

# ICRP

## Radiological Protection in Medicine

ICRP Symposium on the International  
System of Radiological Protection

**ICRP**  
SYMPOSIUM  
October 24-26  
**2011**

October 24-26, 2011 – Bethesda, MD, USA

Eliseo Vano  
ICRP Committee 3

## Committee 3 Protection in Medicine



Main Commission

Scientific Secretariat

Committee 1  
Radiation Effects

Committee 2  
Doses from Radiation Exposure

**Committee 3  
Protection in Medicine**

Committee 4  
Application of the Commission's  
Recommendations

Committee 5  
Protection of the Environment

Full ICRP Membership List

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## Committee 3 Protection in Medicine

Committee 3 is concerned with protection of persons and unborn children when ionising radiation is used for medical diagnosis, therapy, or for biomedical research; also, assessment of the medical consequences of accidental exposures.



Committee 3 in Hong Kong, 2010

### Active Groups under Committee 3

[Task Group 36  
Radiopharmaceuticals](#)

[Task Group 62  
Radiological Protection for Cardiologists  
Performing Fluoroscopically Guided  
Procedures](#)

[Task Group 70  
Evaluation and Management of Secondary  
Cancer Risk in Radiation Therapy](#)

[Task Group 78  
Avoiding Adverse Radiation Effects to Doctors  
and Patients in Fluoroscopically Guided  
Procedures](#)

[C3 Working Party \(Follow up\)  
Follow up of persons accidentally exposed to  
ionizing radiation](#)

[C3 Working Party \(Asymptomatic\)  
Justification of the use of Ionisation Radiation  
in Diagnostic Imaging in Asymptomatic  
Individuals](#)

[C3 Working Party \(Ion Beam\)  
Radiation Protection in Ion Beam  
Radiotherapy](#)

[C3 Working Party \(Children\)  
Radiological Protection in Paediatric  
Diagnostic and Interventional Radiology](#)

# ICRP C3 (October 2011) (Protection in Medicine)

16 members (MP=Med.Phys. RT=Radiotherapy NM=Nucl.Med. DR=Diag. Radiol.)

- Vano ELISEO Prof (Spain) MP  
Chairman
- Cosset JEAN-MARC Prof (France) RT  
Vice-Chairman
- Rehani MADAN M. Prof (IAEA) MP  
Secretary
- Åhlström Riklund KATRINE Prof DR,  
NM (Sweden) 2009
- Baeza MARIO Prof RT (Chile) 2009
- Dauer LAWRENCE Dr MP (USA)  
2010
- Gusev IGOR A. Dr Phys, Dr Biology  
(Russia)
- Hopewell JOHN W Prof Radiobiology  
(UK)
- Mattsson SÖREN Prof MP (Sweden)
- Miller DONALD Prof DR (USA) 2010
- Ortiz Lopez PEDRO Dr MP Spain)
- Khong PEK-LAN Prof DR (Hong Kong)  
2009
- Ringertz HANS Prof DR (Sweden)
- Rosenstein MARVIN Dr Nucl Eng  
(USA)
- Yonekura YOSHIHARU Dr RT (Japan)
- Yue BAORONG Prof (China) 2009

