RADIATION SCIENCE TODAY

A Quarterly eNewsletter

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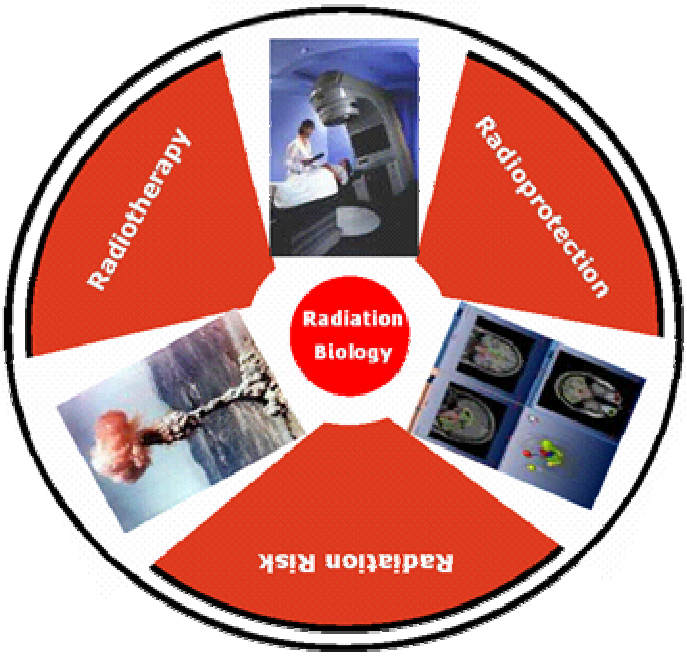
INDIAN SOCIETY FOR RADIATION BIOLOGY



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Radiation Science Today

October-December, 2008 **Issue:** 4, **Year:** 2008

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EDITORIAL

Birth of Universe in LHC!

Circulation of first proton on September 10, 2008 in 27 kilometer long tunnel of Large Hadron Collider (LHC), the world's largest and highest-energy particle accelerator, was a historic event as mankind added a giant pace in the direction to resolve the mysteries of origin of universe. The most expensive experiment of world would be conducted in LHC, which has been built by the European Organization for Nuclear Research (CERN) at the border of France and Switzerland between the Jura Mountains and the Alps. In true sense, the project is global, which is funded by over 100 countries and outcome of praiseworthy collaborative efforts of over 10,000 scientists / engineers from hundreds of universities / institutions. LHC is designed to accelerate two counter-rotating beam of protons with energies of 7 TeV, the energy about a million times higher than radioactive decay. During course of movement, the particle would attain very high energy at each step of accelerator, which would be allowed for head-on collision and resulted impact would be analysed by special detectors. The brave effort is expected to provide further knowledge about nature of sub-atomic particles and how the universe has been originated billions year ago. The experimental data obtained during higher energy collision in LHC can either challenge or confirm established theories and most importantly would dare us to dream nothing is 'impossible'. It is interesting to note that to understand the interaction of tiniest particle we have to conduct the most sophisticated experiment, which would set many records.

The most exciting scientific endeavor was under debate and apprehension in media as well in public about its safety issues and catastrophic consequences resulted out of operation of the accelerator. Creation of vacuum bubbles, magnetic monopoles, microscopic black holes and strangelets are the major concern related to risk associated with operation of LHC. It was somehow surprising to notice that the apprehension was also fumed by a few scientists and their theories.

It may be noteworthy that safety issues are under consideration and evaluation since inception of the project, which has been studied by LHC safety group in 2003 and concluded 'no basis for any conceivable threat from the LHC'. The collision of high energy particles in LHC may be new experience for mankind, but such collisions are common and natural in universe. According to one estimate, since the origin Earth has encountered collision of high energy (in the range of 10^{17} eV) $3x10^{22}$ cosmic rays, which is equivalent to millions of LHC experiments. Moreover, the probability of such encounters is even higher with planets/stars many folds larger in dimension than Earth. Still these planets/stars exist!!

It is true that operation of such big instruments handling very high energy, higher risk is expected. But, we have to trust that global projects like LHC, where the safety considerations are on top priority. No scientist would dare to boast any achievement, which would be at the cost of Earth itself. Sometimes, the media opt for sensitizing the issues without solid facts, which even do not sustain longer but leave a doubt to those, who are not aware about the facts. In fact, it is matter of celebration not for apprehension that one of tiniest object of the universe i.e. human brain keeps capability to solve the mysteries of birth of universe in the laboratory. Let us wish for painless birth of universe in LHC with enjoyment of knowledge. I am sure that the temporary obstacles may slow our pace but our endeavor would not stop us before we know the full truth!!

