"All the Radiation Physics News That's Fit to Print"

The IRPS Times

Late Edition

IRPS

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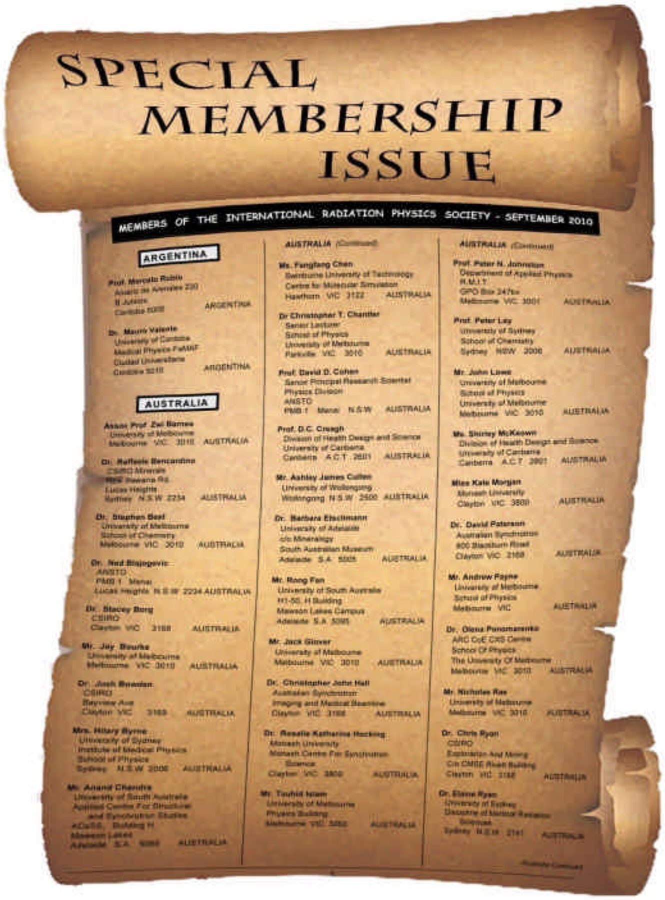

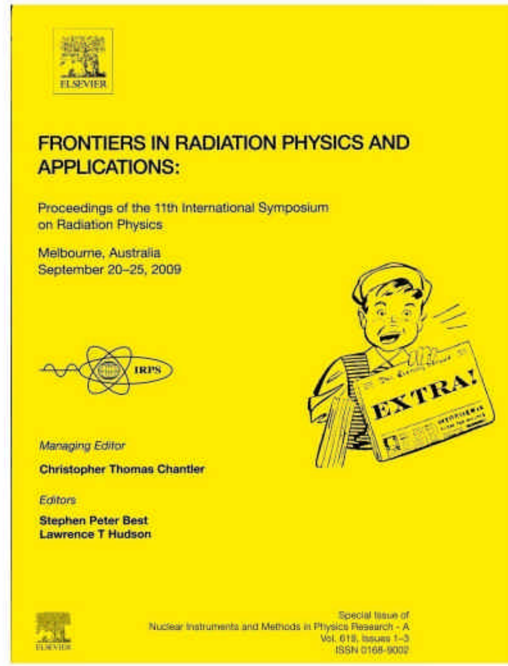

ISRP-11 PROCEEDINGS PUBLISHED

Seen at the September IRPS Council Meeting in Warwick, UK : Professors Ladislav Musilek, Odair Goncalves, Malcolm Cooper, Bill Dunn, Chris Chantler, Richard Pratt, David Bradley, and Dudley Creagh.

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MEMBERSHIP PAYMENT INFORMATION ON PAGE 5

Cover Design - Larry Hudson

From the Editors

Spotlighting You

As you can see from the cover art of this issue of the Bulletin, the focus is upon you, the membership of the International Radiation Physics Society (IRPS).

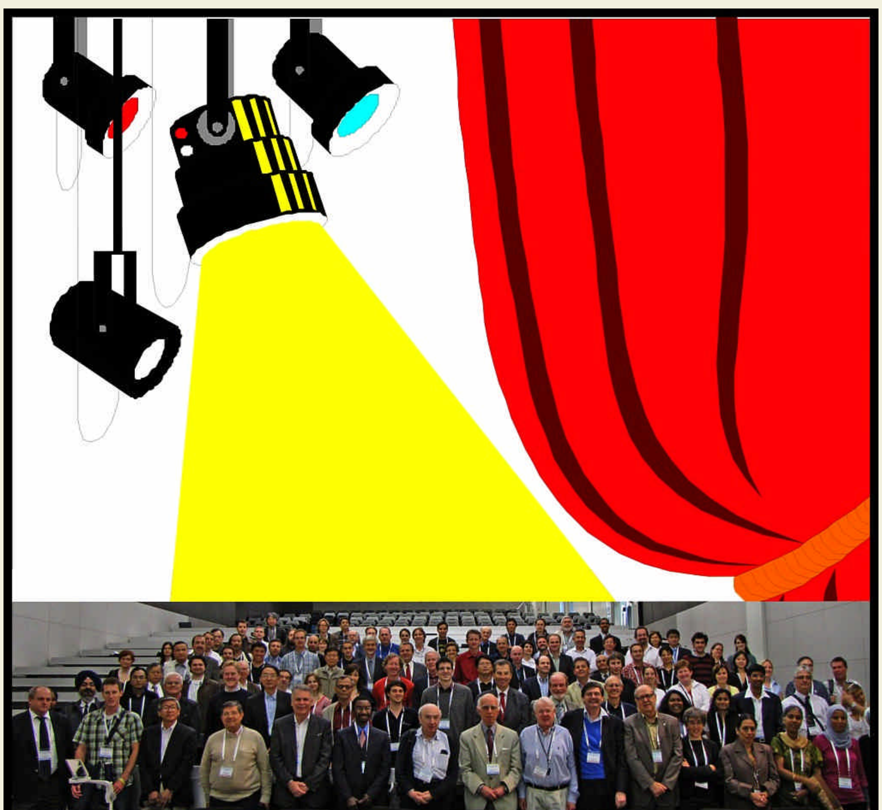
After each triennial Symposium, there are new additions to the rolls. The listing of current members contained within these pages permits us all the opportunity to appreciate the breadth of the Society and can be used to recruit one's colleagues. In past times we published more detailed contact information, but these days there is increased sensitivity to unnecessarily exposing one's personal information to advertisers, identity thieves, etc. In the future we think it would be interesting to include areas of specialization in the Bulletin listings. Anyway, please do take the opportunity to check your entry and alert our membership secretary, Elaine Ryan (e.ryan@usyd.edu.au), of any errors or omissions.

