RADIATION SCIENCE TODAY

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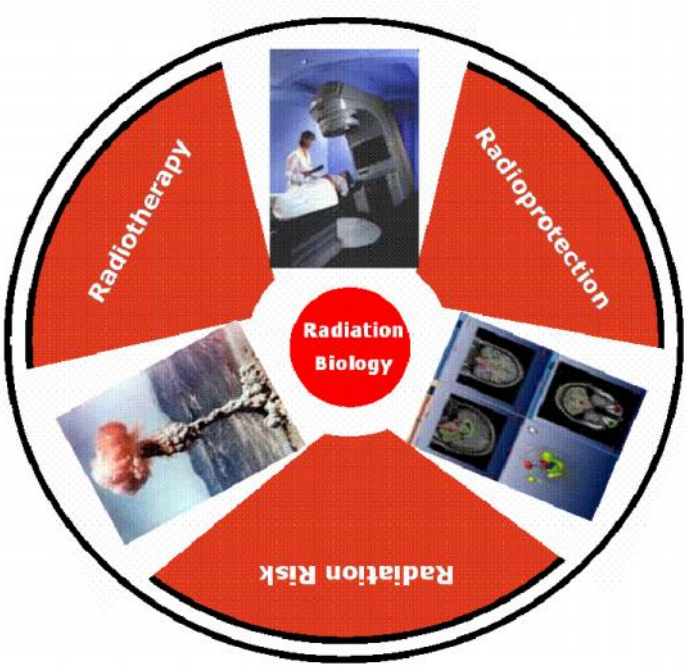

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Happy New Year 2012!!

Radiation Science Today

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New Year Special Issue

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1. Memoir

Professor Zbigniew Jaworowski

(1927-2011)

Prof. Z. Jaworowski
(1927-2011)

Professor Zbigniew Jaworowski, well known to the Polish and international scientific community for his clear and often controversial views on issues of radiation protection and climatology, a medical doctor by training, later devoted to seeking clear answers to the social issues raised by present approaches to the Linear-no-Threshold (LNT) and Global Climate Warming paradigms, died in Warsaw on November 12th at the age of 84. His eventful and prolific career included practice as a medical doctor in cancer radiotherapy and toxicology, expert mountain climbing, combined with glacier studies on the effects of atmospheric atomic bomb testing, international recognition as a radiation health scientist, chairing the United Nations Scientific Committee on the Effects of Atomic Radiations (UNSCEAR), scientific advisor to the Polish Government on the aftermath of the Chernobyl Accident and, finally, eloquent opponent to the Global Warming and LNT hypotheses, against the majority of experts on climatology and radiation protection. His search for truth in science and, the clear and public manner in which he presented his views, was admired by his friends and vehemently criticized by his opponents.

"Prof. Z. Jaworowski, well known to the Polish and international scientific community for his clear and often controversial views on issues of radiation protection and climatology, …later devoted to seeking clear answers to the social issues raised by present approaches to the Linear-no-Threshold (LNT) and Global Climate Warming paradigms…"

Zbigniew Jaworowski was born in Krakow, the medieval capital of Poland, on 17th October 1927 and graduated from its Medical Academy in 1952. While still an undergraduate, he became assistant at the Institute of Physiological Chemistry (of Medical Academy), and studied chemical carcinogenesis. In the years 1953-1958 he worked as medical doctor of radiotherapy at the Institute of Oncology in Gliwice. He next moved to the Institute for Nuclear Research at Swierk near Warsaw, to head the Laboratory of Radiotoxicology. Finally, over the years 1970-1987 Professor Jaworowski worked in the Central Laboratory for Radiological Protection (CLOR) in Warsaw, as head of the Department of Radiation Hygiene.

In the years 1987-1988 Professor Jaworowski travelled to Norway to the Biophysical Group of the Institute of Physics, University of Oslo, and over the next two years (1988-1990) he worked at the Norwegian Polar Research Institute in Oslo. His stay in Norway was interrupted by a six-month visiting professorship at the National Institute for Polar Research in Tokyo (1990/1991), followed by work at the Institute for Energy Technology at Kjeller near Oslo (1991-1993). On retirement, he returned to Warsaw and to the Central Laboratory for Radiological Protection, serving for many years as Chairman of its Scientific Council.

His scientific career covered an unusually broad range of topics. In 1963 he received his Ph.D. and in 1967 his D.Sc., both in natural sciences. In 1977 he became Professor, by state nomination. The list of his scientific interests and achievements is diverse and impressive – in his short CV note, we read: "*Professor Zbigniew Jaworowski studied: (1) internal contamination radionuclides in animals and human beings; (2) development of analytical methods for detection of pollutants in the human body and the environment; (3) metabolism of radionuclides; (4) biological effects of ionizing radiation; (5) impact of nuclear war on the population; (6) remedial measures in nuclear emergencies; (7) environmental levels and migration of radionuclides and heavy metals; (8) relation between pollutants in the environment and in man; (9) historical monitoring of radionuclides and heavy metals in man - the first discovery that lead level in human bones was much higher between 11th and 19th century than is now; (10) historical monitoring of radionuclides and heavy metals in the environment; (11) vertical distribution of natural radionuclides, fission products and heavy metals in the troposphere and stratosphere; (12) determination of natural radionuclides, fission products and heavy metals in contemporary and pre-industrial ice from glaciers in both hemispheres, for studying the geographical distribution, temporal changes and flux of natural and man-made pollutants in the global atmosphere; (13) regional and global impact of pollution caused by coal burning; (14) validity of polar ice core records of greenhouse gases for reconstruction of the composition of the ancient atmosphere*". Not only was Professor Jaworowski's range of interests extensive, but so was his social activity and publication record, in peer-reviewed journals, including *Nature*, but also in popular science journals and newspapers. Professor Jaworowski published 196 peer-reviewed papers, 4 books, edited and co-edited 10 scientific documents published by

" His scientific career covered an unusually broad range of topics."

UNSCEAR, IAEA and UNEP, and also wrote about 60 articles printed in Polish newspapers and popular science magazines.

The contribution of Professor Jaworowski to the work of the United Nations Scientific Committee on the Effects of Atomic Radiations (UNSCEAR) deserves special mention. As Poland was invited to the Committee in 1973, Professor Jaworowski became Representative of Poland to UNSCEAR, until 2009. He was one of the best known and longest-serving members of this Committee, always alert, always extremely well prepared and most knowledgeable on matters the Committee deals with. He was elected vice-Chairman (1978-1979) and next Chairman of UNSCEAR (1980-1982). His pointed and well-focused arguments earned him respect and close friendship with many members of this distinguished Committee.

The Chernobyl Accident in 1986 demonstrated Professor Jaworowski's capacity and competence: he was immediately invited as scientific expert to the Polish Governmental Commission on the Effects of the Chernobyl Accident. On his advice, the Polish Government decided to use stable iodine to protect Polish children against radioiodine from the burning Soviet nuclear reactor. He carefully followed developments after this event, in the former Soviet Union and also all over the world, publishing many papers on the consequences of this largest catastrophe of a commercial nuclear power plant. An article which stirred most vivid discussions was his *Radiation Risk and Ethics*, published in *Physics Today*, **52**(9) in 1999. It clearly shows Professor Jaworowski's concern with properly presenting and interpreting scientific evidence, even if such interpretation went against opinions commonly held.

"The Chernobyl Accident in 1986 demonstrated Professor Jaworowski's capacity and competence…"

Professor Jaworowski participated in, or chaired, about 20 Advisory Groups of the International Atomic Energy Agency (IAEA) and of the United Nations Environmental Programme (UNEP). He was Principal Investigator of three research projects of the US Environmental Protection Agency, and four research projects of the IAEA.

Professor Jaworowski was always interested in environmental issues, devoting his last years to the discussion on global warming. He strongly opposed the anthropogenic cause of this effect, as may be found in his article *Nature, Not Human Activity, Rules the Climate,* in *Summary for Policymakers of the Report of the Nongovernmental International Panel on*

Climate Change, *Edited by S. Fred Singer*, published for the Nongovernmental International Panel on Climate Change by "The Heartland Institute", Chicago, USA, in March 2008.

On the 12th of November 2011, we lost a first-rate scientist, who always shared his knowledge with the broad society. It is now very difficult for us to accept the loss of a warm, knowledgeable and inspiring colleague and friend, endowed with a great sense of humour and leadership ability, but also a devoted husband to his wife, Professor Zofia Kielan-Jaworowska, an eminent paleozoologist in her own right, and a loving father to his son, Mariusz Jaworowski and his family. His Polish nick-name "Baca"(spelled *batza*), earned in his early mountain-climbing years, means "Sheppard", in Polish highlander dialect.

We will miss you Baca, in Poland and elsewhere around the world.