B. N. Pandey
Editor

1. OPINION ARTICLE

EPIDEMIOLOGICAL AND ECOLOGICAL STUDIES OF RADIATION-ASSOCIATED CANCER: A NEED FOR MORE SCIENTIFICALLY VALID DESIGNS

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It was recently pointed out that currently-used procedures in epidemiological studies of radiation-associated cancer are biased in favor demonstrating a **l**inear-**n**o-**t**hreshold (LNT) type, dose-response relationship (Scott 2008; Scott et al. 2008). The LNT dose-response model is based on the presumption that any amount of radiation will cause additional (excess) cancer cases in a very large population and doubling the radiation dose doubles the excess cancer cases. The indicated bias in epidemiological studies can favor an LNT-type response even when the true dose-response curve is of the threshold or hormetic type. With hormetic-type, dose-response relationships, low doses are protective (i.e., lead to a reduction in cancer cases to be low the spontaneous level) while high doses are harmful (i.e., lead to excess cancer cases). Threshold and hormetic-type responses can occur because of low **l**inear **e**nergy **t**ransfer (LET) radiation activated natural protection (ANP) against cancer (Redpath et al. 2001; Scott and Di Palma 2006; Bauer 2007; Liu 2007; Cohen 2008). Beta particles, X-rays, and gamma rays are examples of low-LET radiation. Alpha particles are an example of high-LET radiation. Low-dose, low-LET radiation ANP includes DNA repair and normal apoptosis (cell suicide) of severely-damaged cells, an auxiliary form of apoptosis that selectively removes precancerous cells, and stimulated immunity against cancer.

The previously identified epidemiological procedures that hide threshold- and hormetic-type dose-response relationships for radiation-induced cancer are as follows (Scott 2008; Scott et al. 2008):

1. Dose lagging (i.e., throwing away some of the radiation dose) in cohort and case-control studies, which shifts the dose-response curve to the left.
2. Averaging risk over wide dose intervals in cohort studies.
3. Averaging the odds of cancer over wide dose intervals before calculating the odds ratio in case-control studies.
4. Including individuals who received low-dose radiation in the unexposed group in cohort and case-control studies.
5. Employing linear extrapolation from high to low doses after dose lagging and risk or odds averaging over wide dose intervals.
6. Not adjusting for the impact of combined injuries and differences in genetic susceptibilities to cancer induction when using atomic bomb survivor data to assess cancer risk for another population.
7. Ignoring low-LET radiation ANP (which is supported by abundant low-dose data).

One or more of the above seven procedures are often employed in epidemiological studies leading to the unreliable conclusion that an LNT-type dose-response curve is supported by the data evaluated. Regarding procedure #6, it is now known that populations residing for prolonged periods in high stress environments (as was the case for atomic bomb survivors) can undergo stress-related epigenetic changes, rendering members of the population more sensitive to disease occurrence due to suppressed functioning of the immune system. The term epigenetic refers to a heritable change in the pattern of gene

activity that is mediated by mechanisms other than alterations in the primary nucleotide sequence of a specified gene. The occurrence of stress-related epigenetic changes points to reasons for not relying on atomic bomb survivor data to establish cancer risks for other populations (e.g., persons receiving low doses from diagnostic X-rays in a clinical setting in India).

The indicated dose-lagging procedure (#1) is widely used in epidemiological and ecological studies of an association between radiation and cancer. The procedure is based on the implied assumption that some radiation dose is wasted. Assuming an LNT dose-response curve and using dose lagging is a contradiction because with the LNT model each unit-dose increment (e.g., each 1 mGy increment) is presumed equally effective in adding to the cancer risk. Actually, no dose wasting occurs when each increment in dose (e.g., each 100 mGy increment) shortens the latency period for cancer occurrence as is implied by existing data for the cumulative incidence of cancer vs. time for different radiation dose groups (Mitchel 2007). Additionally, no dose is wasted when added dose increments contribute to suppression of neoplastic transformation and cancer as was demonstrated for extended low-rate exposure to low-LET photon radiation (Sakai et al. 2003; Elmore et al. 2006). No evidence of dose wasting has been reported for inducing DNA double-strand breaks, mutations, or neoplastic transformations, all of which facilitate cancer occurrence. Discarding radiation dose under the presumption of dose wasting is a serious systematic error, especially for low and moderate radiation doses.