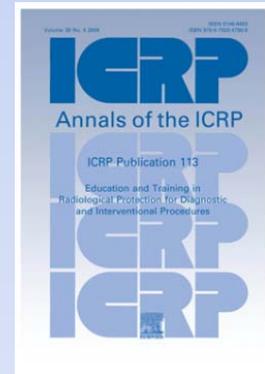
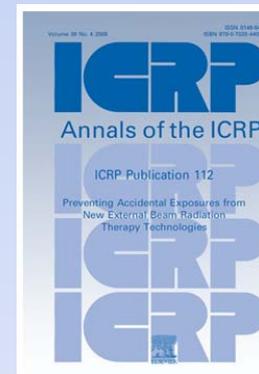
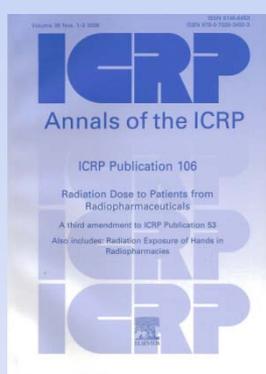
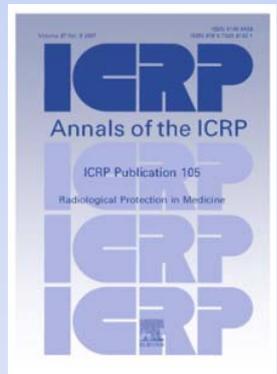
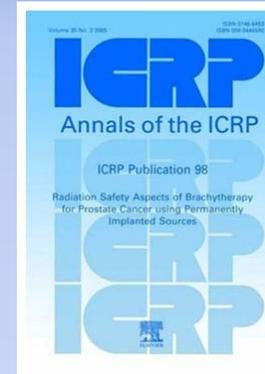
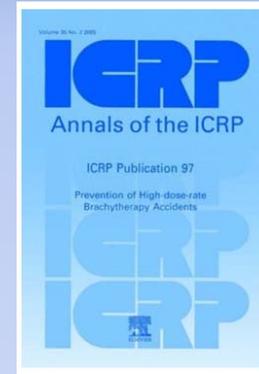
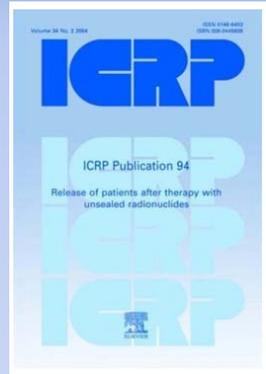
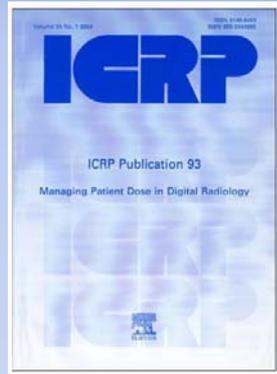
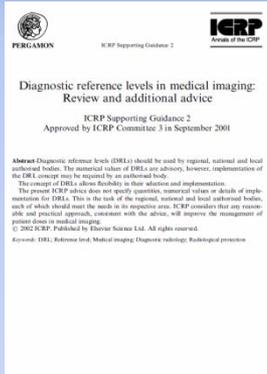
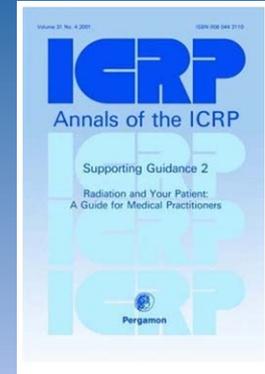
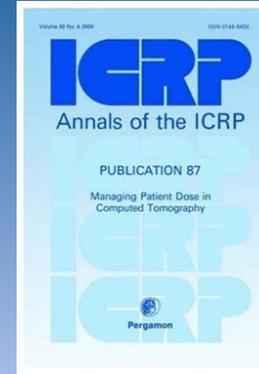
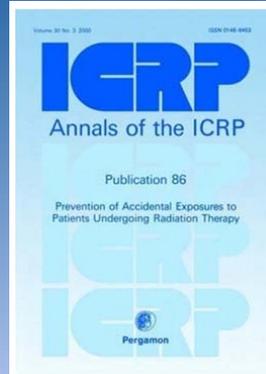
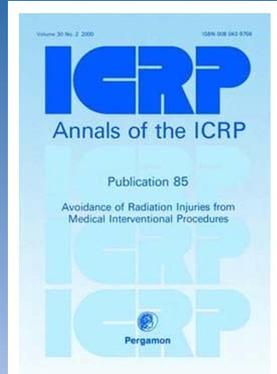
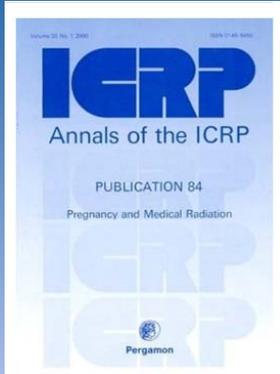
# ICRP C3 (October 2011) (Protection in Medicine)

8 observers (some of them starting in 2011)

- Georgi Simeonov. **European Commission** (EC), Luxembourg
- Dr Ausra Kesminiene. **International Agency for Research on Cancer** (IARC), France
- Prof Andre Wambersie. **ICRU**, Belgium
- Dr Norbert Bischof /Prof. Jim Malone. **IEC** Observers
- Dr Shengli Niu. **International Labour Office** (ILO), Switzerland
- Mr Kenneth R. Kase. **IRPA**, France
- Dr Alain Rannou. **ISO** Observer. France
- Dr Maria del Rosario Perez. **World Health Organisation** (WHO), Switzerland.