By

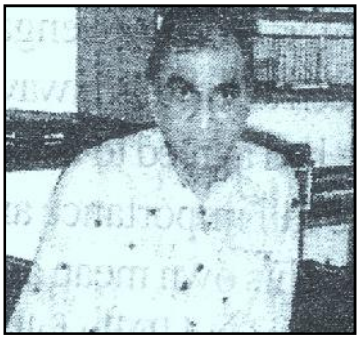
Ludwik Dobrzynski, Professor of Physics
National Centre for Nuclear Research
Otwock, Poland

Michael PR Waligorski
Professor of Physics
Institute of Nuclear Physics, Polish Academy of Sciences
and Centre of Oncology, Krakow Division
Krakow, Poland

2. Dr A. R. Gopal-Ayengar- A few reminiscences

On 103rd Birth Anniversary of Dr A. R. Gopal-Ayengar

(**01.01.1909** - **08.09.1992**)



Dr A. R. Gopal-Ayengar
(1909-1992)

by

***B. B. Singh**, Mumbai, India*

Dr Gopal-Ayengar known among his friends as 'Gopal' was like a coconut fruit - hard shell with several sheaths of protective strong fibres too difficult to reach the soft and sweet pulp inside. He kept himself mostly isolated from his staff with a set of secretaries arranged on a ladder outside his office and whenever someone was summoned to meet him, it was mostly considered by others as his/her dooms day. I recollect vividly that on or around 1st August 1960, I had walked into his room with an adjoining office of his secretary situated in the Indian Cancer Research Centre building annexed to the main Tata Memorial Hospital at Parel, Mumbai. With a small slip of paper in my hand I told him that I was allotted to work in his Division. He must have been surprised to see a rustic semi-socialite youngster with an UP ascent. He asked where had I come from, and when I told him that I was from the Physics Batch of the Training School, he looked more than surprised. He said "I have not requisitioned any Trainee for my Division". "But, I have opted for your Division. Sir!." I had responded. As this amused him, I continued "Sir! I am the second merit holder and have the privilege of doing research in any branch of science in Atomic Energy Establishment and I have opted for Biology". His demeanor changed and he asked me to sit down. "What is your background in Biology?" He demanded. "Sir, in my matriculation examination, I had one paper known as General Science which included Biology along with Physics & Chemistry." He was so shocked that he had to readjust his smoking pipe between his lips that was just about to fall. He thundered "With this back ground, you aspire to do research in Biology!" "Yes Sir, I wanted to work in Theoretical Physics but this subject has now been shifted to Tata Institute of Fundamental Research (TIFR) where I do not intend to work. And if I don't like Biology, I

"...Gopal was like a coconut fruit - hard shell with several sheaths of protective strong fibres too difficult to reach the soft and sweet pulp inside."

have the privilege of my second choice of any other subject within one year." In fact I would be the first physics trainee from the Training School to have joined research in Biological Sciences. It is an interesting coincidence that Dr. Ayengar a biologist, was the very first scientist to have been selected by Dr Homi Bhabha to join India's atomic energy programme which is an arena mostly occupied by Physicists, Chemists and Engineers and if Dr. Bhabha could have taken such an adventurous step why not Dr. Gopal-Ayengar! He softened and accepted my appointment slip and said "Yes, you can join me but I must warn. You are digging your own grave."

Dr Gopal-Ayengar greatly appreciated brilliant and hard working scientists for research purposes and favored mediocrity for administrative responsibilities. This often hindered scientific progress. He himself remained in his office till about mid-night whenever he was in Mumbai, where he rarely was. It is rumoured that once Dr Bhabha said to him "Gopal, spend some time in India too." His foreign travels were so numerous that when he retired and his office was cleared, dozens of Air India complimentary bags were to be emptied of his files and papers. He often traveled abroad first class and kept those bags in his office ante-room.

"..Dr Ayengar a biologist, was the very first scientist to have been selected by Dr. Homi Bhabha to join India's atomic energy programme which is an arena mostly occupied by Physicists, Chemists and Engineers.."

The journals were to be first delivered to him before being placed in the Divisional library. He thoroughly screened those scientific journals as was evident from the pencil markings on the articles he had read. His vast knowledge became in a way a hindrance rather than useful to the scientists in the Division. All manuscripts had to be cleared by him before being sent to Journals and almost every manuscript that entered his office for his comments and approval remained there for months together. This happened to me for my first proposed publication. It was a research paper on the identification of free radicals in irradiated single crystals of nucleic acid bases that was lying in his custody for several months. In the meantime, a similar paper appeared in Journal of Chemical Physics. I just couldn't control my anguish and frustration. I had walked into his office without any prior appointment and showing him the published paper I appraised him how we had lost the credit and how several months of our hard work was wasted. He apologized and thence onwards my manuscripts were never held in his office for more than a week and if there was any delay he would call

me and apologize. But several manuscripts in his office have never been published because the authors did not pursue with vigour and commitment.

As a person he was an up-right bold man. It is believed that when he joined the Indian Atomic Energy programme as a Government Servant he refused to sign the statutory oath of secrecy because he firmly believed that when Atomic Energy is to be used only for peaceful purposes, why the oath of secrecy?

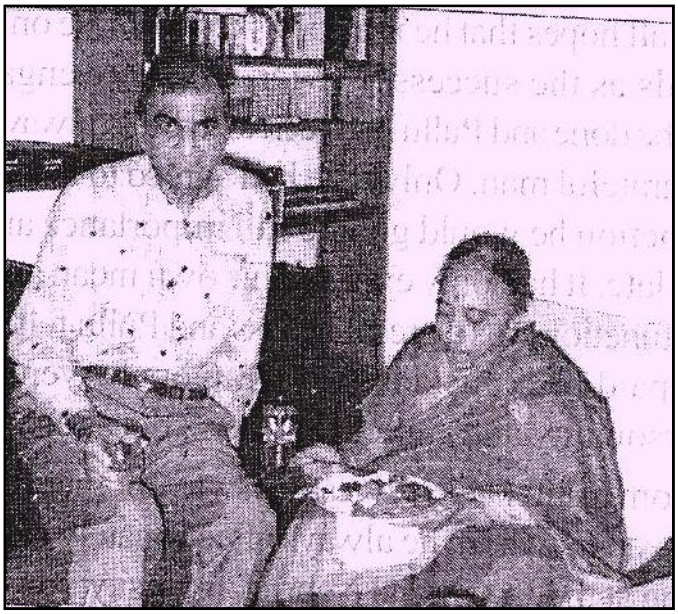
Dr Gopal-Ayengar did not subscribe to any ideology or isms. Once sitting in my house in Vienna long after his retirement I gathered the courage to ask him. "Sir, people believe that I was your most favourite scientist. I never understood why? I don't belong to your community, or to your caste, neither to your province nor I am any way related to you. Then Why?" The old man enigmatically smiled and told a story that I had forgotten long back. It had happened in late 1960s when I was a young colt. I was summoned to his office a description whereof is appropriate at this stage to comprehend the story fully. It was a huge room. At the northern end, he sat behind a large working table full of files and scientific Journals. In its front and in continuation there was a very long conference table with chairs all around. At the southern other end was a black board on the wall. On entering the room I found three senior scientists standing who later succeeded him as Directors of the Group. He had asked me to explain in a simple way how free radicals are formed on exposure of biological materials to ionizing radiations; how are they detected and how identified?. I realized that I have to give a lecture for at least 45 minutes. I looked around the room and found that the black board was too far away; though there were many chairs around the conference table each of them was full with heaps of files. The conference table itself was full of office files. His front table was so full of office files and Journals that I could hardly see his face. I pondered over the situation for a while and then pulled the chair nearest to his table, emptied it by shifting the files to the conference table and gave the lecture sitting on the thus emptied chair while the other three scientists kept standing all the while. Telling this story the old man said: "That is when I realized that you were the only one who had bones while the others were just spineless creatures". He too had common human weaknesses but admired people with courage and confidence.

".. It is believed that when he (Dr Ayengar) joined the Indian Atomic Energy programme as a Government Servant he refused to sign the statutory oath of secrecy because he firmly believed that when Atomic Energy is to be used only for peaceful purposes, why the oath of secrecy?"

Dr Gopal-Ayengar was associated with several international scientific organizations and policy making bodies like United Nations Scientific Committee on Effects of Atomic Radiations (UNSCEAR), International Association of Radiation Research (IARR), International Union of Pure and Applied Biophysics (IUPAB), numerous committees of International Atomic Energy Agency (IAEA), International Commission on Radiation Protection (ICRP), World Health Organization (WHO) and others. He was the founder President of Indian Association for Radiation Protection and Founder Chairman of National Committee on Biophysics. Low dose effects of radiations including the controversial stimulatory effects was the subject closest to his heart and he established the Monazite Survey Laboratory in Kerala now known as Low Level Radiation Research Laboratory (LLRL), Kollam. He actively participated also in the researches on the use of radioisotopes in agriculture and medicine including diagnosis of diseases and treatment of cancer. He had a command over English language and his writings, scientific or otherwise, contained literary flare with a vast vocabulary. When the question of NPT came up before the nation, he wrote the famous passionate article "***To Sign or Not to Sign***". He whole-heartedly supported national programme on radiation preservation of food materials and was a votary of nuclear power with the strictest regulatory controls on radiation exposure of population.

