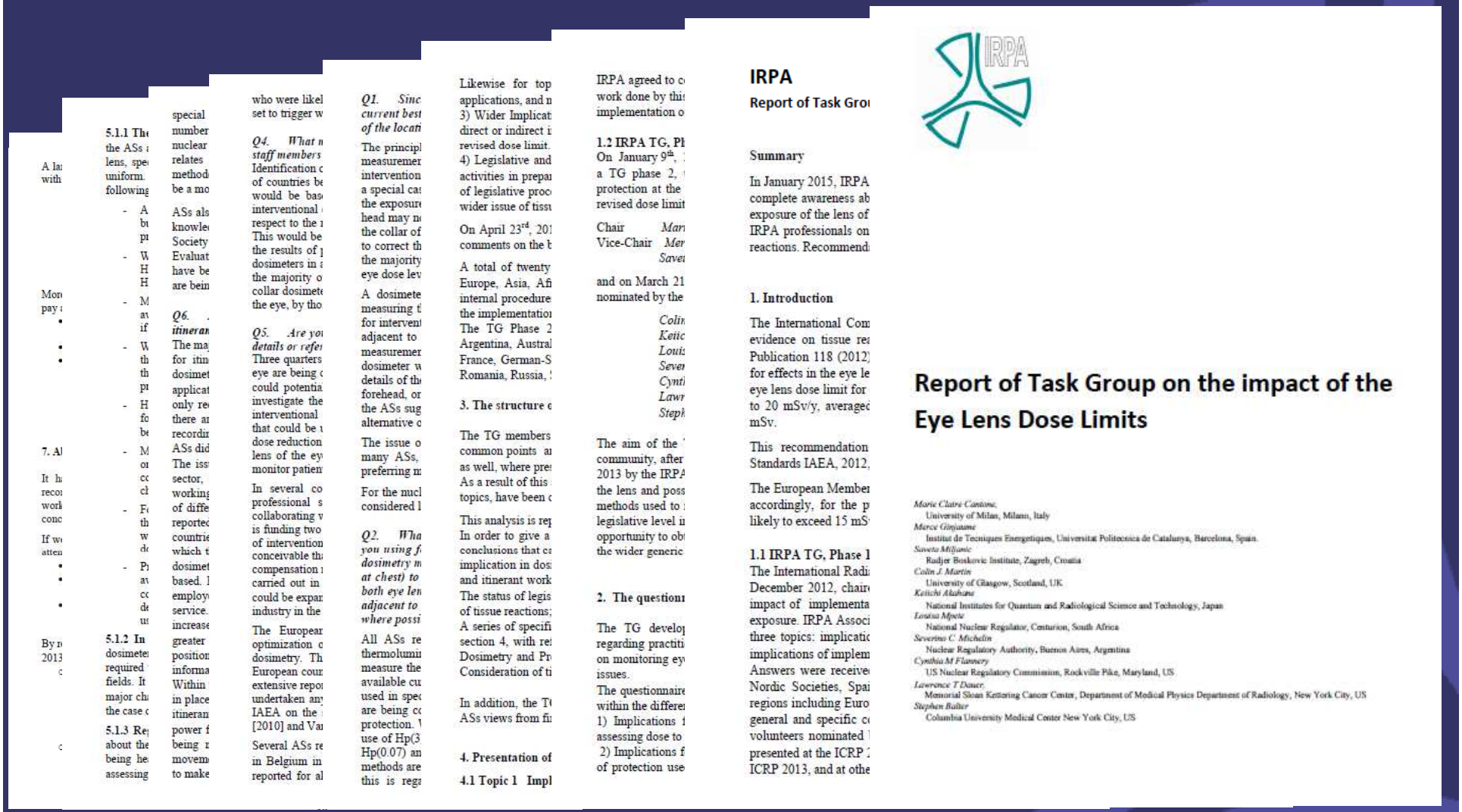
1. Argentine
2. Australia-New Zealand
3. Austria
4. Belgium
5. Canada
6. Croatia
7. East Africa
8. France
9. German-Swiss
10. Hungary
11. Israel
12. Italy
13. Japan
14. Korea
15. Netherland
16. Nordic
17. Romania
18. Russia
19. South Africa
20. Spain
21. UK
22. US



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

The views of the IRPA community

ASs received the draft TG Report on April 25th, 2016



IRPA

Report of Task Grou

Summary

In January 2015, IRPA complete awareness ab exposure of the lens of IRPA professionals on reactions. Recommend

1. Introduction

The International Com evidence on tissue rea Publication 118 (2012) for effects in the eye le eye lens dose limit for to 20 mSv/y, averaged mSv.

