REPROLAM
Red de Optimización de la Protección Radiológica Ocupacional en LatinoAmérica y el Caribe

NEWSLETTER

APRIL 2026

REPROLAM INTERCOMPARISON EXERCISES

ANNOUNCEMENT: 2026 REPROLAM INTERCOMPARISON FOR WHOLE-BODY EXTERNAL DOSIMETRY SERVICES

The Radiation Protection Optimization Network in Latin America and the Caribbean (**REPROLAM**), supported by the International Atomic Energy Agency (IAEA), aims to establish an intercomparison program for various technical radiation protection support services. The purpose of this program is to contribute to the improvement of the technical performance of personal dosimetry services and the harmonization of their protocols within the region. The intercomparison program will encompass external dosimetry services and will be open to both public and private institutions.

On this occasion, **REPROLAM** is pleased to announce the 2026 Intercomparison Exercise for External Dosimetry Services (ICReprolam2026). This exercise will be conducted with the support of the Ionizing Radiation Metrology Laboratory of the Department of Nuclear Energy at the Federal University of Pernambuco (LMRI-DEN/UFPE), Brazil.

SCOPE:

This intercomparison is intended for whole-body dosimeters used for the evaluation of Hp(10) and/or Hp(0,07). Irradiations will be carried out at the LMRI-DEN/UFPE laboratory in Brazil, using photons within the following ranges:

- Energy(keV): 30 a 1250
- Doses (mSv): 0.1 a 50
- Angle of incidence: 0 º y ± 60º

INTERCOMPARISON PROCEDURE:

REGISTRATION:
External Dosimetry Services (EDS) wishing to participate in this intercomparison must complete the registration form available on the **REPROLAM** website at: **https://ic.grupodoin.com.** The EDS must fill out a separate form for each technique or dosimetry system they wish to enroll.

Upon registration, the applicant EDS will receive a confirmation email including:

- Approval of registration.
- A participation code (to ensure the confidentiality of the EDS).
- Instructions for shipping the dosimeters.
- An invoice issued by **REPROLAM** for the participation fee.

REPROLAM
Red de Optimización de la Protección Radiológica Ocupacional en LatinoAmérica y el Caribe

NEWSLETTER

APRIL 2026

REPROLAM INTERCOMPARISON EXERCISES

Costs and Invoicing:
The participation fee for the intercomparison is: 1,000 euros (one thousand euros) for each EDS and dosimetry system (TLD, OSL, or others) per dosimetry type (e.g., Whole Body). If the laboratory possesses and wishes to participate with more than one type of system, each will be charged the same fee.

- Refunds will only be issued if the intercomparison is cancelled by **REPROLAM**.
- The registration fee must be transferred to the **REPROLAM** bank account, which will be provided in the EDS registration confirmation, within a maximum period of 30 days after receiving the invoice. All costs associated with bank transfers shall be borne by the participant.
- The IAEA will sponsor the participation of a single public laboratory per country, for a total of 18 (eighteen) laboratories in the region. This information will be managed and centralized by each country's counterpart for the RLA 9093 project.

Dosimeter Shipping:
Whenever possible, dosimeters should be sent along with the proof of payment of the participation fee. For this Whole Body intercomparison, a total of 30 dosimeters per registered dosimetry system (TLD, OSL, or other) must be submitted:

- 20 dosimeters for irradiation.
- 10 spare dosimeters.
- 2 control dosimeters (BG).

Once the irradiations are completed, LMRI-DEN/UFPE will return the dosimeters to each EDS for processing. Information regarding the procedure for reporting results will also be provided, including the deadline for submission to the Coordinating Laboratory.

One (1) week after the reporting deadline, the Coordinating Laboratory (LMRI-DEN/UFPE) will send each participating EDS the details of their response values. After this point, reported results cannot be changed, except in the case of technical or administrative errors associated with the irradiation process.

Upon confirmation of the results, **REPROLAM** will issue a "Certificate of Participation" to the participants, including information on irradiation qualities, doses, response values, and overall uncertainties for all irradiations.

REPROLAM
Red de Optimización de la Protección Radiológica Ocupacional en LatinoAmérica y el Caribe

NEWSLETTER

APRIL 2026

REPROLAM INTERCOMPARISON EXERCISES

Intercomparison Report

The Organizing Group will prepare a report summarizing the results of the intercomparison. This report will include the names of the participating EDS, the types of dosimeters used, and a photograph of the dosimeters. The results will be presented anonymously using the confidential code sent to each EDS upon registration.

The intercomparison results will be treated as confidential data, and the identity of the EDS will not be disclosed.

Data used in technical and scientific studies will remain anonymous. The Organizing Group has established appropriate procedures to ensure the confidentiality of the results, which will only be accessible to a minimal number of persons within the Organizing Group.