In keeping with our theme, also included in this issue is Elaine's most recent membership report to the Council meeting in Warwick, UK (photo of attendees on cover). This will give you the up-to-date statistics on the global representation of IRPS and ongoing efforts to enhance the website, among other creative activities related to "us."

We also thank Chris Chantler for a summary of the ISRP-11 proceedings that have now been published in NIM A, and M. I. Gohary *et al*. for contributing a technical "member's paper."

Your Editors,

Larry Hudson and Ron Tosh



A Membership Report, September 2010

Elaine Ryan

IRPS Membership Secretary

Discipline of Medical Radiation Sciences, University of Sydney, Sydney, Australia

Current memberships

1. Current membership - 163 current members. These are from 40 countries, of which 18 are developed countries and 22 are developing countries. To date 36 memberships have been completed via Paypal.

2. Memberships that expired in 2009 – 68 memberships. These members have continued to receive the bulletin. I will send out a renewal reminder this week to each of these members inviting them to join again in 2011.

   These members have also been included in the membership directory to be produced for the September issue of the bulletin.

3. Receipts for membership payments are now being issued via email. A sample of a membership fee receipt is attached on the following page.

4. There is a definite number of 34 student memberships, with a possible further 25 student memberships (the status of these members needs to be confirmed). These would be eligible to enter student design competition, as discussed at the last meeting.

Future membership

1. The website design brief is under current development. Comments and Feedback are invited from Board members before the final Development Brief is published.
   Action required: An agreed budget limit needs to be finalised. I propose a budget of £2,000 with a £500 contingency and a budget of £60-100 per year for maintenance.

   Action required: A timeline for the project needs to be discussed and finalised. I propose that quotes can be obtained and collated, with a final decision being made on supplier before the next meeting.

   Action required: The issue of website hosting needs to be discussed. I propose that the web design company will also be able to easily and reliably host the website for a small maintenance fee (£60-100 per year)

2. I would like to write to all student members asking for a brief profile and description of their PhD project, to be included in a future issue of the bulletin. If this is approved by the Board I will work on this for the first issue of 2011.
   Action required: Approval from the board to contact student members via email requesting profile and project information.

3. I am still developing the membership certificates to be issued to new members. Once this has been finalised it will be circulated to Board members for final approval.

Summary of I.S.R.P. Proceedings

Christopher T. Chantler

School of Physics, University of Melbourne, Melbourne, Australia

Email : **chantler@unimelb.edu.au.**

The **11th International Symposium on Radiation Physics and Workshop** was conducted at Melbourne University on 26 and 27 August 2009. There were in attendance 199 for the Symposium, including 134 international participants, and 47 for the workshop "Advances in Analytical Techniques" to give a total attendance for the two separate events of 246. The conference presented 23 plenary lectures, 169 posters, with just over 200 abstract submissions in total.

Below is a summary of the special issue of Nuclear Instruments and Methods in Physics Research **A619** (2010) that has recently been published and distributed to attendees and contributors. Whether you were able to attend or not, you may see descriptions of work that invite your further attention.

Frontiers in Radiation Physics and Applications

Guest Editors ; Christopher T. Chantler, Lawrence T. Hudson, Stephen P. Best

The 11th International Symposium on Radiation Physics

This special issue continues a tradition of strong symposia across the breadth of Radiation Physics, Chemistry and Instrumentation, with many medical and other applications presented. In keeping with the previous Symposium in Coimbra, Portugal, the symposium was supplemented by a strong Workshop entitled 'Advances In Analytical Techniques' with sub-themes of Geology, Conservation Science, Forensic Science, Border Technology & Environmental Science.

This Special Issue concentrates on Radiation Physics, Chemistry and Instrumentation, where this encompasses both fundamental aspects of the interaction of radiation with matter as well application of the techniques in medical, environmental, industrial and cultural applications presented. With representation from over 38 countries including Africa, America, Europe and Asia, the 120 manuscripts that comprise this Special Issue provide a global snapshot of activity in the disparate but connected fields. This issue is divided into nine themes, illustrating the range of topics of the submitted manuscripts:

1. Processes in radiation physics (Atomic);
2. Quantitative X-ray and particle analytical techniques (Condensed Matter);
3. Absorption and fluorescence spectroscopy (Especially XAFS, XANES and Raman);
4. Sources and detectors;
5. Simulation of radiation transport;

6. Materials Science and applications to minerals, mining and processing;
7. Medical applications and biology;
8. Applications to space, earth and environmental sciences;
9. Cultural heritage and art and new technologies and industrial applications.