- **Committee 3: Protection in Medicine**
  - **C3 is concerned with protection of persons and unborn children when ionising radiation is used for medical diagnosis, therapy, or for biomedical research; also, assessment of the medical consequences of accidental exposures.**
  - **New formulation (2011): includes protection of staff and public in medicine.**

# ICRP C3: 15 publications in 10 years



## Relevant ICRP C3 publications during the last years

- P113. **Education and Training** in Radiological Protection for Diagnostic and Interventional Procedures. Ann. ICRP 39 (5), 2009 (issued 2011).
- P112. Preventing accidental exposures from new external beam **radiation therapy** technologies. Ann. ICRP 39 (4), 2009.
- P106. Radiation Dose to Patients from **Radiopharmaceuticals**: Addendum 3 to ICRP Publication 53, Ann. ICRP 38(1-2), 2008.

## Relevant ICRP C3 publications during the last years

- P105. Radiological **Protection in Medicine**, Ann. ICRP 37(6), 2007.
- P102. Managing Patient Dose in Multi-Detector **Computed Tomography** (MDCT), Ann. ICRP 37(1), 2007.
- P98. Radiation safety aspects of **brachytherapy** for prostate cancer using permanently implanted sources, Ann. ICRP 35(3), 2005.

## Relevant ICRP C3 publications during the last years

- P97. Prevention of high-dose-rate **brachytherapy accidents**, Ann. ICRP 35(2), 2005.
- P94. Release of Patients **after Therapy** with Unsealed Radionuclides, Ann. ICRP 34(2), 2004.
- P93. Managing patient dose in **digital radiology**, Ann. ICRP 34(1), 2004.

## Relevant ICRP C3 publications during the last years

- SG2. Radiation and **your patient**: A guide for medical practitioners, Ann. ICRP 31(4), 2001.
- SG2b. Diagnostic **reference levels** in medical imaging – review and additional advice, ICRP Supporting Guidance 2. Ann. ICRP 31(4). 2001.
- P87. Managing Patient Dose in **Computed Tomography**, Ann. ICRP 30(4), 2000.

## Relevant ICRP C3 publications during the last years

- P86. Prevention of accidental exposures to patients undergoing **radiation therapy**, Ann. ICRP 30(3), 2000.
- P85. Avoidance of Radiation Injuries from Medical **Interventional Procedures**, Ann. ICRP 30(2), 2000.
- P84. **Pregnancy** and Medical Radiation, Ann. ICRP 30(1), 2000.

## Documents already finished. Waiting for Main Commission approval after public consultation

1. Radiological Protection in **fluoroscopically guided procedures** performed outside the Imaging Department (M. Rehani) 2011.
2. Radiological Protection in **Paediatric Diagnostic and Interv. Radiology** (PL Khong and H Ringertz) 2011.
3. Patient and staff Radiation **Protection in Cardiology** (D Miller and C Cousins) 2011.

### Committee 3 Protection in Medicine

**August 2011**

#### Current Consultations

2011-05-20

[Patient and Staff Radiological Protection in Cardiology](#)

(comments due August 19, 2011)

2011-05-18

[Radiological Protection in Fluoroscopically Guided Procedures Performed outside the Imaging Department](#)

(comments due August 19, 2011)

2011-05-09

[Radiological protection in paediatric diagnostic and interventional radiology](#)

(comments due August 5, 2011)

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## Downloads

Preventing accidental exposures from new external beam radiation therapy technologies

ICRP Publication 112

Task Group:  
P. Ortiz Lopez (chairman), J.M. Cosset,  
O. Hännberg, J.C. Rosenwald, P.  
Duncombe, J.J. Villarut, L. Pinillos,  
S. Vahlsbky



ICRP Publication 103

The 2007 Recommendations of the International Commission on Radiological Protection

Free Summary Recommendations

Free ICRP Posters: Paediatric radiology

Free Guides and Explanatory Notes

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## Free Educational Downloads

The following files are downloadable here at no cost. They can be used by teachers, doctors, and those interested in radiological protection in medicine, together with recent medical reports.