" The man who once roared like a lion, stood in the 'Q' to catch the bus for travel from BARC to his official residence for which he was charged rent at market rate, which he could ill-afford it. "

Dr Gopal-Ayengar never planned to retire and took up an assignment as Advisor to the Director, Bhabha Atomic Research Centre (BARC) for which he repented. The man who once roared like a lion, stood in the 'Q' to catch the bus for travel from BARC to his official residence for which he was charged rent at market rate, which he could ill-afford it. He was rescued by his close friend Prof. Dr. Hellmut Glubrecht from Germany who offered him a 5-year assignment at the University of Hannover. On his return to India he settled in his own bungalow in Mumbai interacting with only a few friends and admirers. He breathed his last on 8th September 1991 after a short illness leaving behind his wife as his only heir whom he affectionately called "Raju". She too lived lonely and died a few years later with only 4 persons accompanying her body on her last journey.



Dr Gopal-Ayengar with his wife

Article prepared and submitted by

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3. FROM ARCHIVES OF RADIATION SCIENCES

Paper: The relation between DNA synthesis and chromosome structure as resolved by X-ray damage

Source: The Journal of Cell Biology, Year: 1963, Vol.:18, page:525-540.
(http://jcb.rupress.org/content/18/3/525.long)

Authors: HJ Evans and JR Savage

Laboratory: Medical Research Council Radiobiology Research Unit, Harwell, England

Highlights of the paper

This paper was aimed to understand radiation induced chromosomal aberrations in synthesized or unduplicated chromosome regions during cell cycle. The paper used *Viola faba* root tip as experimental model, in which cells were treated with tritiated thymidine, either immediately before or after exposure of roots to x-rays. To determine the chromosomal aberrations autoradiography was performed to locate the loci of tritiated thymydine labeling at different development stages. Chromosome types of aberrations were induced only in unreplicated chromosome regions. However, following replication, only chromatic aberrations were induced, but these aberrations are also induced in chromosome regions preparing to incorporate DNA. The yield of aberration in damaged cells which were irradiated in G1, S and early G2 were in the ratio of 1.0:2.0:3.2 suggesting higher radio-sensitivity of early G2 relative to S cells may be a consequence of changes in the spatial distribution of the chromosomes within the nucleus.

Significance of the paper

This is one of the seminal papers, where types of chromosome/chromatid radiation damages have been distinguished. It also showed differential response of cells in different stages of cell cycle.

by
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Note: *Interested readers may submit similar articles. This column is aimed to highlight the salient points and significance of seminal research articles/events in radiation biology and allied sciences, which further substantially changed the understanding in that particular research field.*

4. ARTICLE OF THE ISSUE

α-Particle Irradiated Zebrafish Embryos Rescued by Bystander Unirradiated Zebrafish Embryos

Radiation induced bystander effect has been manifested in modification of cellular radio-sensitivity. Most of the studies in literature demonstrate the damaging nature of bystander signals. However, due to social behavior of cells in tissue condition 'protective' signals are also expected, which may be helpful rescuing the bystander cells. Present paper published recently in *Environmental Science and Technology (2012) 46, 226–231* demonstrate such rescue signals from zebrafish embryos cells, which were bystander to α-particles irradiated zebrafish embryos sharing the same water medium.

Read the abstract / full article on following link:
http://pubs.acs.org/doi/pdf/10.1021/es2016928

5. LITERATURE UPDATE

Radiation exposure and cancer risk

- **Magnitude of radiation induced DNA damage in peripheral blood leukocytes and its correlation with aggressiveness of thymic lymphoma in Swiss mice**
  http://www.ncbi.nlm.nih.gov/pubmed/21913818
- **Thyroid cancer after Chernobyl: mechanisms of overestimation**
  http://www.springerlink.com/content/v168h81216616488/

Non-ionizing radiation and cancer risk

- **Exposure Limits: The underestimation of absorbed cell phone radiation, especially in children**

  http://informahealthcare.com/stoken/default+domain/ONC1%20Dec%202011/abs/10.3109/15368378.2011.622827

- **Risk of childhood acute lymphoblastic leukaemia following parental occupational exposure to extremely low frequency electromagnetic fields**
  http://www.nature.com/bjc/journal/v105/n9/abs/bjc2011365a.html?WT.ec_id=BJC-201110
- **Exposure Limits: The underestimation of absorbed cell phone radiation, especially in children**
  http://informahealthcare.com/stoken/default+domain/ONC1%20Dec%202011/abs/10.3109/15368378.2011.622827
- **Metastasis suppressor NM23-H1 promotes repair of UV-induced DNA damage and suppresses UV-induced melanomagenesis**
  http://cancerres.aacrjournals.org/content/early/2011/11/10/0008-5472.CAN-11-1795.abstract?papetoc

Radiation carcinogenesis

- **Effects of phytochemicals on ionization radiation-mediated carcinogenesis and cancer therapy**
  http://www.ncbi.nlm.nih.gov/pubmed/22030216
- **Sequential mutations in Notch1, Fbxw7, and Tp53 in radiation-induced mouse thymic lymphomas**
  http://www.ncbi.nlm.nih.gov/pubmed/22117044

Radiation Biology

- **Effects of Radiation Quality and Oxygen on Clustered DNA Lesions and Cell Death**
  http://www.bioone.org/doi/abs/10.1667/RR2663.1
- **Interaction between ionizing radiation and estrogen: what we are missing?**
  http://www.ncbi.nlm.nih.gov/pubmed/21903337
- **Gamma-irradiation increased meiotic crossovers in mouse spermatocytes**
  http://mutage.oxfordjournals.org/content/26/6/721.abstract?etoc
- **Induction and repair of DNA strand breaks and oxidised bases in somatic and spermatogenic cells from the earthworm Eisenia fetida after exposure to ionising** radiation
  http://mutage.oxfordjournals.org/content/26/6/783.abstract?etoc

- **Rapid Loss of Bone Mass and Strength in Mice after Abdominal Irradiation**
  http://www.bioone.org/doi/abs/10.1667/RR2505.1

- **Modulation of in utero total body irradiation induced newborn mouse growth retardation by maternal manganese superoxide dismutase-plasmid liposome (MnSOD-PL) gene therapy.**
  http://www.ncbi.nlm.nih.gov/pubmed/21248791

- **Transcriptional Response of *Ex Vivo* Human Skin to Ionizing Radiation: Comparison Between Low- and High-Dose Effects**
  http://www.bioone.org/doi/abs/10.1667/RR2524.1

Radiation exposure and non-cancer diseases

- **Risk of cancer and non-cancer diseases in the atomic bomb survivors**
  http://rpd.oxfordjournals.org/content/146/1-3/272.abstract?etoc
- **Childhood Exposure to Ionizing Radiation to the Head and Risk of Schizophrenia**
  http://www.bioone.org/doi/abs/10.1667/RR2596.1
- **Effect of Low and Chronic Radiation Exposure: A Case-Control Study of Mental Retardation and Cleft Lip/Palate in the Monazite-Bearing Coastal Areas of Southern Kerala**
  http://www.bioone.org/doi/abs/10.1667/RR2699.1

High LET Radiation Biology

- **Spatial Dynamics of DNA Damage Response Protein Foci along the Ion Trajectory of High-LET Particles**
  http://www.bioone.org/doi/abs/10.1667/RR2592.1

Radiation induced Bystander effect

- **Increased frequency of spontaneous neoplastic transformation in progeny of bystander cells from cultures exposed to densely ionizing radiation**
  http://www.ncbi.nlm.nih.gov/pubmed/21738697
- **Exposure to low level chronic radiation leads to adaptation to a subsequent acute X-ray dose and communication of modified acute X-**

ray induced bystander signals in medaka (Japanese rice fish, Oryzias latipes).
http://www.ncbi.nlm.nih.gov/pubmed/21939425

- **Reactive oxygen species-induced release of signalling factors in irradiated cells triggers membrane signalling and calcium influx in bystander cells.**
  http://www.ncbi.nlm.nih.gov/pubmed/21294691
- **Communicating non-targeted effects of ionizing radiation to achieve adaptive homeostasis in tissues.**
  http://www.ncbi.nlm.nih.gov/pubmed/21143182
- **Effects of very low fluences of high-energy protons or iron ions on irradiated and bystander cells.**
  http://www.ncbi.nlm.nih.gov/pubmed/21988573
- **Involvement of bystander effect in suppression of the cytokine production induced by heavy-ion broad beams.**
  http://www.ncbi.nlm.nih.gov/pubmed/22040060
- **Neutrons do not produce a bystander effect in zebrafish irradiated in vivo.**
  http://www.ncbi.nlm.nih.gov/pubmed/21756060
- **Role of connexin43 and ATP in long-range bystander radiation damage and oncogenesis in vivo**
  http://www.nature.com/onc/journal/v30/n45/abs/onc2011176a.html?WT.ec_id=ONC-201111
- **Effects of Very Low Fluences of High-Energy Protons or Iron Ions on Irradiated and Bystander Cells**
  http://www.bioone.org/doi/abs/10.1667/RR2674.1
- **α-Particle Irradiated Zebrafish Embryos Rescued by Bystander Unirradiated Zebrafish Embryos.**
  http://www.ncbi.nlm.nih.gov/pubmed/22103474
- **Intrachromosomal changes and genomic instability in site-specific microbeam-irradiated and bystander human-hamster hybrid cells.**
  http://www.ncbi.nlm.nih.gov/pubmed/22077336