Several of these sections have Topical Reviews of a key area in the broader field. The first section on new fundamental understanding of the universe and of radiation includes fundamental experiments and applications across diverse areas of science. Bartlett et al. present a detailed review of dramatic advances obtained over the past decade in few-electron atomic scattering, which will yield major applications to broader fields in the near future. La John et al. discuss multipolar zeroes and their effect in angular photoelectron scattering, which can be incipient areas of future investigation.

Rehr et al. report the outcome of many years of investigation into experimental discrepancies in the XAFS regime and the latest status on this broad theoretical development. Bourke et al. describe the first extension of near-edge theory into the full XAFS range, opening up a wide range of new analytical investigations. Ryan describes a beautiful review of an amazing experimental development in micro-XRF tomography, now realizing great success and sought-after worldwide. Hugtenberg et al. describe new applications of Monte Carlo developments for medical imaging diagnostics. Guedouar et al. investigate image processing methods and find surprising complexity in reproduction and stability of current approaches.

Borg et al. make a classic XAFS investigation and describe outcomes. Conversely Pan et al. use XAS but to investigate quantum dot production. Bradley et al. give an excellent and perhaps frightening review of the latest developments in characterization of degeneracy of medical cartilage; and in another paper describes bomb detection, fortunately using different techniques! Farquharson et al. present investigations of correlation of species distribution around tumors.

Obhodas et al. discuss a key survey of dangerous contaminants in European waters and how to investigate these, perhaps leading to some preventative mitigation procedure in the future. Treasure et al. discuss and review key areas of cultural heritage, while Seely et al. survey recent developments in diagnostics of the most extreme laser-produced plasmas to round off the issue.

Many of the areas that formed the core business of early issues of this series[1] have now reached a state of maturity with applications across biomedical, chemical and engineering fields and in border protection, geothermal and many other areas. Subjects that were once regarded as arcane areas of fundamental research in experimental and theoretical atomic and molecular physics now make vital contributions to the development of new materials, forensic sciences, pharmaceuticals and metrology standards.

Emerging fields, including the generation of intense X-ray sources, imaging techniques, and the design of instrumentation and synchrotron beamlines, are also well represented, together with papers on the detailed understanding that access to synchrotron light sources affords us in our efforts to elucidate the nature of fundamental electronic processes.

The International Radiation Physics Society is a broad and welcoming organization which I can encourage all to be a part of irrespective of background field or favorite application. We hope that this issue has reflected new research directions, and encouraged new collaborations and cross-disciplinary interest.

We thank the International Radiation Physics Society and the School of Physics, University of Melbourne; Australia, State and Federal government support (DEST, DIIRD), and the Australian Synchrotron; the IUCr International Commission on XAFS (X-ray Absorption Fine Structure) and all referees and contributors for their contributions to the success of the Symposium and this Special issue.

[1] NIM A 580 (Issue 1, 21 September 2007) Issue 1; M.I. Lopes, J.E. Fernández, W.L. Dunn, M.M.R. Costa, editors

Note: see also an excellent summary by Malcolm Cooper and Dudley Creagh in IRPS Bulletin 24 issue 1, pp 4-8.

Membership Payments by Credit Card

PayPal is now fully connected !!

Internet payments by credit card (Visa, Mastercard, AMEX, Discover) can be made via the IRPS website

http://www.canberra.edu.au/irps

You do not need a PayPal account to use this method of payment

Go to the Home Page on our website (as above)
click on Membership, scroll down to the selection of buttons and click on the one that suits your membership.

If you have any queries or problems contact :

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Coventry CV4 7AL, U.K

email : m.j.cooper@warwick.ac.uk

New Memberships, Membership Renewals

Membership form for new members, and details for payments by cheque for new and renewing members are on the back page of this journal and information for payment by credit card is given above.

If you are unsure when your renewal is due, contact

Elaine Ryan

email: elaine.ryan@sydney.edu.au

Internal Dosimetry of ^{40}K and ^{131}I in Egyptian Radiation Workers

M.I. Gohary [(1)], M.A. Gomaa, Samia M. Rashad, Eid M.A. and T.M. Morsi [(2)]

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[(2)] Atomic Energy Authority, Cairo, Egypt

Abstract

The aim of the present work is to review experience gained in the field of radiation internal dosimetry of Egyptian workers who deal with unsealed radioactive sources (e.g. as in nuclear medicine). Radioactivity levels for ^{40}K and ^{131}I were measured for both males and females using a whole body counter (WBC). This study includes the calibration of the WBC using several radionuclides. The activity of ^{40}K in males ranged from 2724 to 7529 Bq with an average of 5196 ±7.05 % Bq. The activity of ^{40}K in females ranged from 2984 to 6159 Bq with an average of 4118.5 ±7.7 % Bq. The measured activity of ^{131}I due to inhalation for some individuals varied from 201 to 51248 Bq, corresponding to a range of estimated initial activity of 2946 to 212523 Bq. The obtained dosimetric results are compared with dose limits to individuals recommended by 2007 ICRP recommendations.