Please note that while we encourage you to download and use these modules, ICRP has the copyright and you must not edit or try to sell the files.

- [ICRP 84. Pregnancy and medical radiation \(1.3 Mb\)](#)
- [ICRP 84. Pregnancy and medical radiation, Spanish version \(2.3 Mb\)](#)
- [ICRP 85. Interventional radiology \(1.4 Mb\)](#)
- [ICRP 86. Accidents in radiotherapy \(0.8 Mb\)](#)
- [ICRP 86. Accidents in radiotherapy, Spanish version \(0.6 Mb\)](#)
- [ICRP 87. CT dose management \(0.6 Mb\)](#)
- [ICRP 93. Digital radiology \(1.2 Mb\)](#)
- [ICRP 93. Digital radiology, Spanish version \(1.2 Mb\)](#)
- [ICRP 112. Preventing accidental exposures from new external beam radiation therapy technologies \(0.8 Mb\)](#)
- [ICRP 112. Preventing accidental exposures from new external beam radiation therapy technologies, Spanish version \(0.9 MB\)](#)

- **Pregnancy**
- **Interventional Radiology**
- **Accidents in Radiotherapy**
- **CT dose management**
- **Digital Radiology**



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## Downloads

Preventing accidental exposures from new external beam radiation therapy technologies

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Task Group:  
P. Ortiz López (chairman), J.M. Cosset,  
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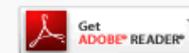
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## Free Guides and Explanatory Notes

 [Radiation and your Patient: A Guide for Medical Practitioners](#)

 [Explanatory note on Diagnostic Reference Levels](#)

In order to be able to read these, you need the "Adobe Acrobat Reader". If you do not already have the reader, you can download it, free of charge, here.



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## Pediatric X-ray Examinations

1. Have parents and child been properly informed about the procedure?
2. Is the child's ID, date, and position marker etc. correct?  
Do the markers cover any important parts of the image?
3. Is the child immobilized by device or parent?
4. Is the field size correct and centering appropriate?  
Not too large, not too small?  
They should be set by hand, not automatically!  
Correct centering point?  
Correct film-focus distance?
5. Has necessary shielding been applied?  
With the edge within a centimeter of the field edge?  
Gonad shielding applied?  
Has thyroid shielding been applied?
6. Are the exposure settings correct?  
Is the exposure time shortest possible?  
Is the kVp above 60, when possible?  
Can you add more filtration?  
Is the anti-scatter grid necessary?
7. Can you reduce the number of exposed films?  
If films are rejected, they should be collected and analyzed.



## Estudios de Radiología Pediátrica

1. ¿ Tanto los padres como los niños han sido informados adecuadamente con relación al procedimiento radiológico ?
2. ¿ Está seguro que los datos demográficos del infante están correctos ?  
¿ Cree usted que los marcadores cubren una parte importante de la imagen ?
3. ¿ Cómo se está inmovilizando al infante, por algún elemento externo o por alguno de los padres ?
4. ¿ Considera que se está cubriendo adecuadamente el área de estudio ?  
Un área no muy larga o corta.  
Se adecuó el área de estudio a mano o en forma automática ?  
¿ Está centrado el punto focal ?  
¿ Está el área de estudio a una distancia apropiada del punto focal ?
5. ¿ Considera usted que se está utilizando la protección adecuada ?  
¿ Se ha tomado en cuenta 1 centímetro alrededor del área a estudiar ?  
¿ Se utiliza adecuadamente el protector de gónadas ?  
¿ Se utiliza adecuadamente el protector de tiroides ?
6. ¿ Está la técnica calibrada adecuadamente ?  
¿ Es posible hacer una prueba rápida de exposición ?  
¿ Se puede aumentar el kV arriba de 60, cuando es necesario ?  
¿ Sería posible agregar más filtro ?  
¿ Es necesario un grid/rejilla ?
7. ¿ Cree Usted que puede reducir el número de exposiciones ?  
Si una placa fue rechazada deberá ser guardada para un análisis posterior.