This recommendation Standards IAEA, 2012,

The European Member accordingly, for the p likely to exceed 15 mS

1.1 IRPA TG, Phase 1

The International Radi December 2012, chair impact of implementa exposure. IRPA Associ three topics: implicatio implications of implem Answers were receive Nordic Societies, Spai regions including Euro general and specific co volunteers nominated presented at the ICRP 2 ICRP 2013, and at othe

Report of Task Group on the impact of the Eye Lens Dose Limits

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IRPA Report of Task Group on the impact of the Eye Lens Dose Limits

1. **Introduction**
   - 1.1 ***IRPA TG, Phase 1***
   - 1.2 ***IRPA TG, Phase 2***
2. **The questionnaire, its distribution and the obtained responses**
3. **The structure of the survey Report**
4. **Presentation of answers**
   - 4.1 ***Topic 1 Implications for Dosimetry***
   - 4.2 ***Topic 2 Implications for Methods of Protection***
   - 4.3 ***Topic 3 Wider Implications of Implementing the Revised Limit***
   - 4.4 ***Topic 4 Legislative and other general aspects***

IRPA Report of Task Group on the impact of the Eye Lens Dose Limits

5. Conclusions

5.1 ***Direct implication in dosimetry and protection***

5.1.1 The area of medical applications

5.1.2 In the area of nuclear or other non-medical sectors

5.1.3 Regardless of the area of use

5.2 ***Pilot studies***

5.3 ***Implications related to dose recording and itinerant workers***

5.4 ***Exposure for the eye lens of patients and public***

5.4.1 Patients.

5.4.2 Public.

5.5 ***Health surveillance***

5.6 ***Legislative processes status with regard to the new limits for the lens***

5.7 ***The wider issue of tissue reactions***

5.8 ***Costs***

5.9 ***Training***

IRPA Report of Task Group on the impact of the Eye Lens Dose Limits

4.1 Topic 1 Implications for Dosimetry:

Q1. ***Since there is already a requirement to assess doses to the eye, what is/are the current best method(s) in use for the measurement of Hp(3)? Consider and specify in terms of the location, the types of dosimeters and the use of correction factors.***

Q2. ***What systems under consideration or further development are you aware of or are you using for improved measurement of Hp(3)? Please consider and specify the different dosimetry methods: from the use of double dosimetry (over-apron at neck and under-apron at chest) to the use of a single collar dosimeter, outside apron, to obtain an indication of both eye lens and body doses, to the use of a supplementary dosimeter placed in a position adjacent to the eye. Consider both passive and active dosimeters. Provide cost implications where possible.***

Q3. ***Are these measurement methods dependent (or likely to be dependent) on the level of the dose being measured on the type of work or on any other conditions?***

4.1 Topic 1 Implications for Dosimetry:

Q4. ***What methods will be used to assess potential doses to the eye lens and to identify staff members who are likely to require monitoring for eye dose?***

Q5. ***Are you aware of any pilot study in progress or already finished? Please specify details or references and highlight the changes since the last 2 years.***

Q6. ***Are there any implications for dose recording, including possible considerations for itinerant workers ("outside workers" - i.e. people who work at more than one location)?***

Q7. ***Are there any problems foreseen in achieving compliance by wearing eye dosimeters and if so, is there any information about strategies that might be used to overcome these problems?***

Q8. ***Are there experiences in the evaluation of dose to the lens of the eye, in relation to possible contamination ?***

4.2 Topic 2 Implications for Methods of Protection:

Q9. ***What procedures and currently available protective equipment are used for reduction of the dose to the eye? Indicate also any problem experienced and provide cost implications if possible.***

Q10. ***What procedures and equipment might be used in the future for reduction of the dose to the eye? Are you aware of any study in progress to evaluate the effectiveness of the protection?***

Q11. ***What methods are used to ensure that the use of protective equipment is optimized?***

Q12. ***What specific training needs are already implemented or are foreseen in the near future related to the new limits and what are the direct implications?***

4.3 Topic 3 Wider Implications of Implementing the Revised Limit:

Q13. *Are there any short-term implications before the satisfactory implementation of revised dosimetry and methods of protection (as in those topics described above) ?*

Q14. *Are there any potential long term issues which may have an impact on working activities on a more permanent basis?*

Q15. *Are there any implemented or foreseen changes in the Health surveillance of the workers? Specify costs estimates, if possible.*