Radiation Protection

- **Current issues in radiation protection in medicine**
  http://rpd.oxfordjournals.org/content/147/1-2/1.extract
- **Radioprotection by the histone deacetylase inhibitor phenylbutyrate**
  http://www.springerlink.com/content/9lh76602888j13l3/
- **Sesamol as a Potential Radioprotective Agent: In Vitro Studies**
  http://www.bioone.org/doi/abs/10.1667/RR2661.1
- **Mitigation of Lung Injury after Accidental Exposure to Radiation**
  http://www.bioone.org/doi/abs/10.1667/RR2562.1

Accidental radiation exposure

- **Uncoupling p53 Functions in Radiation-Induced Intestinal Damage via PUMA and p21**
  http://mcr.aacrjournals.org/content/9/5/616.abstract?etoc
- **Effect of Radiation on Age at Menopause among Atomic Bomb Survivors**
  http://www.bioone.org/doi/abs/10.1667/RR2676.1
- **The Association of Inbreeding with Lung Fibrosis Incidence in Beagle Dogs That Inhaled $^{238}PuO_2$ or $^{239}PuO_2$**
  http://www.bioone.org/doi/abs/10.1667/RR2686.1

Radiation and Evolution

- **Multiple routes to mammalian diversity**
  http://www.nature.com/nature/journal/v479/n7373/full/nature10516.html

Carcinogenesis

- **MiR-21 plays an important role in radiation induced carcinogenesis in BALB/c mice by directly targeting the tumor suppressor gene Big-h3.**
  http://www.ncbi.nlm.nih.gov/pubmed/21494432

Cancer Biology and Therapy

- **Caspase 3–mediated stimulation of tumor cell repopulation during cancer radiotherapy**
  http://www.nature.com/nm/journal/v17/n7/full/nm.2385.html?WT.ec_id=NM-201107
- **Tumourigenicity and radiation resistance of mesenchymal stem cells**
  http://informahealthcare.com/stoken/default+domain/ONC1%20Dec%202011/abs/10.3109/0284186X.2011.636752
- **Polyphenol-rich sweet potato greens extract inhibits proliferation and induces apoptosis in prostate cancer cells in vitro and in vivo**
  http://carcin.oxfordjournals.org/content/32/12/1872.abstract?etoc
- **Inhibition of DNA-Dependent Protein Kinase Induces Accelerated Senescence in Irradiated Human Cancer Cells**
  http://mcr.aacrjournals.org/content/early/2011/11/22/1541-7786.MCR-11-0312.abstract?papetoc
- **Telomere Targeting with a New G4 Ligand Enhances Radiation-Induced Killing of Human Glioblastoma Cells**
  http://mct.aacrjournals.org/content/10/10/1784.abstract?etoc
- **NF-κB Is Required for Smac Mimetic-Mediated Sensitization of Glioblastoma Cells for γ-Irradiation–Induced Apoptosis**
  http://mct.aacrjournals.org/content/10/10/1867.abstract?etoc
- **Resveratrol Inhibits Proliferation and Survival of Epstein Barr Virus–Infected Burkitt's Lymphoma Cells Depending on Viral Latency Program**
  http://mcr.aacrjournals.org/content/9/10/1346.abstract?etoc
- **Novel cancer immunotherapy agents with survival benefit: recent successes and next steps**
  http://www.nature.com/nrc/journal/v11/n11/abs/nrc3153.html?lang=en?WT.ec_id=NRC-201111
- **Inhibition of DNA-dependent protein kinase induces accelerated senescence in irradiated human cancer cells**
  http://mcr.aacrjournals.org/content/early/2011/10/18/1541-7786.MCR-11-0312.abstract?papetoc

- **IL-6 promotes head and neck tumor metastasis by inducing epithelial-mesenchymal transition via the JAK-STAT3-SNAIL signaling pathway**
  http://mcr.aacrjournals.org/content/early/2011/10/05/1541-7786.MCR-11-0271.abstract?papetoc
- **Evolution of Tumor Invasiveness: The Adaptive Tumor Microenvironment Landscape Model**
  http://cancerres.aacrjournals.org/content/71/20/6327.abstract?etoc
- **How the risk of liver cancer changes after alcohol cessation: A review and meta-analysis of the current literature**
  http://www.biomedcentral.com/1471-2407/11/446/abstract
- **Mitochondria as Therapeutic Targets for the Treatment of Malignant Disease**
  http://www.liebertonline.com/doi/abs/10.1089/ars.2011.4078
- **Tumourigenicity and radiation resistance of mesenchymal stem cells**
  http://informahealthcare.com/stoken/default+domain/ONC1%20Dec%202011/abs/10.3109/0284186X.2011.636752

Cancer Radiotherapy

- **Radiotherapy: Repopulating tumor cells—dying for caspase 3**

  http://www.nature.com/nrclinonc/journal/v8/n9/full/nrclinonc.2011.112.html?WT.ec_id=NRCLINONC-201109

Cancer: Prognosis and Diagnosis

- **Fatty acid binding proteins (FABPs) in prostate, bladder and kidney cancer cell lines and the use of IL-FABP as survival predictor in patients with renal cell carcinoma**
  http://www.biomedcentral.com/1471-2407/11/302/abstract
  (Open access)

- **Classifying human brain tumors by lipid imaging with mass spectrometry**

  http://cancerres.aacrjournals.org/content/early/2011/12/09/0008-5472.CAN-11-2465.abstract?papetoc

Technological advancement/note

- **Current progress of the biological single-ion microbeam at FUDAN**

  http://www.springerlink.com/content/l310840p37045486/

- **A framework to select clinically relevant cancer cell lines for investigation by establishing their molecular similarity with primary human cancers**

  http://cancerres.aacrjournals.org/content/early/2011/10/18/0008-5472.CAN-11-2427.abstract?papetoc

- **The effects on DNA migration of altering parameters in the comet assay protocol such as agarose density, electrophoresis conditions and durations of the enzyme or the alkaline treatments**

  http://mutage.oxfordjournals.org/content/26/6/689.abstract?etoc

- **In vitro primary human lymphocyte flow cytometry based micronucleus assay: simultaneous assessment of cell proliferation, apoptosis and MN frequency**

  http://mutage.oxfordjournals.org/content/26/6/763.abstract?etoc

- **Multiplex serum biomarker assessments: technical and biostatistical issues**

  http://www.translational-medicine.com/content/9/1/173

6. NEWS

Nuclear Technology & Safety

Fukushima Accident and Radiation Safety

- **Creation path of ^{35}S from Fukushima not so obvious**

  http://www.pnas.org/content/108/51/E1388.extract?etoc

- **The Disaster at Japan's Fukushima-Daiichi Nuclear Power Plant after the March 11, 2011 Earthquake and Tsunami, and the Resulting Spread of Radioisotope Contamination1**

  http://www.bioone.org/doi/abs/10.1667/RR2830.1

- **Commentary on the Combined Disaster in Japan**

  http://www.bioone.org/doi/abs/10.1667/RRXX40.1

Radiation Safety

- **Dynamic model for tritium transfer in an aquatic food chain**

  http://www.springerlink.com/content/w655750262qw02q0/

- **A quality control programme for medical X-ray films in India**

  http://rpd.oxfordjournals.org/content/148/1/51.abstract?etoc

- **Depth dependent study of radon, thoron and their progeny in tube-wells**

  http://www.springerlink.com/content/j568p8687hr8x245/

- **Mutagenicity of diagnostic and therapeutical doses of radiopharmaceutical iodine-131 in Wistar rats**

  http://www.springerlink.com/content/x270380u554q5801/

- **Chromosome aberrations in peripheral blood lymphocytes of individuals living in high background radiation areas of Ramsar, Iran**

  http://www.springerlink.com/content/m607136574lh7755/

- **Biokinetics of ^{90}Sr after chronic ingestion in a juvenile and adult mouse model**

  http://www.springerlink.com/content/p2t11w02w4744611/

- **Mortality from Cardiovascular Diseases in the Semipalatinsk Historical Cohort, 1960–1999, and its Relationship to Radiation Exposure**

  http://www.bioone.org/doi/abs/10.1667/RR2211.1

- **Associations of Ionizing Radiation and Breast Cancer-Related Serum Hormone and Growth Factor Levels in Cancer-Free Female A-Bomb Survivors**

  http://www.bioone.org/doi/abs/10.1667/RR2631.1

- **Examining the importance of the particle size effect in inhalation dose assessment for short-term radiological events**

  http://rpd.oxfordjournals.org/content/147/3/439.abstract?etoc

- **Radiation protection for accompanying person and radiation workers in PET/CT**

  http://rpd.oxfordjournals.org/content/147/4/528.abstract?etoc

- **Radiation dose to members of public residing around uranium mining complex, Jaduguda, Jharkhand, India**

  http://rpd.oxfordjournals.org/content/147/4/565.abstract?etoc

Science and Society

Indian Science and Technology

- **Developing world: Educating India**
  http://www.nature.com/news/2011/110405/full/472024a.html?WT.ec_id=NATURE-20110407
- **Radiation dose to members of public residing around uranium mining complex, Jaduguda, Jharkhand, India**
  http://rpd.oxfordjournals.org/content/147/4/565.abstract?etoc
- **Cell biology in India: The future needs an international perspective**
  http://www.nature.com/ncb/journal/v13/n12/full/ncb2391.html?WT.ec_id=NCB-201112