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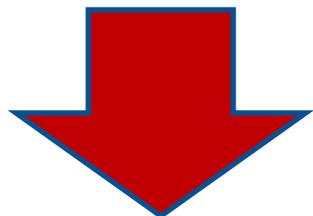
## Radiological Protection in Medicine

### ICRP Publication 105

Ann. ICRP 37 (6), 2007

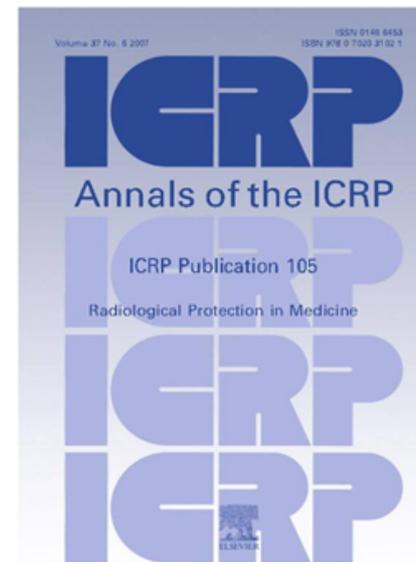
**Abstract** - This report was prepared to underpin the Commission's 2007 Recommendations with regard to the medical exposure of patients, including their comforters and carers, and volunteers in biomedical research. It addresses the proper application of the fundamental principles (justification, optimisation of protection, and application of dose limits) of the Commission's 2007 Recommendations to these individuals.

With regard to medical exposure of patients, it is not appropriate to apply dose limits or dose constraints, because such limits would often do more harm than good. Often, there are concurrent chronic, severe, or even life-threatening medical conditions that are more critical than the radiation exposure. The emphasis is then on justification of the medical procedures and on the optimisation of radiological protection. In diagnostic and interventional procedures, justification of procedures (for a defined purpose and for an individual patient), and management of the patient



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## Committee 3. Work in Progress

1. TG. **Secondary cancer risk after modern radiotherapy**; practical recommendations (JM Cosset, new TG and terms of reference to be proposed in October 2011).
2. TG. Radiation Dose to Patients from **Radiopharmaceuticals** (S Mattsson, together with C2). 2012.
3. WP: Radiation Protection in **Charged Ion Radiotherapy** (Y Yonekura). First full draft October 2011.
4. WP: Justification of the use of Ionisation Radiation in Diagnostic Imaging in **asymptomatic Individuals** (KA Riklund). Detailed table of contents October 2011.
5. WP: Follow up of **persons accidentally exposed** to ionizing radiation (I Gusev).
6. Participation in the TG on **Effective Dose** (P Ortiz).

## TG 36 Radiation Dose to Patients from Radiopharmaceuticals (S Mattsson, together with C2)

- Using the dose coefficients for **the new computational phantoms** for adults and children.
- A number of options were considered for **dissemination of existing material** (ICRP Publication 106, 80 and 53): making free use of a newly developed viewer for indexing the available documents on the ICRP website.
- C3 approved **the biokinetic models** for  $^{18}\text{F}$ -FLT (fluorothymidine),  $^{18}\text{F}$ -FET (fluoroethyl tyrosine) and  $^{18}\text{F}$ -choline during the last meeting (Oct 2010).