Findings in many ecological studies of radiation-associated cancer that do not support the LNT hypothesis have been discounted when developing cancer risk estimates for low doses and dose rates (for low- or low- plus high-LET radiation). More weight needs to be given to ecological studies because many demonstrate protective effects of low doses and dose rates of low-LET or combinations of low- and high-LET radiation. Now there is also evidence for a cancer suppressive effect of residential exposure to radon (Thompson et al. 2008), presumably due to the low-LET component to the dose (Scott and Di Palma 2006). At the United States Environmental Protection Agency action level of 4 pCi/L for indoor radon concentrations in air, there appears to be a substantial reduction of lung cancers (a protective effect). This is consistent with findings in some other radon studies (Cohen 2008).

Given the above information, there is a need for more scientifically valid designs of epidemiological and ecological studies of radiation-associated cancer that allow for the possibility of radiation ANP. Special consideration needs to be given to what are appropriate doses to use, especially for combined exposure to low and high-LET radiation and for nonlinear dose-response curves. The practice of using LNT-based weighted doses (e.g., effective doses in mSv) may have to be replaced with a more scientifically valid approach.

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2. TECHNICAL ARTICLE

CYTOGENETIC MARKERS FOR RADIATION BIODOSIMETRY

P. Venkatachalam[1] and Solomon F.D. Paul[2]
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Exposure to high level of radiation induces a spectrum of changes in a cell, known as radiation biomarkers. Measurements of these changes are generally precise and can be effectively used to assess the dose after exposure. Among various biomarkers, chromosomal changes are considered reliable for the estimation of dose. Biodosimetry, using chromosomal analysis (cytogenetic markers) is based on the relationship between chromosome aberration frequency and the amount of absorbed dose. The breaks occurring in chromosomes due to radiation exposures get repaired and in this process in addition to restitution, asymmetrical exchanges like dicentric chromosomes (DC), tricentrics, ring chromosomes and symmetrical exchanges like translocations or inversions occur (Brown, 1993) and all of which can be related to dose. Generally the techniques used to detect those damages are named after the type of chromosomal aberrations looked for or the stains used to visualise the chromosomes. Generally, the aberration frequency is analysed in lymphocytes of the exposed individuals, as they are obtained easily from blood and have convenient life span to make biodosimetric studies (IAEA Technical report, 2001).

Among the existing cytogenetic techniques, measurement of dicentric chromosomes in uniformly stained metaphase chromosome preparations (Figure-1) or centeromieric fluorescence in-situ hybridization (FISH) (Figure-2) is widely being used to quantify the absorbed dose in many accidental and suspected overexposures due to its specificity and sensitivity (10cGy); in addition from the distribution frequency, it is possible to differentiate partial body exposure to that of whole body exposure though it is time consuming (Bender et al., 1988). Alternatively, scoring of micronucleus (MN) is in practice as a method of choice to estimate the radiation absorbed dose as a triage biodosimeter. Fragments of chromosomes or whole chromosomes which fail to get incorporated into daughter nuclei during mitosis, either due to spindle poison or lack of centromere, develop into MN (Figure-3). The micronucleus technique is easier to perform with a lower sensitivity of 25cGy (Paul et al., 1997). Since the distribution of MN follows over dispersion in whole and partial body exposure, it can not be used to differentiate whole and partial body exposure (Prosser et al., 1988). However, both the dicentric chromosomes and micronucleus are of unstable type aberrations and the cells carrying such aberrations are eliminated from the body as a function of time. Hence, it is of limited use for the assessment of exposure, received in the distant past. Reciprocal translocations induced by radiation are of stable type aberration and has been shown to remain in circulation more or less permanently (Lucas et al., 1992) and used in cumulative and retrospective dose estimation (Darroudi and Natarajan, 2000). Banding and FISH technique are in practice to score translocations (Figure-4) and relate to it dose. In addition, these techniques permits to identify the chromosomal involvement in exchange type aberrations (Venkatachalam et. al 1999; Kaur et al., 2007). Recently developed multiple fluorescence in-situ hybridization (mFISH) and spectral karyotyping (SKY-FISH) can be used to dissect out the origin of complex chromosome aberration induced at high doses of radiation exposures. Though, the sensitivity of these techniques is equivalent to that of dicentric chromosomes (10cGy), they are either laborious or costly and not specific to ionising radiation. The premature condensation of chromosomes (PCC) technique can also be used to relate the dose without

culturing the exposed cell populations (Prasanna et al., 1997). Thus each methods has its merit and demerits and can be employed depending upon the need.