Key word: whole body counter- ^{40}K- ^{131}I

Introduction

Following 2007 ICRP recommendations and its new terminology - internationally known as ***ICRP-103*** [(1)] - exposure to radioactivity is categorized according to the following situations: planned exposure situations, existing exposure situations or emergency exposure situations. The present study focuses on planned exposure situations involving individual workers, public or private. Occupational radiation workers are exposed to natural and man-made sources by external exposure and/or internal contamination. Internal exposure arises when radiation is emitted from radioactive materials present within the body. The internal dose is directly related to the intake of radioactive materials, which are introduced into the body by inhalation, ingestion or through the skin (absorption, injection, etc.) ***(IAEA, safety standard series 1999)*** [(2)]. Internal contamination continues until the radioactive material is cleared from the body by natural processes or is removed by medical countermeasures.

All forms of radiation can cause internal radiation exposures. Occupational exposure to ^{131}I occurs in the nuclear industry, in research and in nuclear medicine, in both diagnostic and therapeutic settings.[(3, 4)] (In treatment facilities throughout Egypt, diagnostic use involves smaller quantities, of order MBq, compared to quantities required for treatment of patients, which which may exceed 10 GBq per week.) Generally, with ^{131}I, an individual is exposed to beta particles (average energy for main emission is 0.19 MeV) and gamma rays (main emission 0.36 MeV) [(5)].

^{131}I is produced by the irradiation of ^{130}Te in a nuclear reactor [(n, gamma) reaction] and has a half-life of 8.04 days, but its effective half life in the body is reduced to 7.3 days because of physiological processes. Iodine is rapidly absorbed in the blood following intake, where about 70% is excreted in the urine and about 30% concentrates in the thyroid.[6, 7] The biological half life of iodine in the blood is quite short, about 6 hours, because of these two mechanisms; the much longer 80 day biological half life in the thyroid, where it is incorporated into thyroid hormones that subsequently enter other tissues [8], accounts for the overall effective half life in the body of 7.3 days. ^{131}I may be detected directly in the thyroid or indirectly in urine samples.

Direct measurement of body radioactivity using the whole body counter (WBC), a type of gamma-ray spectrometer used for in vivo measurements, is the most reliable method of monitoring such internal exposure to an individual. It has been used on a routine basis for radiation workers and for the public in case of an emergency (*e.g.* it was also used in the late 1950s and early 1960s to detect global fallout that had contaminated the general population) [9]. It is capable of both qualitative and quantitative measurement of natural and artificial radioactivity within the human body, and, in the present study, was used to conduct measurements of ^{40}K – as a continuation of earlier studies on Egyptian individuals – and of ^{131}I, in connection with contamination incidents at nuclear medicine facilities.

Materials and methods

The FASTSCAN whole-body counter, in use at the Egyptian Atomic Energy Authority since 1999, is designed to quickly and accurately monitor individuals for internal contamination of radionuclides that emit energies between 300 KeV and 1.8 MeV. It consists of two large sodium iodide detectors, configured in a linear array on a common vertical axis. The detectors are each 3x5x16 inch, and are each viewed by a single photomultiplier tube. In addition, it uses a shadow shield to minimize spectral background interference. The shield is constructed of 10 cm thick low background steel. Steel was chosen over lead because of its structural properties and because it does not contain ^{226}Ra which is always present in lead. The low background steel is manufactured for Canberra using a special cobalt-free process. This special process guarantees that the steel will be free of the ^{60}Co contamination found in normal steel. The FASTSCAN's steel shield is covered with painted sheet metal and lined with moulded plastic for ease of decontamination.

The electronic system and computer are straightforward. The two NaI (TI) detectors are biased by Canberra high voltage power supplies. Each detector signal goes through a pre-amplifier and an amplifier. The signals are routed into an appropriate multi-channel analyzer.

System operation

Each test subject enters the counting shield and leans against the back wall. There are molded positioning devices on the back wall that make it natural for the individual to stand in the correct location. The operator starts the count using the ABACOS software included with the system. The software starts the data collection and brings up a subject demographics screen.

For direct measurements, individuals should be free from external contamination and in fresh clothing. Usually, this will involve taking a shower, washing the hair, and donning disposable paper garments before entering the monitoring area. Accessories such as jewelry, watches and spectacles should be removed. Such precautions help to avoid false identification of internal activity, and also prevent the transfer of contamination to the counting equipment.

Results and discussion

Factors Affecting WBC performance

The following factors were studied: linearity, efficiency and absolute efficiency for ^{40}K and ^{131}I, and energy resolution. Linearity between channel number and energy in KeV was verified by using multi-gamma sources covering a range of energy from 300 KeV to 1600 KeV. Figure (1) shows the energy calibration for WBC.

The counting efficiency of the FASTSCAN WBC, defined as the measured count rate per unit activity, varies with energy and, hence, is one of the most important physical parameters affecting the performance of the whole body counter. It is determined experimentally by using calibrated mixed gamma-ray sources, which were, in the present case, placed inside a Canberra transfer phantom. The counting efficiency (observed count rate per Bq, divided by the associated branching fraction 0.817 for ^{131}I and 0.11 for ^{40}K), and consequently the statistical accuracy of measurements, depends on the crystal dimensions, geometry and the energy of incident photons. Figure (2) shows the efficiency calibration curve for the FASTSCAN WBC.