# WP: Radiation Protection in Charged Ion Radiotherapy (Prof. Y Yonekura).

- First draft is ready to be discussed in Bethesda (October 2011).
- **Members from other Committees invited to contribute.**
- Initial main chapters:
  - Outline of ion beam RT
  - Physical issues for RP
  - Radiobiological implications
  - Exposures in ion beam RT
  - Radiation safety for ion beam RT facilities and 3 appendixes

1		Draft-3.2
2		
3	<b>Radiation Protection in Ion Beam Radiotherapy</b>	
4		
5		
6		
7	<b>Chair:</b> Yoshiharu Yonekura, C3	
8		
9	<b>Members:</b>	
10	Jean-Marc Cosset, C3	
11	John W. Hopewell, C3	
12	Pedro Ortiz Lopez, C3	
13	Hirohiko Tsujii, National Institute of Radiological Sciences	
14		
15	<b>Corresponding Members:</b>	
16	Keiichi Akahane, Japan	
17	Antony Lomax, Switzerland	
18	Anders Montelius, Sweden	
19	Takashi Nakamura, Japan	
20	Harald Paganetti, USA	
21	Takeji Sakae, Japan	
22	Dieter Schardt, Germany	
23	Yoshiya Shimada, Japan	
24		

## WP: Justification of the use of Ionisation Radiation in Diagnostic Imaging in Asymptomatic Individuals (Prof. K.A. Riklund)

- Methods using ionisation radiation for investigation of asymptomatic individuals have increased (e.g. whole body CT, cardiac CT, PET/CT, CT colonography, etc).
- Revision of the **risks and benefits and latest situation including position statements of professional societies and preparing practical recommendation on RP.**
- Evidence based screening programs such as **mammography will be excluded.**
- Initial extended table of contents to be discussed during the meeting in Bethesda (Oct 2011).

# Follow up of persons accidentally exposed to ionizing radiation (I. Gusev)

- To prepare the ICRP publication giving **recommendations and advice on the scientifically justified scope of medical examinations to be provided to different human cohorts affected by the ionizing radiation due to radiation accidents and unintended medical overexposure** at late periods after the radiation exposure, when acute radiation effects (if any) were already treated
- **The audience of the publication involves health authorities and GMP** treating patients affected to accidental radiation in the past.

## **Documents to be considered in Bethesda (as agreed during the 2010 annual meeting, P = priority)**

1. Occupational protection in Brachytherapy (L. Dauer) P1.
2. Radiation protection in cone-beam CT (medical and dental) (M. Rehani) P1.
3. Justification in medical exposure (H. Ringertz) P1.
4. Occupational protection issues in interventional procedures (P. Ortiz) P2.
5. Extending the use of reference levels for interventional radiology, digital radiology and new technology. P2.
6. Occupational protection issues in PET/CT and cyclotron use. P2.

## **Committee 3 is improving the information on the ICRP work and projects to the medical community and other stakeholders and promoting their feedback**

- Presence in medical and RP congresses and meetings.
- Observers from several organizations invited to C3:
  - World Health Organisation (WHO)
  - European Commission, IEC, IRPA, ISO.
  - International Agency for Research on Cancer (IARC)
  - International Labour Office (ILO)
  - But also, regular contacts with: ISR, IAEA, ESR, etc

# Occupational protection in Brachytherapy (L. Dauer)

- Introduction
  - Current clinical use of Brachytherapy
  - Characterizing Brachytherapy treatments
  - Brachytherapy source characteristics
  - Motivation, objectives and existing additional information
- Biological effects of radiation
- Principles of radiological protection for staff applied to BT
- Radiation doses and protection of staff during BT
- Staff dose management in specific applications of BT
- Emergency plan and response
- QA programmes, training and appendices.

# Radiation protection in cone-beam CT (medical and dental) (M. Rehani)

- Introduction
  - Increasing application of Cone beam CT
  - Technology and radiation doses involved
  - Awareness and motivation
- Principles of radiological protection for patients and staff
- Patient doses in different CBCT
- Patient dose management in CBCT
- QA and training
- Dose management in specific applications of CBCT
- Recommendations for various stake holders

# Justification in medical exposure (H. Ringertz)

- Introduction (including ethical issues).
- Current situation.
- The principle of justification in medicine
  - All medical procedures (e.g. diagnosis, therapy, research)
  - Multiple levels of justification
  - Key players in each of these levels and their respective roles.
- General framework
  - Benefits of negative and positive results
  - Additional considerations for interventional procedures
- Specific situations where justification is most important
- Appropriateness criteria and referral guidelines development, meaning and scope

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