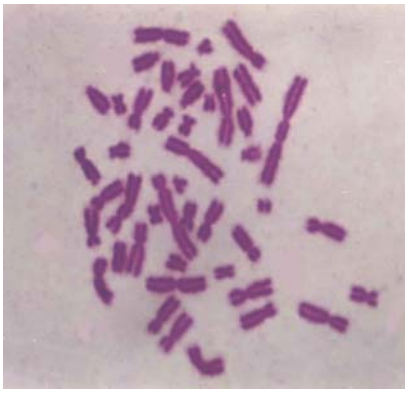

Figure 1. DC assay (Giemsa stained)

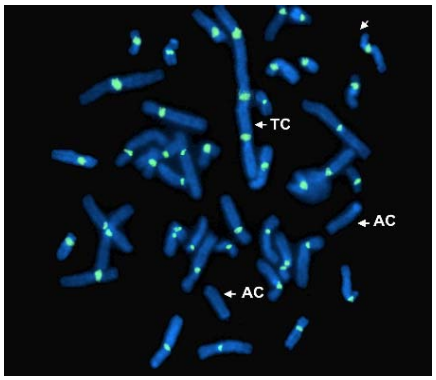

Figure 2. Tricentric chromosome (FISH)

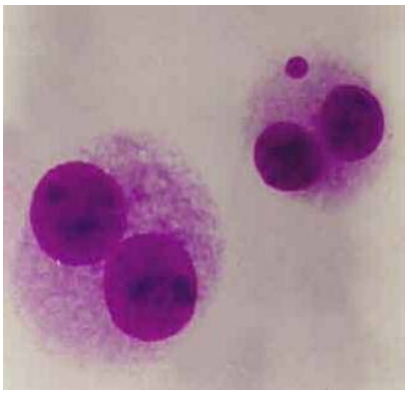

Figure 3. MN assay (Giemsa stained)

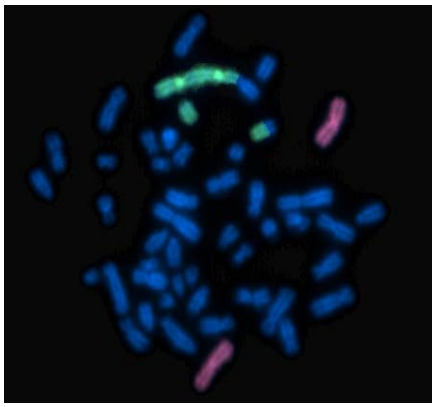

Figure 4. FISH–Reciprocal translocations

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3. PROFILE *of*

Prof. Jean Cadet

Scientific Adviser, French Atomic Energy Commission at CEA/Grenoble and Adjunct Professor, University of Sherbrooke, Sherbrooke, Canada after being the Head of the Laboratory of "*Lésions des Acides Nucléiques*" and Research Director at CEA. He is involved in research activities both at Grenoble and more recently at Sherbrooke that deal with various aspects of the chemistry and biochemistry of oxidatively generated and photo-induced damage to DNA (mechanisms of reactions, measurement in cells, assessment of biological features such as substrate specificity of DNA repair enzymes and mutagenesis of base lesions). As some of the most striking findings, one may quote the identification of several radiation-induced degradation pathways of pyrimidine and purine nucleobases mediated by OH radical (indirect effects) and ionization (direct effect) in both isolated and cellular DNA. He has also contributed to a better understanding of the molecular effects of solar radiation on DNA in isolated cells with the delineation of direct excitation effects promoted by UVB light and photosensitized reactions induced by UVA radiation. Thanks to the development of highly sensitive and specific methods of measurement of dimeric pyrimidine photoproducts, information and the repair of DNA photodamage has been recently obtained in human skin. He is author or co-author of 510 publications consisting of more than 460 original contributions to peer-reviewed journals and about 50 book chapters including exhaustive surveys on the photochemistry of nucleic acids ("*Bioorganic Photochemistry*", H. Morrison, Ed., Vol. 1, Wiley & Sons, New York, pp. 1-272, 1990) and on oxidatively generated damage to DNA (*Reviews in Physiology Biochemistry and Pharmacol*ogy, 131, 1-87, 1997; *Functional Groups in Organic Chemistry – The Chemistry of Peroxides,* Z. Rappoport, Ed., Vol. 2, Wiley & Sons, New York, pp. 915-1000, 2006). He has also published more than 30 targeted review articles in journals that include the following: *Mutation Research*, 531, 5-23, 2003; *ibid.*, 571, 3-17, 2005; *Accounts of Chemical Research*, 41, 1075-1083, 2008). His "h" factor is 55 with 950 citations in 2006. He is currently editor of *Free Radical Research*, member of the editorial board of several other journals (*Chemical Research in Toxicology*, *Free Radical in Biology and Medicine*, *Mutation Research* and *Indian Journal of Radiation Research*). He has been recently assigned as the new Editor-in-Chief of *Photochemistry and Photobiology*, the journal of the American Society for Photobiology. He is also involved annually in the reviewing of more than 150 scientific documents including grant applications and submitted publications for more than 25 journals. He is also member of several international (US Steering Committee of the ILSI Health and Environmental Sciences Institute group on DNA adducts and biological significance, Life Sciences Advisory Group of the European Space Agency, European Society for Photobiology council) and national (working group of the French Agency of Heath Safety on cosmetic ingredients and sunscreens, councils of the French Societies of Photobiology, Photodermatology and Free Radical Research in Biology) committees and societies. He has received several awards including "*Armes Lecturer*" from The University of Manitoba, Winnipeg, Canada (1986/87), "*Weiss Medal*" from the Association for Radiation Research, UK (1997), "*Grand Prix Scientifique*" from the French Atomic Energy Commission (1999), "*Research Award*" from the American Society for Photobiology (2004), the "*Medal for Excellence*" from the European Society for Photobiology (2005), the "*Prix Charles Dhéré*" in chemical biology and the "*Médaille Berthelot*" in