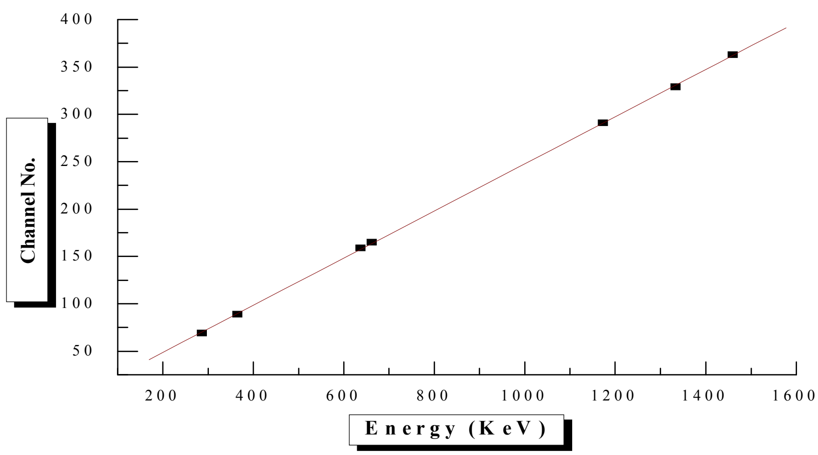

Figure (1) Energy Calibration for WBC.

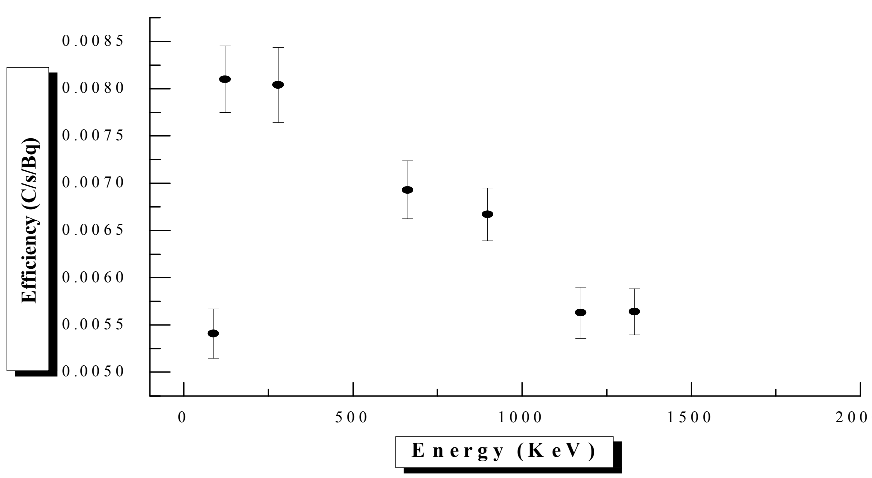

Figure (2) Efficiency Calibration Curve for 2 vertical NaI(Tl) detectors

Absolute efficiencies for counting gamma rays from ^{40}K and ^{131}I – with energies of 1.46 MeV and 364.5 KeV, respectively – were then determined by placing solutions with various, known concentrations of each radionuclide within a Bottle Mannequin Absorber (BOMAB) phantom and measuring the count rate as a function of the calculated activity. The obtained data of count rate vs. activity are plotted in Figures (3) and (4), respectively for ^{40}K and ^{131}I. The average absolute efficiency at ^{40}K was found to be 5.24×10^{-3} C/s/Bq, (Table 1). The latter showed that the average efficiency calibration for our two-vertical-NaI(Tl) WBC was 7.22×10^{-3} counts per second per Bq at 364.5 KeV (Table.2).

Table (1) Count rates of ^{40}K versus Efficiency for WBC.

Activity of ^{40}K (Bq)	Counts /s	Efficiency C/s/ Bq
2512.44	1.45	5.25×10^{-3}
2677.65	1.54	5.23×10^{-3}
3184.11	1.83	5.22×10^{-3}
3584.08	2.07	5.26×10^{-3}
3994.98	2.30	5.23×10^{-3}
4395.49	2.54	5.25×10^{-3}
5166.60	2.98	5.24×10^{-3}

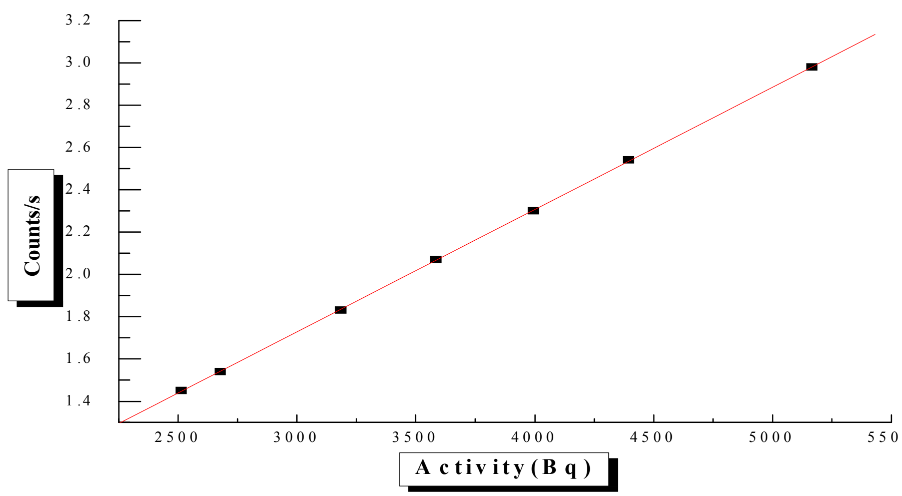

Figure (3) Count rate as a function of ^{40}K concentrations for 2 vertical NaI(Tl) in a FASTSCAN WBC.