PROPOSED SCHEDULE	
Announcement – Call for Participants	April 2026
Participant Registration	April – May 2026
Registration Deadline	May 23, 2026
Deadline for Shipping Dosimeters to LMRI-DEN/UFPE	June 30, 2026
Irradiations	June – August 2026
Return of Dosimeters to EDS for Processing	September 2026
Deadline for Submission of Results	2 months after receipt of irradiated dosimeters
Final Results Notification	December 2026
Issuance of Certificates of Participation	December 2026

REPROLAM

Red de Optimización de la Protección Radiológica Ocupacional en LatinoAmérica y el Caribe

NEWSLETTER

APRIL 2026

REPROLAM INTERCOMPARISON EXERCISES

REPROLAM

IAEA 60 Years Atoms for Peace and Development

REPROLAM ORGANIZING GROUP	
Daniel Molina	CPHR – Center for Radiation Protection and Hygiene, Cuba
Denison Souza-Santos	Institute of Radioprotection and Dosimetry,Dosimetry Division - IRD/CNEN, Brazil.
Viviane Khoury Asfora	Federal University of Pernambuco, Brazil
Juan Carlos Mora Canada	Center for Energy, Environmental and Technological Research (CIEMAT), Spain, Radiation Protection Service
Leslie Vironneau	Individual Radiological Surveillance Section Chilean Nuclear Energy Commission, Chile
Patricia Mora	Coordinator of the External Dosimetry Area of REPROLAM, Costa Rica

Coordinating Laboratory:

Ionizing Radiation Metrology Laboratory – LMRI-DEN/UFPE, Brazil Head of Laboratory: Viviane Khoury Asfora

Contact: ic.lmri@ufpe.br

Registration: https://ic.grupodoin.com/

REPROLAM

Red de Optimización de la Protección Radiológica Ocupacional en LatinoAmérica y el Caribe

NEWSLETTER

APRIL 2026

REPROLAM DIRECTORIES

REGIONAL SURVEY ON AREA DOSIMETRY (ENVIRONMENTAL AND WORKPLACE) USING PASSIVE DOSIMETERS

The announcement for the Regional Survey is now published on the IAEA's ORPNET platform.

The launch of the survey, which was initially shared in the March newsletter, has been officially mirrored on the IAEA's ORPNET CP platform, expanding its reach to an international level.

You can view the announcement at the following link:

https://nucleus.iaea.org/sites/orpnet-cp/SitePages/REPROPLAM-announces-regional-survey-on-dosimetry-services-for-environmental-and-workplace-monitoring.aspx

REPROLAM

Red de Optimización de la Protección Radiológica Ocupacional en LatinoAmérica y el Caribe

NEWSLETTER

APRIL 2026

WORKING GROUP (WG) PROGRESS

Working Group virtual meeting regarding the survey (March 23)

Key Results from the Working Meeting:

- Review and Improvement of the Technical Questionnaire: Refinement of the survey tools.
- Approval of the Work Program: Formal endorsement of the project timeline.
- Definition of Roles and Responsibilities: Allocation of tasks within the group.

Official Invitation: Work is currently underway to prepare the formal invitation, with the goal of publishing it in the May REPROLAM Newsletter.
Questionnaire: The survey is being designed using Google Forms and will be made available simultaneously with the publication of the official invitation
Dissemination of Results: A summary has been prepared and submitted to the IRPA Regional Congress in Medellín.

KEY REMINDERS:

1. **Survey Objective**

To obtain a comprehensive overview of the regional status of area dosimetry (environmental and workplace) using passive dosimeters. The aim is to assess existing capabilities and identify actions that contribute to the improvement and harmonization of measurement and evaluation practices.

2. **Why is participation important?**

- You help identify regional technical capabilities.
- The results will help pinpoint actions of interest for the region, which can be implemented for the benefit of all participating institutions.

Note: Courtesy of Daniel Molina Pérez on behalf of the Working Group.

REPROLAM
Red de Optimización de la Protección Radiológica Ocupacional en LatinoAmérica y el Caribe

NEWSLETTER

APRIL 2026

PAPER

PREPARATION FOR I-131 MONITORING IN CHILDREN'S THYROIDS DUE TO A NUCLEAR OR RADIOLOGICAL EMERGENCY: CALIBRATION, SOFTWARE COMPARISON, AND DOSE ESTIMATION.

BEGOÑA PÉREZ LÓPEZ (1), ERICA S. PEDEMONTI (2), ADRIÁN M. VILLELLA (2)
(1) Center for Energy, Environmental and Technological Research (CIEMAT), Madrid, Spain
(2) Nuclear Regulatory Authority of Argentina (ARN), Ezeiza, Argentina

Abstract

This study addresses the challenges associated with Iodine-131 (I-131) intake during radiological or nuclear emergencies, such as incidents in medical facilities, nuclear reactors, or nuclear detonations, where the environmental dispersion of radioactive contaminants poses a significant risk to the population.