Science in General

- **The roles of herbal remedies in survival and quality of life among long-term breast cancer survivors - results of a prospective study**
  http://www.biomedcentral.com/1471-2407/11/222/abstract
- **Observed increase in local cooling effect of deforestation at higher latitudes**
  http://www.nature.com/nature/journal/v479/n7373/full/nature10588.html?WT.ec_id=NATURE-20111017
- **Secrets of the human genome disclosed**
  http://www.nature.com/news/2011/111005/full/478017a.html?WT.ec_id=NATURE-20111006
- **Focus on Cell cycle and DNA damage**
  http://www.nature.com/ncb/journal/v13/n10/full/ncb2357a.html?WT.ec_id=NCB-201110
- **Multiple routes to mammalian diversity**
  http://www.nature.com/nature/journal/v479/n7373/full/nature10516.html
- **How the risk of liver cancer changes after alcohol cessation: A review and meta-analysis of the current literature**
  http://www.biomedcentral.com/1471-2407/11/446/abstract

- **Why do our patients get chemotherapy until the end of life?**
  http://annonc.oxfordjournals.org/content/22/11/2345.extract?etoc
- **Today's lifestyles, tomorrow's cancers: trends in lifestyle risk factors for cancer in low- and middle-income countries**
  http://annonc.oxfordjournals.org/content/22/11/2349.abstract?etoc
- **Urinary Levels of Cigarette Smoke Constituent Metabolites Are Prospectively** Associated with Lung Cancer Development in Smokers
  http://cancerres.aacrjournals.org/content/early/2011/10/22/0008-5472.CAN-11-0209.abstract?papetoc

7. VIEWS

- **Childhood leukaemia near nuclear sites: fourteenth report of the Committee on Medical Aspects of Radiation in the Environment (COMARE)**
  http://rpd.oxfordjournals.org/content/147/3/351.extract?etoc
- **Finding a Panacea Among Combination Cancer Therapies**
  http://cancerres.aacrjournals.org/content/early/2011/11/02/0008-5472.CAN-11-3091.abstract?papetoc
- **Exposure Limits: The underestimation of absorbed cell phone radiation, especially in children**

  http://informahealthcare.com/stoken/default+domain/ONC1%20Dec%202011/abs/10.3109/15368378.2011.622827

- **Estimation of risk for the general public contaminated with radioiodine in nuclear accidents from the viewpoint of nuclear medicine physicians**
  http://rpd.oxfordjournals.org/content/147/4/489.extract?etoc
- **Second cancers following Hodgkin's lymphoma: radiation therapy once more**
  http://annonc.oxfordjournals.org/content/22/12/2539.extract?etoc
- **Better value cancer care for the 21st century**
  http://annonc.oxfordjournals.org/content/22/12/2541.extract?etoc

8. ARTICLE SERIES/REVIEWS

- **Targeting hypoxia in cancer therapy**
  http://www.nature.com/nrc/journal/v11/n6/abs/nrc3064.html?lang=en?WT.ec_id=NRC-201106

- **Molecular imaging of tumor metabolism and apoptosis**
  http://www.nature.com/onc/journal/v30/n40/abs/onc2011169a.html?WT.ec_id=ONC-201110

- **RAS oncogenes: weaving a tumorigenic web**
  http://www.nature.com/nrc/journal/v11/n11/abs/nrc3106.html?lang=en?WT.ec_id=NRC-201111
- **Targeting protein prenylation for cancer therapy**
  http://www.nature.com/nrc/journal/v11/n11/abs/nrc3151.html?lang=en?WT.ec_id=NRC-201111

- **The role of miRNA in the direct and indirect effects of ionizing radiation**
  http://www.springerlink.com/content/h5vn056463366116/

- **Clinical radioimmunotherapy—the role of radiobiology**
  http://www.nature.com/nrclinonc/journal/v8/n12/abs/nrclinonc.2011.160.html?lang=en?WT.ec_id=NRCLINONC-201112

- **Treating metastatic cancer with nanotechnology**
  http://www.nature.com/nrc/journal/v12/n1/abs/nrc3180.html?lang=en?WT.ec_id=NRC-201201
- **The Fraction of Cancer Attributable to Lifestyle and Environmental Factors in the UK in 2010**
  http://www.nature.com/bjc/journal/v105/n2s/index.html#

9. RECENT BOOKS

- **Units of measurement past, present and future. International system of units**
  http://rpd.oxfordjournals.org/content/145/4/426.extract?etoc
- **High Frequency electromagnetic dosimetry**
  http://rpd.oxfordjournals.org/content/147/3/483.extract?etoc
- **Optically stimulated luminescence: fundamentals and applications**
  http://rpd.oxfordjournals.org/content/147/4/619.extract?etoc
- **Clinical fundamentals for radiation oncologists**
  http://www.nature.com/bjc/journal/v105/n11/full/bjc2011454a.html?WT.ec_id=BJC-201111

10. LETTER(S) FROM THE READERS

- Thank you very much for giving nice Diwali Gift as eNewsletter ISRB. The letter covers very important components concerned with radiation biology. It is very useful for research and training purposes.

  I wish you a very happy Diwali to Editors and all members of eNewsletter who takes wholeheart efforts for making beautiful issues.
  -Dr P M Dongre, Head, Department of Biophysics, University of Mumbai, Mumbai

- The eNewsletter is highly informative and carrying all useful contents.
  -***Prof. P. K. Goyal,*** President- ISRB, Dept. of Zoology, Univ. of Rajasthan, Jaipur

11. UPCOMING CONFERENCE & WORKSHOP OF ISRB

International Conference on Cancer Prevention, Diagnosis & Treatment, Jaipur

January 21-22, 2012

Contact Person:
Prof. (Dr.) P. K. Goyal
President- ISRB and Convener, Radiation & Cancer Biology Laboratory
Department of Zoology, University of Rajasthan, Jaipur 302 004 (INDIA)
Tel: +91-141-2651199 (R), 09829134133 (M); Fax: +91-141-2656273
Email: pkgoyal2002@gmail.com
or visit to our web page:
http://www.isrbindia.com/upcoming-events-of-the-society/

International Conference on Emerging Frontiers & Challenges in Radiation Biology, Department of Zoology, Government Dungar College, Bikaner (Rajasthan)

January 24-25, 2012

Contact Person: Dr. Rajendra Kumar Purohit, Radiation Biology Laboratory, Department of Zoology, Government Dungar College, Bikaner (Rajasthan); Email: dr_rajendra_purohit@yahoo.co.in or visit to our web page: **http://www.isrbindia.com/upcoming-events-of-the-society/**

International Conference on Radiation Biology: (ICRB- 2012) and 11th Biennial Meeting of Indian Society for Radiation Biology Theme: Cosmic Radiation to Cancer Therapeutics Advanced Centre for Training, Research and Education on Cancer (ACTREC), Navi Mumbai, Mumbai, India

November 22-24, 2012

Contact details:
Dr. Nagraj G. Huilgol, Chief Radiation Oncologist
Department of Radiation Oncology, Dr. Balabhai Nanavati Hospital, S.V.Road, Vile Parle (W), Mumbai - 400 056.
Tel : +91 22 26182255 Extn 618/692
: 261883352 (dir) **Cell** : +91 9820450969
Fax : +91 22 26119363
Email : nagrajhuilgol@gmail.com

For updated information visit web page:
http://www.isrbindia.com/upcoming-events-of-the-society/

12. UPCOMING MEETINGS / WORKSHOPS

- **International Conference on Cancer Prevention, Diagnosis & Treatment, Jaipur, January 21-22, 2012**

  Contact Person: Prof. (Dr.) P. K. Goyal, President- ISRB and Convener, Radiation & Cancer Biology Laboratory, Department of Zoology, University of Rajasthan, Jaipur 302 004 (INDIA)

  Tel: +91-141-2651199 (R), 09829134133 (M); Fax: +91-141-2656273

  Email: pkgoyal2002@gmail.com

- **International Conference on Emerging Frontiers & Challenges in Radiation Biology, Department of Zoology, Government Dungar College, Bikaner (Rajasthan), January 24-25, 2012**

  Contact Person: Dr. Rajendra Kumar Purohit, Radiation Biology Laboratory, Department of Zoology, Government Dungar College, Bikaner (Rajasthan); Email: dr_rajendra_purohit@yahoo.co.in

- **International Conference on Radiation Biology: (ICRB- 2012) and 11th Biennial Meeting of Indian Society for Radiation Biology, Theme:** Cosmic Radiation to Cancer Therapeutics, Advanced Centre for Training, Research and Education in Cancer (ACTREC), Navi Mumbai, Mumbai, India, November 22-24, 2012

  Contact details:
  Dr. Nagraj G. Huilgol, Chief Radiation Oncologist
  Department of Radiation Oncology, Dr. Balabhai Nanavati Hospital, S.V.Road, Vile Parle (W), Mumbai - 400 056.
  Tel : +91 22 26182255 Extn 618/692
  : 261883352 (dir) **Cell** : +91 9820450969
  Fax : +91 22 26119363
  Email : nagrajhuilgol@gmail.com

  Important Notice: Are you organizing any Workshop/Meeting related to Radiation Research or in related research areas? You can add the announcement of event to this eNewsletter **free of cost**!! The announcement would reach to ISRB Community as well many more in India and abroad. The details of announcement may be communicated to: **isrb_enewsletter@yahoo.co.in.** Moreover, the information would be included to web page as and when it would be available.