Table (2) Count rates of ^{131}I versus Efficiency for WBC.

Activity of ^{131}I (Bq)	Counts /s	Efficiency C/s/ Bq
16197	96.47	7.29×10^{-3}
43923	262.34	7.31×10^{-3}
74524	440.30	7.23×10^{-3}
134754	783. 70	7.12×10^{-3}
245370	1437.65	7.17×10^{-3}

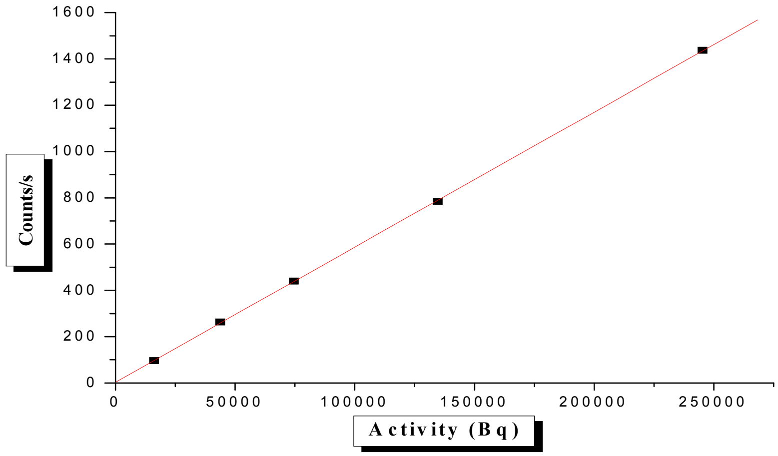

Figure (4) Count rate versus activity for FASTSCAN (WBC) using ^{131}I.

The energy resolution of the detector is conventionally defined as the full width at half maximum (FWHM) divided by the location of the peak energy. Resolution was calculated using different sources such as ^{60}Co and ^{137}Cs. The obtained result showed that the resolution for FASTSCAN (WBC) ranged from 5.80 % to 8.95 %.

The minimum significant activity (MSA) and minimum detectable activity (MDA) was evaluated in the region of interest at 1.46 MeV and 364.5 KeV. The *MSA and MDA* (10) are expressed in terms of:

$$MSA = \frac{1.64}{F}\sqrt{\frac{n_b}{t_s}\left(1+\frac{t_s}{t_b}\right)} \qquad (1)$$

$$MDA = \frac{2.71}{F\,t_s} + 2MSA \qquad (2)$$

where n_b is the background count rate; t_s and t_b are respectively the count times for the sample and for an associated measurement of the background; *F* is calibration efficiency. The MDA for NaI (Tl) FASTSCAN are equal to 14 Bq at 364.5 keV and 41 Bq at 1460 keV.

Experimental results

1. ^{40}K Measurements

Natural potassium is a mixture of three isotopes: ^{39}K, ^{40}K and ^{41}K with mass percentages of 93.08 %, 0.0118 % and 6.91 % respectively (***Carinou, E., et al, 2007***) (11) A typical 70 kg human body contains about 140 g of potassium with about 4400 Bq of ^{40}K (***T.Ishikawa, 2000***) (12). The 1.46 MeV gamma rays emitted from ^{40}K in the body can be detected with a whole body counter FASTSCAN.

239 male individuals aged from 25 up to 65 years old and 47 female individuals aged from 25 up to 50 years old were selected for the study. The ^{40}K activity in males ranged from 2724 Bq to 7529 Bq with an average of 5196 Bq ±7.05 %. The ^{40}K activity in females ranged from 2984 Bq to 6159 Bq with an average of 4118 Bq ±7.7%. The present work results are in agreement with previously measured results (Table 3), where stand up geometry was used.

Table (3) Average ^{40}K activity measured compared to the present results for males and females.

Author	N_0 of Individual		^{40}K (Bq)	
	Male	Female	Male	Female
T.M.Taha, et al, 1996 (13)	42	22	4835	3818
W.M.Badawy, et al, 2005 (14)	17		4425	
The present work , 2010	192	47	5196 ± 7.05 %	4118.5 ± 7.7 %

The average total body potassium (TBK) content in males is 2.12 ± 0.44 g K/kg. The average total body potassium (TBK) content in females is 1.96 ± 0.51 g K/kg. The obtained results showed that the data of ^{40}K are in agreement with previously measured Egyptian results [13-14], (Table 4). TBK is dependent on sex, age, body index, body fat, food system, and environment. This smaller TBK for females relative to that for males may be a consequence of their relatively smaller body index (the ratio of flesh to bone in case of females being slightly less than that of males).

Table (4) Average TBK determined by different authors compared to the present work for males and females.

Author	**N_0 of Individual**		**(g K/kg)**	
	Male	Female	Male	Female
M.T.Abass, et al, 1994 (15)	120 both sexes		2.65	2.42
T.M.Taha, et al, 1996	42	22	2.1	1.7
T.P.Lynch, et al, 2004 (16)	2037	248	1.68 ± 0.3	1.41 ± 0.3
The present work	192	47	2.12 ± 0.44	1.96 ± 0.51

The present work values (with these errors) of total body potassium for males and females per one kg are compatible with the internationally accepted recommended values (*e.g.* the recommended TBK is about 2 g of K/kg for reference man, 4400 Bq of ^{40}K [***ICRP 23, 1974***] [17]).