Due to its high volatility and atmospheric transport capacity, I-131 can be incorporated into the body primarily through inhalation or ingestion. Once incorporated, it exhibits a strong affinity for the thyroid gland—a critical target organ—thereby increasing the risk of adverse radiological effects, particularly in highly radiosensitive groups such as the pediatric population.

For the assessment of internal contamination, the use of in vivo measurement techniques based on gamma spectrometry is highlighted, as these allow for the direct, rapid, and non-invasive quantification of thyroidal I-131 activity. The reliability of these measurements depends on proper system calibration, which includes the use of representative anthropomorphic phantoms and the consideration of specific anatomical and geometric variables.

In this context, the importance of having pre-established monitoring systems is emphasized. These systems must include appropriate detectors, standardized measurement geometries, validated calibration procedures, and robust data analysis tools. Such preparation is essential to ensure traceable and accurate results during emergency response, facilitating the estimation of committed doses and the implementation of timely radiological protection measures.

This study was conducted at the Whole Body Counter of the Nuclear Regulatory Authority (ARN) in Ezeiza, Argentina, contributing to the strengthening of national capabilities for in vivo monitoring in the event of radiological emergencies.

REPROLAM
Red de Optimización de la Protección Radiológica Ocupacional en LatinoAmérica y el Caribe

NEWSLETTER

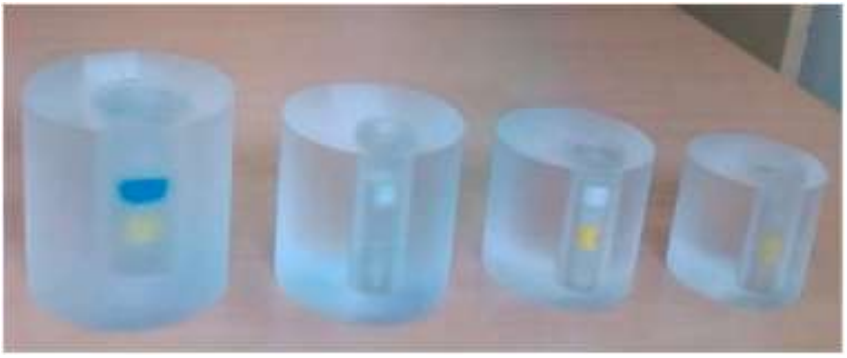
APRIL 2026

MATERIALS:

Thyroid activity measurement systems were based on NaI(Tl) detection systems of various dimensions, including their respective electronic chains and analysis software. Additionally, a high-efficiency HPGe detector was utilized, installed in a shielded chamber optimized to reduce background levels and enhance spectral resolution.

To simulate pediatric anatomical conditions, four neck and thyroid phantoms representing ages 1, 5, 10, and 15 years were used. These were designed according to international references (ICRP and ICRU), incorporating realistic anatomical dimensions and soft-tissue equivalent attenuation properties. The phantoms, manufactured from Lucite-type material, feature specific cavities for radioactive source placement, allowing for the controlled reproduction of I-131 distribution within the thyroid gland.

This instrumental and experimental setup ensures suitable conditions for the calibration, validation, and comparison of in vivo measurement systems, particularly in the context of thyroid monitoring for the pediatric population.



Age-specific pediatric neck and thyroid phantoms (15, 10, 5, and 1-year-old models).

For the NaI(Tl) detectors, ScintiVision-32 was used, which enables gamma spectra acquisition and analysis with MCA (Multi-Channel Analyzer) functions. For the HPGe detector, GammaVision 8 was employed, providing high-resolution spectrometric analysis, calibrations, corrections, and tools for quality control and traceability.

Calibration calculations and the determination of dosimetric parameters were performed using Microsoft Excel via an in-house tool developed by the Internal Dosimetry Laboratory, validated in accordance with the ISO 17025 standard. This application allows for the calculation of system efficiency for specific radionuclides, along with their associated uncertainties, as well as detection and quantification limits (Decision Threshold and Detection Limit).

Additionally, Genie 2000 software was used for HPGe spectra calibration and for the comparison of results with other platforms. This software incorporates advanced spectral analysis algorithms and enables data management through specific file formats, facilitating traceability, reprocessing, and consistency of the obtained results.

REPROLAM
Red de Optimización de la Protección Radiológica Ocupacional en LatinoAmérica y el Caribe

NEWSLETTER

APRIL 2026

Calibration geometries across different age groups.

Each obtained spectrum was analyzed peak-by-peak. To account for the primary emission of Ba-133, the efficiency at 356 keV was calculated. Using the software, the Region of Interest (ROI) for the peak was selected, and the total number of counts was determined.