13. AWARDS/HONORS TO ISRB MEMBERS

Name of the ISRB Member	Affiliation	Award/Honors	Year/ Period
Dr. N. Rajendra Prasad	Dept. of Biochemistry and Biotechnology, Annamalai University Annamalainagar-608 002	Young Investigator Meeting (YIM-2012) Travel Award, Lonavala, India organized by www.indiabioscience.org Welcome Trust-DBR Alliance Jan 8-12, 2012	Jan. 2012

Congratulations *to the Life Members of Indian Society for Radiation Biology for prestigious Awards and Honors!!*

May God bless you many more in future!!

14. RECENT PUBLICATIONS/PATENTS OF ISRB MEMBERS

Author/Affiliation	Title	Citation	Key words
B.N. Pandey*, A. Kumar, M. Ali and K.P. Mishra Radiation Biology and Health Sciences Division, Bhabha Atomic Research Centre, Mumbai *Email: bnp@barc.gov.in, badrinarain@yahoo.co.in	Bystander Effect of Conditioned Medium from Low and High Doses of γ-Irradiated Human Leukemic Cells on Normal Lymphocytes and Cancer Cells	Journal of Environmental Pathology, Toxicology and Oncology, 2011, 30(4):333-340	Radiation induced bystander effect, apoptosis, reactive oxygen species, mitochondrial membrane potential, low and high dose, diffusible factors, lymphocytes and cancer cells
B. Venkata Reddy, N. Rajendra Prasad Department of Biochemistry & Biotechnology Annamalai University Annamalainagar - 608 002. Email: drprasadnr@gmail.com	2-deoxy-D-glucose combined with ferulic acid enhances radiation response in non-small cell lung carcinoma cells	Cent. Eur. J. Biol. 2011, 6(5), 743-755	Reactive Oxygen Species, H2-DCFDA, Mitochondrial membrane potential, Apoptosis, DNA damage
Farheen N. Sayed[a], V. Grover[a], V. Sudarsan[a], B.N. Pandey[b], A. Asthana[c], R.K. Vatsa[a], A.K. Tyagi[a],* [a]Chemistry Division, Bhabha Atomic Research Centre, Mumbai 400 085, India [b]Radiation Biology and Health Sciences Division, Bhabha Atomic Research Centre, Mumbai 400 085, India [c]Michigan Technological University, Houghton, MI 49931, USA *Email: aktyagi@barc.gov.in	Multicolored and white-light phosphors based on doped GdF3 nanoparticles and their potential bio-applications	Journal of Colloid and Interface Science 367 (2012) 161–170	Nanofluoride Luminescence Phosphors Gadolinium fluoride
G. Kanimozhi, N. Rajendra Prasad, S. Ramachandran, K. V. Pugalendi Department of Biochemistry & Biotechnology Annamalai University Annamalainagar - 608 002. Email: drprasadnr@gmail.com	Umbelliferone modulates gamma-radiation induced reactive oxygen species generation and subsequent oxidative damage in human blood lymphocytes	European Journal of Pharmacology 672 (2011) 20–29	Umbelliferone Radiation Reactive oxygen species DNA damage Mitochondrial membrane potential
N. Krishnakumar, N. Sulfikkaralia, N. Rajendra Prasad, S. Karthikeyan Department of Biochemistry & Biotechnology Annamalai University Annamalainagar - 608 002.	Enhanced anticancer activity of naringenin-loaded nanoparticles in human	Biomedicine & Preventive Nutrition, 2011, 1, 223–231	Naringenin, Nanoparticles, Anticancer effect, HeLa cells

Email: drprasadnr@gmail.com	cervical (HeLa) cancer cells		
R. Nagalekshmi[a], Aditya Menon[b], Dhanya K. Chandrasekharan[b], Cherupally Krishnan Krishnan Nair[c], [a] Amrita School of Pharmacy, Kochi 682041, Kerala, India [b] Amala Cancer Research Centre, Thrissur 680555, Kerala, India [c] Pushpagiri Institute of Medical Sciences and Research Centre, Thiruvalla 689101, Kerala, India Email: ckknair@yahoo.com	Hepatoprotective activity of Andrographis Paniculata and Swertia Chirayita	Food and Chemical Toxicology 2011 49, 3367–3373	Andrographis paniculata Swertia chirayita Paracetamol Liver marker enzymes Hepatoprotection
S. Karthikeyan, G. Kanimozhi, N. Rajendra Prasad Department of Biochemistry & Biotechnology Annamalai University Annamalainagar - 608 002. Email: drprasadnr@gmail.com	Radiosensitizing effect of ferulic acid on human cervical carcinoma cells in vitro	Toxicology in Vitro 25 (2011) 1366–1375	Ferulic acid, Radiation, Cervical cancer Radiosensitization, ROS

15. CAREER FORUM

Grants and Awards

- Looking for **Grants, Funds, Fellowships** related to **Radiation Research,** visit the Radiation Research Web page or following link **http://www.radres.org/ECOMradres/timssnet/common/tnt_JobsFundingandFellowships.cfm**
- **Pre- and Post Doctoral Fellowships from NIH** **http://grants.nih.gov/training/extramural.htm**
- **AACR-Gertrude B. Elion Cancer Research Award** **http://www.aacr.org/default.aspx?p=3859**
- **AACR Career Development Awards** **http://www.aacr.org/default.aspx?p=3858**
- **AACR seeks nominations of outstanding scientists for prestigious Landon-AACR Prizes for Basic & Translational Cancer Research.** Call for nominations now open through August 25, 2008 For information, visit **http://www.aacr.org/page13893.aspx**

- **Science Foundation Ireland, (SFI)**
  The national foundation for excellence in scientific research is investing in academic researchers and research teams who are most likely to generate new knowledge, leading edge technologies, and competitive enterprises.
  www.sfi.ie
- **Pancreatic cancer research centre funding over 2 million dollars**
  Please view individual grant mechanisms for eligibility and deadlines.
  Grants provide funding for outstanding pancreatic cancer research .
  http://www.aacr.org/home/scientists/research-funding--fellowships.aspx
- **AACR, Research Funding & Fellowships**
  http://www.aacr.org/home/scientists/research-funding--fellowships.aspx

Article related to career issues

- **Education: The PhD factory**
  http://www.nature.com/news/2011/110420/full/472276a.html?WT.ec_id=NATURE-20110421
- **Education: Rethinking PhDs**
  http://www.nature.com/news/2011/110420/full/472280a.html?WT.ec_id=NATURE-20110421
- **Seven ages of the PhD**
  http://www.nature.com/nature/journal/v472/n7343/full/472283a.html?WT.ec_id=NATURE-20110421
- **Developing world: Educating India**
  http://www.nature.com/news/2011/110405/full/472024a.html?WT.ec_id=NATURE-20110407
- **Postdoctoral training: Time for change**
  http://www.nature.com/ncb/journal/v13/n7/full/ncb0711-735a.html?WT.ec_id=NCB-201107

Important Web Sites

- **AACR Research Fellowships**
  http://www.aacr.org/default.aspx?p=3860

- ***GrantsNet*** is resource to find funds for training in the sciences and undergraduate science education. Through the support of HHMI and AAAS, this service is completely free.
  http://www.grantsnet.org/start.cfm?session_id=844615
- **Naturejobs** the career magazine from Nature with the hottest science jobs and details of career related issues.
  http://www.nature.com/naturejobs/index.html
- **Post Doc Jobs,** a site providing opportunities about Post Doc Jobs. It is a platform to bring students, Professionals and Research Institutes together.
  http://www.postdocjobs.com/
- ***Science's Next Wave*** is a weekly online publication that covers scientific training, career development, and the science job market. *Next Wave* is published by *SCIENCE* magazine and the American Association for the Advancement of Science.
  http://nextwave.sciencemag.org/?CFID=789744&CFTOKEN=78870222
- The National Academy of Sciences offers Research Associateship Awards to doctoral level scientists and engineers (US and foreign nationals). For more information go to
  http://sites.nationalacademies.org/pga/RAP/index.htm
- **Science careers**
  http://sciencecareers.sciencemag.org/tools_tips/outreach/relationships_booklet

  Important Notice: If you have any vacancy in your laboratory/Institute, you can advertise the post through this eNewsletter. In addition, any award in these fields may be also announced. **It is absolutely free!!** The advertisement would reach to Members of ISRB and many more, who may be interested about the vacancy. The details of vacancy may be communicated to: **isrb_enewsletter@yahoo.co.in**.