2. ^{131}I Estimation

In the present work, 239 individuals were monitored for ^{131}I, of whom 21 tested positive for contamination. Nine of the latter individuals were counted just after intake and 12 were counted later. Since all of these individuals were contaminated with ^{131}I through inhalation, a dose-activity conversion factor of 1.05×10^{-8} Sv/Bq [18] for inhalation of ^{131}I was used to estimate the committed effective dose (CED) for each individual.

In the first group, where individuals were monitored directly after intake, the estimated results of CED range between 2.11 µSv to 157.22 µSv. Results are shown in table (5) and Figure (5).

Table (5) Activities and committed equivalent dose due to ^{131}I for individuals monitored directly after intake.

Individual	Counts/ s	Activity (Bq)	σ%	CED (µSv)
1	01.18	201.0	± 29.8	2.11
2	01.56	264.0	± 18.8	2.77
3	01.96	332.0	± 19.5	3.49
4	02.02	343.0	± 16.8	3.60
5	02.17	368.0	± 14.5	3.86
6	04.07	690.0	± 8.7	7.24
7	08.53	1447.0	± 4.5	15.20
8	50.84	8619.0	± 1.5	90.50
9	88.32	14973.0	± 1.1	157.22

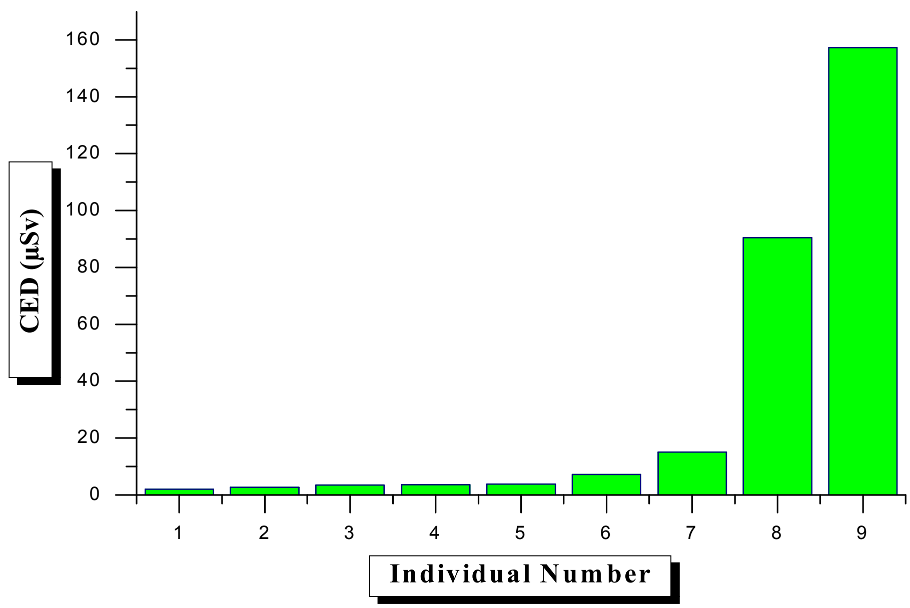

Figure (5) CED values measured after intake for individual workers at nuclear medicine unit.

For the second group, where individuals were counted several days after intake, CED at the measuring date varied between 5.25 µSv to 538.10 µSv as shown in Table 6a. Initial activities for all contaminated individuals were calculated (19) using the decay equation, $A = A_0 e^{-\lambda t}$, and effective half life for ^{131}I. Hence, the initial dose due to inhalation was assessed and found to be in the range 7.85 µSv to 2231.50 µSv. Results are shown in Tables (6a and 6b).

Table (6a) Determination of activities measured and CED due to inhalation of ^{131}I, measured several days after intake.

Individual	Days after Intake	Counts/s	Activity (Bq)	σ%	CED (μSv)
1	6	002.950	500	± 16.80	5.25
2	30	003.672	623	± 10.40	6.54
3	23	007.188	1219	± 6.20	12.80
4	9	007.950	1348	± 7.50	14.15
5	35	008.350	1415	± 7.40	14.86
6	2	021.028	3565	± 2.40	37.43
7	30	021.850	3704	± 3.90	38.90
8	7	043.008	7291	± 1.90	76.56
9	7	043.222	7327	± 1.50	76.93
10	2	108.455	18386	± 0.95	193.05
11	2	105.233	17840	± 1.00	187.32
12	2	302.300	51248	± 0.90	538.10

Table (6b) Initial activities calculated and CED due to inhalation of ^{131}I for individuals registered in Table 6a.

Individual	Initial activity (Bq)	CED (μSv)
1	2946	7.85
2	35827	87.00
3	36003	378.03
4	10553	110.81
5	130493	1370.18
6	14367	150.85
7	212523	2231.50
8	47210	495.71
9	47443	498.15
10	74090	778.00
11	71890	754.85
12	206513	2168.39