Q16. *Are there any circumstances in which you foresee that the introduction of new limits for the workers might lead to more claims for compensation?*

Q17. *What is the issue to be considered on the exposures for the lens of the eye for the patients in medicine and for the public ?*

Q18. *Are there any additional matters regarding the change of dose limit that you wish to bring to the attention of the Task Group?*

4.4 Topic 4 Legislative and other generla aspects

Q19. *Are there in your country, guidelines or documents under preparation, addressing eye lens monitoring related to the new dose limit for workers ?*

Q20. *Does your Association have an involvement with governmental or regulatory advisory bodies regarding consultation for a legislation, at national level, about radiation protection ?*

Q21. *What is the progress on the ongoing path of the legislative process with regard to the new limits for the lens of the eye in your country ?*

Q22. *Are you analyzing and taking into consideration the wider issue of tissue reactions and in particular the case of circulatory disease because of recent evidence of higher incidences of injury occurring at lower doses than previously reported ?*

7. About the trend in the ASs views from first to second TG phase

- A greater involvement and a larger number of answers on the subject;

- Despite the number of questions in this survey being doubled (from 11 to 22), the participating ASs have increased by almost 90% (from 12 to 22);

- The process of taking into account changes to monitoring the lens of the eye and protection is now clearly being addressed and no longer being postponed.

By referring to this Report and publications of the first phase IRPA TG

•The need for *'harmonisation of radiological protection criteria to monitor the eye lens for workers'* is still a challenge, but now three quarters of the ASs reported that some pilot studies are being conducted in their countries, with the general aim to identify staff groups who could potentially receive high doses to the lens of the eye, in different work places and to investigate the most appropriate monitoring arrangements;

•The attention to a *'confusion among radiation practitioners about the rational for the change in the dose limit'* is now less evident in the answers, as a result of meetings, events and documents on the subject, where practitioners have become involved, but we also think that this is the result of a shift in attention now towards a greater concern about the implementation of the new dose limit.

By referring to this Report and publications of the first phase IRPA TG

•The ASs are no longer focused on the motivations of the significant reduction of the dose limit (*'The relationship between dose and cataract formation is not well understood and the causality should be clarified'* in 2013), but more focused on the implication in dosimetry and protection even though at the scientific research level, the matter of whether radiation cataracts are deterministic effects, stochastic effects or both is still open to question. The need for further epidemiological and mechanistic studies is acknowledged. The attention to these aspects, in ASs seems to have shifted to the case of circulatory disease and the uncertainties in the data and studies supporting the question;

By referring to this Report and publications of the first phase IRPA TG

•Great differences were present in the ASs answers, in the first survey, about **cost implications** for the reduction of the eye dose, and the perception of future compensations caused by the new limit.

Now, great differences still remain about cost implications: for instance, in the health surveillance of the workers the answers span from no cost to significant costs, while on **future compensations, a large majority of ASs agree that there are likely to be an increased number of claims for compensation in the future**;

By referring to this Report and publications of the first phase IRPA TG

•Now, more attention to be dedicated to **dose recording** compared to the first survey, e.g. from additional dosimeters to monitor the eye dose, to dose recording for itinerant workers,. This attention could also be the result of the ASs community naturally **focusing on practical aspects** aimed at reduction of the eye dose;