16. USEFUL LINKS

- **Radiation Research Podcast**
  You can listen, the telephone interviews to author(s) of selected paper published each month from the latest issue of international scientific journal ***Radiation Research***, official journal of the Radiation Research Society. In addition, you can also listen, the interviews by eminent scientists in radiation research about the current topics.
  http://lsmr1.lbl.gov:8080/xwiki/bin/view/Radiation+Research+Society/
  Or Look for Journal Podcast under category 'Journal' and then 'Journal Podcast' on following web page
  http://www.radres.org/podcast/

Or Look for 'Radiation Research Podcast' in Google Search

- **Radiation Research Society SIT Discussion Board**
  Another site, which may attract you to get information related to Scientific Meetings, vacancies and discussion in Radiation Sciences.
  http://www.radres.org/ECOMradres/timssnet/phpBB2/index.php
- ***Science's Next Wave*** is a weekly online publication that covers scientific training, career development, and the science job market. *Next Wave* is published by *SCIENCE* magazine and the American Association for the Advancement of Science.
  http://nextwave.sciencemag.org/?CFID=789744&CFTOKEN=78870222
- **Link to related other Professional / Academic Societies related to Radiation Biology and Oncology**
  http://www.radres.org/ECOMradres/timssnet/common/tnt_RelatedSocieties.cfm
- **Nuclear India**
  A publication by Department of Atomic Energy, Government of India about nuclear energy and various other related issues
  http://www.dae.gov.in/ni/nimain.htm

17. IMPORTANT JOURNALS

- **Annals of Oncology**
  http://annonc.oxfordjournals.org/
- **Acta Oncologia**
  http://www.informaworld.com/smpp/title~content=g779470932~db=all
- **BMC Cancer (Open Access Journal)**
  http://www.biomedcentral.com/bmccancer/
- **Cancer Discovery**
  http://cancerdiscovery.aacrjournals.org/
- **Cancer Epidemiology Biomarkers & Prevention**
  http://cebp.aacrjournals.org/
- **Cancer Prevention Research**
  http://cancerpreventionresearch.aacrjournals.org/
- **Cancer Research**
  http://cancerres.aacrjournals.org/
- **Cell Death & Disease (Open Access Journal)**

http://www.nature.com/cddis/index.html

- **Cell Growth and Differentiation**
  http://cgd.aacrjournals.org/
- **Clinical Cancer Research**
  http://clincancerres.aacrjournals.org/
- **Clinica Chimica Acta**
  http://www.elsevier.com/wps/find/journaldescription.cws_home/506018/description#description
- **DNA and Cell Biology**
  http://www.liebertpub.com/products/product.aspx?pid=13
- **Free Radical Biology and Medicine**
  http://www.elsevier.com/wps/find/journaldescription.cws_home/525469/description#description
- **Free Radical Research**
  http://www.tandf.co.uk/journals/authors/gfrrauth.asp
- **Genome Integrity**
  www.genomeintegrity.com
- **Human Gene Therapy**
  http://www.liebertpub.com/products/product.aspx?pid=19
- **Indian Journal of Radiation Research**
  For manuscript submission and, subscription and free sample copy of the Journal contact, Editor: Dr K. P. Mishra, Email: **mishra_kaushala@rediffmail.com**, Assistant Editor: Dr. H. D. Sarma Email: **hdsarma1162@yahoo.com**
- **International Journal of Radiation Biology**
  http://www.informaworld.com/smpp/title~content=t713697337
- **International Journal of Radiation Oncology, Biology and Physics**
  http://www.elsevier.com/wps/find/journaldescription.cws_home/525471/description#description
- **Iranian Journal of Radiation Research**
  http://www.ijrr.com/
- **Japanese Journal of Clinical Oncology**
  http://www.oxfordjournals.org/our_journals/jjco/about.html
- **Journal of Cancer Research and Therapeutics**
  http://www.cancerjournal.net/

- **Journal of Experimental and Clinical Cancer Research**
  http://www.jeccr.com/
- **Journal of Radiation Research**
  http://www.journalarchive.jst.go.jp/english/jnltop_en.php?cdjournal=jrr1960
- **Molecular Cancer Research**
  http://mcr.aacrjournals.org/
- **Molecular Cancer Therapeutics**
  http://mct.aacrjournals.org/
- **Radiation Measurements**
  http://www.elsevier.com/wps/find/journaldescription.cws_home/286/description#description
- **Radiation Oncology**
  http://www.ro-journal.com/
- **Radiation Physics and Chemistry**
  http://www.elsevier.com/wps/find/journaldescription.cws_home/331/description#description
- **Radiation Protection Dosimetry**
  http://rpd.oxfordjournals.org/
- **Radiation Research**
  http://www.rrjournal.org/perlserv/?request=get-archive
- **Radiotherapy and Oncology**
  http://www.elsevier.com/wps/find/journaldescription.cws_home/506042/description#description
- **Science Signaling**
  http://stke.sciencemag.org/

18. NEW LIFE MEMBERS OF ISRB

Warm welcome to New Life Members of ISRB

S. N.	Name	Affiliation	Research Interest/Expertise
1.	Ms. Amritha M. Joshi *(ISRB/J-15/206)*	Dept. of Biophysics, Mumbai University, Kalina, MUMBAI 400098, **INDIA**	Radiation Biophysics, Radiation protection
2.	Prof. P. M. Dongre *(ISRB/D-10/013)*	Prof. and Head, Dept. of Biophysics, Mumbai University, Kalina, MUMBAI 400 098, **INDIA**	Radiation Biophysics, Radiation protection
3.	Shri Damodar K. M Gowda *(ISRB/G-20/039)*	Department of Physiology, K.G. Hegde Medical Academy, Deralakatte, MANGALORE-18, **INDIA**	Radiation Biology
4.	Shri Shrikant L. Patil *(ISRB/P-10/208)*	Department of Physiology, K.G. Hegde Medical Academy, Deralakatte, MANGALORE-18, **INDIA**	Radiation Biology
5.	Ms. K. B. Kalpana *(ISRB/K-13/280)*	Department of Biochemistry and Biotechnology, Annamalai University, ANNAMALAI NAGAR, 608 002, Tamil Nadu, **INDIA**	Radiation Biology
6.	Prof. Shyam Kishore Srivastava *(ISRB/S-59/233)*	Prof. and Head, Department of Radiation Oncology, TMH, Parel, MUMBAI 400 012, **INDIA**	Radiation oncology
7.	Dr Umesh Mahantshetty *(ISRB/M-13/207)*	Department of Radiation Oncology, Tata Memorial Hospital, Dr Ernest Borges Street, Parel, MUMBAI – 400012, **INDIA**	Radiation oncology

19. NOTICE BOARD

- ## Update your email and contact address

Dear Members of ISRB,

The eNewsletter would be send to ISRB Members by email only. If your email address is getting changed or you have any other preferred email, please communicate to us as soon as possible on **isrb_enewsletter@yahoo.co.in**. In case, any other ISRB Member, who is not receiving eNewsletter, please intimate us his/her email address.

In addition, if any other friend or colleague is interested to receive the eNewsletter, please let us know his/her email address to be included in our mailing list. The eNewsletter is free to ISRB Members as well as non-Members too. **The subscription of eNewsletter is absolutely free!!!**

In addition, it is frequent problem to communicate with ISRB members due to change in address. If your contact address has been changed please intimate to Secretary, ISRB. This would help us to reach you and communicate, when ever needed.

- ## Join ISRB

Are you/your colleague/friend working in Radiation Research or related field and still not a Member of Indian Society for Radiation Biology? Join ISRB.

As Member of ISRB, (a) you would join with scientific community working in Radiation Research and related research areas. (b) You are entitled to participate in Meeting/Workshops of ISRB at reduced Registration Fee (c) Your interaction with Scientists and experts from India and abroad would help in your career.

To be a Member of ISRB, fill the attached application form (in last of eNewsletter) along with along with Membership fee to Secretary, ISRB. For details, contact Secretary or any of the Office Bearers of ISRB as given below.

The application form can be downloaded from the web page: **www.isrbindia.com** or click on following link:

http://www.isrbindia.com/assets/Uplaods/ISRB-Membership-Application-Form.doc (MS Word Version)

http://www.isrbindia.com/assets/Uplaods/ISRB-Membership-Application-Form.pdf (PDF Version)

- ## Awards / Honors to ISRB Members

Editorial Board '**Radiation Science Today'** is pleased to launch a column "**AWARDS/HONORS to ISRB Members**" in the eNewsletter. We hope the column would make us more aware with each other about our awards/ scientific achievements.

This column is only for Members of Indian Society for Radiation Biology. If you are Member of ISRB and received any award or scientific honor, you are requested to send details of same in following format on email address: **isrb_enewsletter@yahoo.co.in**, with **subject line**: Awards/Honors.

To avoid the verification of Membership and any ambiguity from non-ISRB Members, a line of statement is requested that 'I am a Member / Life Member of Indian Society for Radiation Biology'.

Details of award or scientific recognition can be submitted in prescribed format provided below as when received, which would be included in next upcoming issue of the eNewsletter.

Please circulate the announcement to your colleagues and friends, who are Members of ISRB. Please provide complete information to avoid unnecessary delay in publication in eNewsletter.

Name and Present Address of ISRB Member	Affiliation (if any)	Name of Award/Honor	Year/Period

Statement: I am Member/Life Member of Indian Society for Radiation Biology.