Fifteen measurements were performed for each calibration. Four calibrations were carried out using the spectra obtained for each age-specific neck and thyroid phantom across three different detectors. Consequently, a total of twelve calibrations were completed.

Diferencia (%)	Detector de NaI(Tl) 1	Detector de NaI(Tl) 2	Detector HPGe
1	30,46	27,07	11,79
5	15,83	20,3	5,69
10	9,59	13,53	2,64

Percentage efficiency differences between each pediatric phantom and the 15-year-old reference model.

RESULTS

The efficiency results show significant differences among detectors; the 3” × 3” NaI(Tl) detector presents the highest efficiencies, while the smaller NaI(Tl) detector exhibits the lowest. The HPGe detector shows intermediate values. Furthermore, a strong dependence of efficiency on phantom size is evident, with higher values observed in geometries corresponding to younger ages. The use of non-specific calibrations can introduce significant errors, with differences reaching up to ~30% for NaI(Tl) detectors and ~12% for HPGe when extrapolating between age extremes.

Due to its high resolution, the HPGe detector allowed for the construction of calibration curves across a broad energy range (80–400 keV), facilitating the interpolation of efficiencies for thyroid activity quantification. The curves obtained through different tools (Excel, GammaVision, and Genie 2000) show globally consistent trends, using third-order polynomial fits, although with variations in peak positions and behavior smoothness, particularly within spectral analysis software.

The comparative analysis between efficiency curves for different phantom sizes shows general agreement, with differences of less than 2%, indicating consistency across methodologies, though with sensitivity to the specific fitting algorithms used.

Regarding detection capability, the Minimum Detectable Activity (MDA) increases with phantom size, reflecting attenuation and geometric effects. The HPGe detector exhibits the lowest MDA values across all configurations, followed by the NaI(Tl) detectors. These results determine detection capabilities in real-world scenarios, especially as a function of the time elapsed since intake.

Finally, the dosimetric analysis based on an acute inhalation scenario of I-131 shows that thyroid activity decreases significantly over time. In this context, the HPGe detector allows for the detection of most considered cases even at prolonged times post-intake, whereas NaI(Tl) detectors, with higher detection limits, require careful selection based on the individual's age and the time since exposure.

Taken together, these results highlight the importance of using age-specific calibrations and appropriate detection systems to ensure accurate quantification of thyroid activity and reliable dosimetric assessment in radiological emergency situations.

CONCLUSIONS:

It is demonstrated that the use of realistic pediatric neck and thyroid models is fundamental for the correct calibration of efficiency in in-vivo measurement systems. The implementation of these geometries allows for more reliable estimates of the I-131 activity retained in the thyroid, reducing biases associated with the use of generic anatomical models.

The results show that detection efficiency has an inverse relationship with phantom size, being higher in geometries corresponding to younger ages. Furthermore, efficiency differences between different models are less pronounced in the HPGe detector compared to the NaI(Tl) detectors, while the larger volume NaI(Tl) detector exhibits the highest absolute efficiencies.

The calibration of the HPGe detector across a broad energy range (80–400 keV) enables the proper identification and quantification of radioiodine in complex contamination scenarios. In this regard, the various analysis and calibration software tools employed show consistent results, with efficiency curves that can be represented by polynomial fits of different orders.

REPROLAM
Red de Optimización de la Protección Radiológica Ocupacional en LatinoAmérica y el Caribe

NEWSLETTER

APRIL 2026

Regarding detection capability, the Minimum Detectable Activity (MDA) values obtained with acquisition times of approximately 10 minutes are suitable for monitoring up to 30 days post-intake. For longer intervals or in the case of younger individuals, detection capability can be maintained by increasing the measurement time.

Finally, the use of calibrations based on realistic anatomical models eliminates the need to apply scaling factors derived from adult models, significantly improving the accuracy of thyroid activity quantification and, consequently, the reliability of the committed effective dose estimation for the pediatric population.

Age (Years)	Detector 1 NaI(Tl) (20 min)	Detector 2 NaI(Tl) (10 min)	Detector HPGe (10 min)
1	700 Bq	423 Bq	93 Bq
5	786 Bq	454 Bq	107 Bq
10	809 Bq	479 Bq	103 Bq
15	890 Bq	544 Bq	136 Bq

Minimum Detectable Activity (MDA) values for each detector and phantom configuration..

This work was made possible by the support of the International Atomic Energy Agency (IAEA), through project ARG9019 of the Division for Latin America and the Caribbean (TCLAC) and the Incident and Emergency Centre (IEC).

To access the full article, visit:
https://www.sciencedirect.com/science/article/pii/S0969806X26002926?dgcid=author