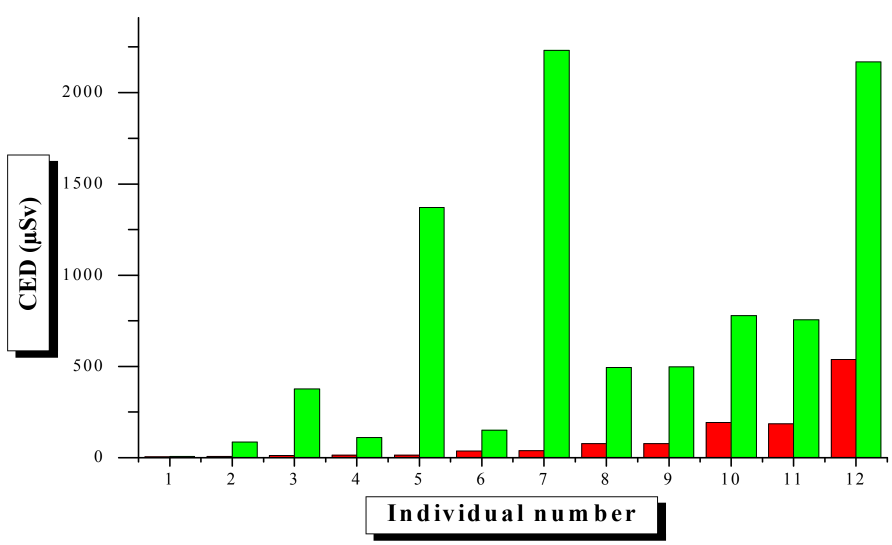

Figure (6) Initial dose were calculated (green column) and measured dose (red column) several days after intake of 131I

Conclusion

Experimental results for Egyptian individuals who participated in this study indicated that the average Total Body Potassium TBK is 2.12 ± 0.44 g K/kg for males and for females is 1.96 ± 0.51 g K/kg. The present ^{40}K results are in agreement with previously measured results. The results obtained for individuals exposed to ^{131}I as shown in tables 5 and 6 indicate that internal dose to individuals varied from 5.25 μSv to 2231.50μSv. Hence contaminated individuals were exposed internally to less than the average annual dose limit for workers; see ICRP-103, (2007).

References

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Calendar

2010

November, 2010 **26th - 30th**

10th Radiation and Physics Protection Conference

Al-Menia University, Al-Menia, Egypt

Early Announcement

For further information

Prof. Mohamed Ahmed Gomaa
Conference Scientific Secretary
3 Ahmed El Zommer Street, Nasr City, Cairo, Egypt

Phone : **00202-22728813** ***Fax :*** **22202-22876031** ***Email :*** **radmedphys@yahoo.com**

Website : **http://rphysp.com**

2011

February, 2011 **6th - 11th**

AXAA
Australian X-ray Analytical Association

Schools, Advanced Workshops, Conference and Exhibition

Star City, Sydney, N.S.W., Australia

To register your interest, submit an abstract, and for further information, please visit

Website : **http://www.axaaconference.info**

June - July, 2011 **26th June - 1st July**

IRRMA - 8

8th International Topical Meeting on

Industrial Radiation and Radioisotope Measurement Applications

Kansas City, Missouri, U.S.A.

Further information on page 17 of the December 2009 Bulletin, and also visit the website

http://www.dce.k-state.edu/conf/irrma/

INTERNATIONAL RADIATION PHYSICS SOCIETY

The primary objective of the International Radiation Physics Society (IRPS) is to promote the global exchange and integration of scientific information pertaining to the interdisciplinary subject of radiation physics, including the promotion of (i) theoretical and experimental research in radiation physics, (ii) investigation of physical aspects of interactions of radiations with living systems, (iii) education in radiation physics, and (iv) utilization of radiations for peaceful purposes.

The Constitution of the IRPS defines Radiation Physics as "the branch of science which deals with the physical aspects of interactions of radiations (both electromagnetic and particulate) with matter." It thus differs in emphasis both from atomic and nuclear physics and from radiation biology and medicine, instead focusing on the radiations.

The International Radiation Physics Society (IRPS) was founded in 1985 in Ferrara, Italy at the 3rd International Symposium on Radiation Physics (ISRP-3, 1985), following Symposia in Calcutta, India (ISRP-1, 1974) and in Penang, Malaysia (ISRP-2, 1982). Further Symposia have been held in Sao Paulo, Brazil (ISRP-4, 1988), Dubrovnik, Croatia (ISRP-5, 1991) Rabat, Morocco (1SRP-6, 1994), Jaipur, India (ISRP-7 1997), Prague, Czech Republic (ISRP-8, 2000), Cape Town, South Africa (ISRP-9, 2003), Coimbra, Portugal(ISRP-10, 2006), Australia (ISRP-11, 2009) and ISRP-12 will be in Salvador, Brazil in 2012. The IRPS also sponsors regional Radiation Physics Symposia.

The **IRPS Bulletin** is published quarterly and sent to all IRPS members.

The IRPS Secretariat is : Prof. M.J. Farquharson, (IRPS Secretary),
Department of Medical Physics and Applied Radiation Sciences
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The IRPS welcomes your participation in this "global radiation physics family."

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1. Name : ______________________________
(First) (Initial) (Last)

2. Date and Place of Birth : ______________________________

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Telephone:__________ Email: __________ Fax: __________

4. Current Title or Academic Rank (Please also indicate if Miss, Mrs., or Ms.): __________

5. Field(s) of interest in Radiation Physics (Please attach a list of your publications, if any, in the field:

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6. Please list any national or international organization(s) involved in one or more branches of Radiation Physics, of which you are a member, also your status (e.g., student member, member, fellow, emeritus):

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7. The IRPS has no entrance fee requirement, only triennial (3-year) membership dues. In view of the IRPS unusually low-cost dues, the one-year dues option has been eliminated (by Council action October 1996), commencing January 1, 1997. Also, dues periods will henceforth be by calendar years, to allow annual dues notices. For new members joining prior to July 1 in a given year, their memberships will be considered to be effective January 1 of that year, otherwise January 1 of the following year. For current members, their dues anniversary dates have been similarly shifted to January 1.

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