Name of the ISRB Member:

• Recent publications/patents of ISRB Members

Dear Members of ISRB,

It is our pleasure to mention that in last two years, '**Radiation Science Today**' the eNewsletter published by Indian Society for Radiation Biology, has made a significant contribution to link the Members of Society working in various research fields of radiation biology and allied sciences. To further strengthen the interaction amongst Members of ISRB, we have initiated a new Column **'Recent Publications of ISRB Members' beginning** from issue of eNewsletter i.e. **Jan-March , 2010 Issue 9.**

The publication/patents meeting following criteria would be included in the eNewsletter:

1. At least one author of citation should be Life Member of ISRB.

2. Citations only with final page number should be provided i.e. 'In Press' citations would not be considered.

3. It should be published in National/International Journals or Book/Book Chapters. No abstract or Conference Proceedings would be considered.

4. Names of ISRB Members names should be bold and underlined. The authors may provide maximum five key words. The email address of corresponding authors should be provided so that interested may contact to seek some clarification or to receive reprints.

5. Members should provide full citation(s) as and when it would be made available in the required format.

All ISRB Members are requested and encouraged to submit their recent publication(s) in format provided with **Subject Head line: Publication.** A copy of the format is provided below for your reference.

You may communicate the message to other ISRB members, if they could not receive this communication.

Authors/Affiliation/Email	Title	Citation	Key Words
Kumar A, Ali M, Mishra P, **Pandey BN**, Sharma P, **Mishra KP**. Email: mishra_kaushala@rediffmail.com Radiation Biology and Health Sciences Division, Bhabha Atomic Research Centre, Mumbai - 400085, India	Thorium-induced neurobehavioural and neurochemical alterations in Swiss mice.	International Journal of Radiation Biology, 2009, 85(4):338-347.	Thorium Toxicity; Neurobehavioral, neurochmeical alterations; oxidative injury
Hazra B[1], **Pandey BN**, Kumar A, Ghosh S[1], Kumar B[1], **Mishra KP** Email: banasrihazra@yahoo.co.in Radiation Biology and Health Sciences Division, Bhabha Atomic Research Centre, Mumbai - 400085, India [1]Department of Pharmaceutical Technology, Jadavpur University , Kolkata , India	Plant Products in modification of cellular damage by radiation: Implications in cancer radiotherapy.	In "Herbal Drugs: A Cancer Chemopreventive and Therapeutic Perspective" (Ed.: R. Arora, INMAS, New Delhi), Publisher: Jaypee Brothers Medical Publishers, New Delhi , 2009	Cancer radiotherapy; Natural Plant Products; Apoptosis

• You can contribute in this eNewsletter

You can send your contribution, which may be included in this eNewsletter under **'Reader's Column'**

Brief scientific article (maximum 1000 words, if reference needed, in 'International Journal of Radiation Biology' style) may be submitted for publication in eNewsletter. Your article may fall under following subject category: (i) radiation sciences or related research areas; (ii) your opinion on any scientific issue, technique or some general topics; (iii) any major finding or research concept from the archives of radiation sciences. The article should be original. It would be published in eNewsletter after general screening/reviewing of the article by the Editorial Board.

For any further clarification or submission of any article write to Editor on email address: isrb_enewsletter@yahoo.co

In addition, if you come across any recent journal / books published in radiation and related research areas, please send us the details of the book/journal on our email: isrb_enewsletter@yahoo.co. The details of books/journal would be included in the eNewsletter **free of cost**!!!

INDIAN SOCIETY FOR RADIATION BIOLOGY
Executive Council (2011-13)

Prof. P. K. Goyal (President)	Radiation & Cancer biology Laboratory, Department of Zoology, University of Rajasthan, Jaipur, India
Dr. M. Bala (Vice President)	Department of Radiation Biology, Institute of Nuclear Medicine & Allied Sciences Brig. S. K. Mazumdar Marg, Delhi, India
Dr. S.C. Jain (Vice President)	Centre for Fire, Explosive & Environment Safety, Brig. S.K. Mazumdar Marg, Delhi – 110054, India
Dr. B. N. Pandey (Secretary)	Radiation Biology and Health Sciences Division, Bhabha Atomic Research Centre, Mumbai 400 085, India
Dr. R. K. Purohit (Treasurer)	Radiation Biology Laboratory, P.G. Department of Zoology, Govt. Dungar College, Bikaner, Rajasthan, India
Dr Amit Kumar (Member)	Radiation Biology and Health Sciences Division, Bhabha Atomic Research Centre, Mumbai 400 085, India
Dr Arindam Basu (Member)	Radiation Biology Laboratory, Department of Zoology, Seth R. L. Ruia Govt. College, Ramgarh Shekhavati. Sikar, Rajasthan, India
Prof. Arun Chougule (Member)	Medical Physics Unit, S.M.S. Medical College & Hospitals, Jaipur- 302015, India
Prof. C. K. K. Nair (Member)	Department of Radiation Biology, Amala Cancer Research Centre, Trichur 680555, Kerala, India
Dr Dhanraj Soyal (Member)	Radiation & Cancer biology Laboratory, Department of Zoology, University of Rajasthan, Jaipur, India
Dr N. Rajendra Prasad (Member)	Department of Biochemistry and Biotechnology, Annamalai University, Annamalai Nagar, 608 002, Tamil Nadu, India
Dr Rita Mukhopadhaya (Member)	Molecular Biology Division, Bhabha Atomic Research Centre, Mumbai, 400 085, India
Dr Sunil Kumar (Member)	National Institute of Occupational health, Meghani Nagar, Ahmadabad, India
Dr. V. K. Kalia (Member)	Department of Biophysics, National Institute of Mental Health and Neurosciences Bangalore – 560 029, India
Prof. Y. B. Tripathi (Member)	Department of Medicinal Chemistry, Institute of Medical Sciences, Banaras Hindu University, Varanasi, India
Dr. Carmel Mothersill (Foreign Member)	Department of Medical Physics and Applied Radiation Sciences, McMaster University, Hamilton, Ontario, Canada.
Dr. Mansoor Ahmed (Foreign Member)	Department of Radiation Oncology, University of Miami, Miami, Florida, USA
Prof. Munira A. Kadhim (Foreign Member)	School of Life Sciences, Oxford Brookes University, Oxford, OX3 0BP, UK
Dr. Vijay K. Singh (Foreign Member)	Armed Forces Radiobiology Research Institute, Bethesda, MD, USA
Dr. Yoshihisa Matsumoto (Foreign Member)	Tokyo Institute of Technology, Research Laboratory for Nuclear Reactors, Ookayama, Meguro-ku, Tokyo 152-8550, Japan

Published by:

INDIAN SOCIETY FOR RADIATION BIOLOGY

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Web page: **www.isrbindia.com**

We hope you will find this Newsletter as a useful resource of information. However, we look forward for your active contribution and valuable comments/ suggestions for improvement of the eNewsletter on **isrb_enewsletter@yahoo.co.in** or any of the Member of Editorial Board.

Disclaimer: You are being sent the eNewsletter since either you are member of Indian Society for Radiation Biology or identified as potential reader of the eNewsletter. If you wish to discontinue receiving the eNewsletter in future write to us: isrb_enewsletter@yahoo.co.in.

Every effort has been taken to provide up-to-date and correct information in the Newsletter. However, readers are advised to check the related source of information.

Editorial Board

INDIAN SOCIETY FOR RADIATION BIOLOGY

(Regd. No. 5-19927, dt. May 5, 1989)
H.O.: Institute of Nuclear Medicine & Allied Sciences, Lucknow Road, New Delhi-110 054
Web page: **www.isrbindia.com**

Application for Membership

Affix your passport size photo here

To:

Secretary
Indian Society for Radiation Biology (ISRB)

Dear Sir,

I wish to apply for **Life Membership** for the Indian Society for Radiation Biology. My particulars are given below:

1. Full Name (Block Letters)
   .....
2. Present Position/Title
   .....
3. Date of Birth ...
   .....
4. Academic qualifications: Degree University Year

   ....
   .....

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   .....

   ....
   .....
5. Field of Specialization
   .....
6. Research Interest
   .....

.....

7. Address: Official:
..……………..………………………………………………………………..…...….......

…….……………………………………………………………………………………..
………..

Tel… ……………..Fax: ……………… E-mail
..................………………………..………......

Permanent
……………………………………………………………………………..….…....

8. Life Membership fee : Rs 2000.00 Foreign members: US$ 200
Bank transfer/Draft/Cheque No. …………Date: …………Drawn on Bank. …………………………
……………………………………in favor of 'Indian Society for Radiation Biology' is enclosed.

(Note: Outstation cheques would not be accepted. DD should be payable at Mumbai or Delhi.)

Place: ………………..……….. Date:……….. Signature: ……………………………….………....

Proposed by …………………………Membership No. and Signature …….…..……...….…………...….…...

Seconded by ………………….… Membership No. and Signature …………...……………………..…

For Use of ISRB Secretariat Only

Membership No. ....Type of Membership ....…..........……...……...….................
Membership approved/not approved by Executive Council in its meeting held
on………………………………
Payment received vide …………………………… on
…………………………………………………………...

Secretary/Treasurer: …………………………..

President, Indian Society for Radiation Biology

Please mail the Application for Membership along with recent passport size photographs to:
Dr B. N. Pandey, Secretary, ISRB, Radiation Biology and Health Sciences Division, Bhabha Atomic Research Centre, Mumbai 400 085, India. E-mail: isrbindia@yahoo.in; badrinarain@yahoo.co.in