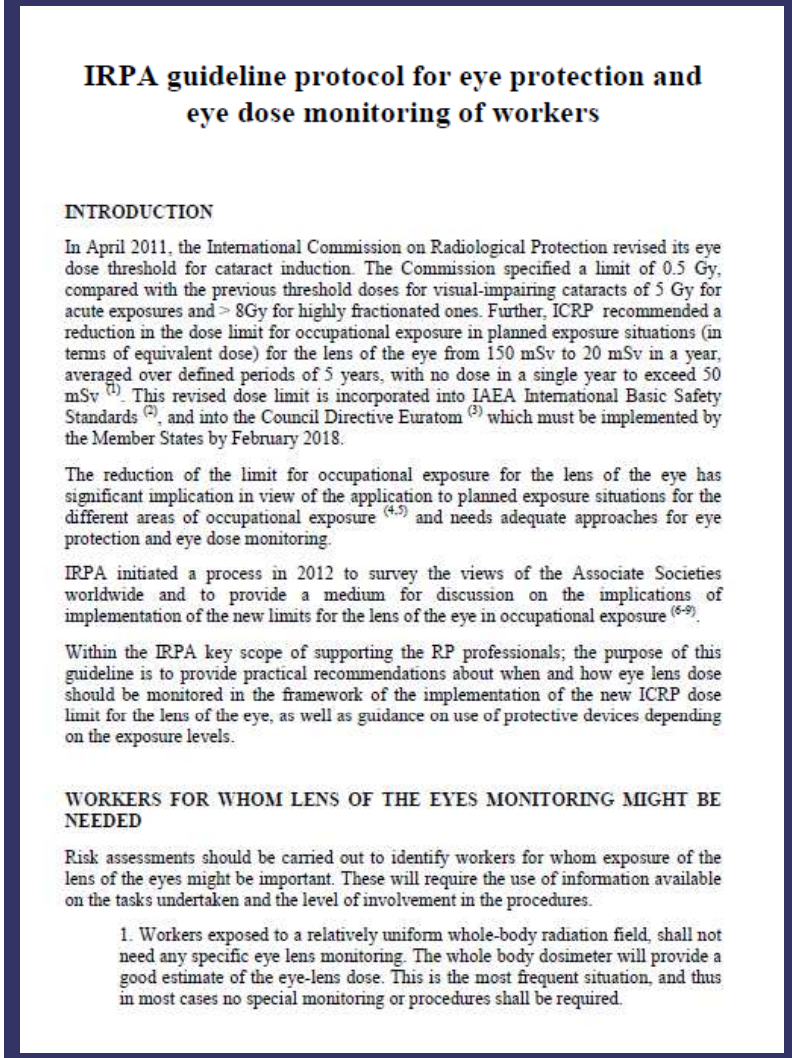
•European countries are paying **more attention now than in 2013**, **to the aspect of classification of radiation workers** with the increase in administrative activities and to the cost for dosimeters and surveillance systems. This is doubtless related to the implementation of the new Euratom Directive, to be completed by 2018 by the European Member States.

What is certain is that a number of questions remain:

The passage of 3 years since the first IRPA survey is insufficient to create a profoundly different picture with every aspect resolved.
Even though it is 5 years since the recommendation for a new eye lens limit, a complete resolution of all the practical issues has not been achieved.

We conclude, as evidence from the responses received, that 'such a drastic reduction in the dose limit needs due time to be implemented and applied, since it will deeply change some previously consolidated operating procedures', but nevertheless we are gradually progressing along the path of considering the implementation.

Guideline protocol for eye protection and eye dose monitoring of workers



IRPA guideline protocol for eye protection and eye dose monitoring of workers

INTRODUCTION

In April 2011, the International Commission on Radiological Protection revised its eye dose threshold for cataract induction. The Commission specified a limit of 0.5 Gy, compared with the previous threshold doses for visual-impairing cataracts of 5 Gy for acute exposures and > 8Gy for highly fractionated ones. Further, ICRP recommended a reduction in the dose limit for occupational exposure in planned exposure situations (in terms of equivalent dose) for the lens of the eye from 150 mSv to 20 mSv in a year, averaged over defined periods of 5 years, with no dose in a single year to exceed 50 mSv [1]. This revised dose limit is incorporated into IAEA International Basic Safety Standards [2], and into the Council Directive Euratom [3] which must be implemented by the Member States by February 2018.

The reduction of the limit for occupational exposure for the lens of the eye has significant implication in view of the application to planned exposure situations for the different areas of occupational exposure [4,5] and needs adequate approaches for eye protection and eye dose monitoring.

IRPA initiated a process in 2012 to survey the views of the Associate Societies worldwide and to provide a medium for discussion on the implications of implementation of the new limits for the lens of the eye in occupational exposure [6-9].

Within the IRPA key scope of supporting the RP professionals; the purpose of this guideline is to provide practical recommendations about when and how eye lens dose should be monitored in the framework of the implementation of the new ICRP dose limit for the lens of the eye, as well as guidance on use of protective devices depending on the exposure levels.

WORKERS FOR WHOM LENS OF THE EYES MONITORING MIGHT BE NEEDED

Risk assessments should be carried out to identify workers for whom exposure of the lens of the eyes might be important. These will require the use of information available on the tasks undertaken and the level of involvement in the procedures.

1. Workers exposed to a relatively uniform whole-body radiation field, shall not need any specific eye lens monitoring. The whole body dosimeter will provide a good estimate of the eye-lens dose. This is the most frequent situation, and thus in most cases no special monitoring or procedures shall be required.

A guideline protocol has been drafted by IRPA TG, to provide practical recommendations about **when** and **how eye lens dose should be monitored** in the framework of the implementation of the new dose limit for the lens of the eye, as well as guidance on **use of protective devices** depending on the exposure levels.