chemistry, the two last awards having been delivered in 2007 by the French Academy of Sciences. He has also organized several major international conferences including the *1st and 11th Congress of the European Society for Photobiology*, Grenoble (1986) and Aix-les-Bains (2005) and be involved in the organization of seven editions of the *Winter Research Conferences on Free Radicals in Biology* in the French Alps (1993-1995-1997-1999-2001-2003-2006) and the "*Nutrition, Oxygen Biology and Medicine*" conferences in Paris (2005 and 2007). He liked traveling and enjoyed hiking and skiing in the French Alps after having being actively involved in several sports including track and field, rugby and volley-ball.

Prof. Jean Cadet during 11th Congress of the European Society for Photobiology, Aix-les-Bains, France, Sept. 3-8, 2005 when he received 'Medal for Excellence of the Society'

Prof. Jean Cadet during 4th International Congress on Trace Elements in Medicine & Biology "Trace elements and free radicals in oxidative diseases", Chamonix, France , April 05-09, 1993

4. FROM ARCHIVES OF RADIATION SCIENCES

Paper: Unexpected Resistance to X-Irradiation in a Strain of Hybrid Mammalian Cells

Source: Proceedings of National Academy of Sciences, USA, 1972, Vol. 69, page 1363-65

Authors: John B. Little[1], U. Ingrid Richardson[2] and Armen H. Tashjian, Jr.[3]

Laboratory: [1]Depertment of Physiology, Harvard School of Public Health; [2]Pharmacology Department, Harvard School of Dental Medicine; and [3]Department of Pharmacology, Harvard Medical School, Botosn, Massachusetts 02115, USA

Highlights of the paper: The paper investigates the radiation sensitivity of two mammalian cells lines (mouse fibroblast; C1-1D and rat pituitary cells; GH_12C_1) and hybrid of these two cells (α-RST) in terms of their clonogenic ability. C1-1D, a mouse fibroblast cell line derived from L-cells is deficient in thymidine kinase and GH_12C_1 cell line secretes growth hormone. The mean chromosome number for C1-1D, GH_12C_1 and α-RST were 50, 70 and 111, respectively. The spontaneous hybrid was produced culturing these cell lines together without use of viruses and physicochemical methods. For the dose range of 2-20 Gy, no significant difference in extrapolation number was observed in these cell lines. However, the D_0 values hybrid cells were about 1.6 times higher than parent cell lines suggesting higher radiation resistance of hybrid cells than parent cell lines. However, the hybrid cell line did not show any significant difference in extrapolation number or repair of sub-lethal radiation damage while split dose radiation experiments.

Significance of the paper: The paper has significant relevance to understand the target theory, where fusion of cell lines resulted increase in chromosome number, hence increase in 'targets' of radiation. The difference in radiation sensitivity of different strains, species could be explained based on the understanding. The paper is not only one of the seminal

paper in classical radiation biology but also helped us to understand the difference in radio-sensitivity of tumor cells and their counterpart normal cells, which harbor alterations in chromosome number (and hence radiation 'targets') during malignancy. In addition, this paper suggested in 1970's that hybrids cells could provide interesting model to investigate the molecular mechanism of radiation action and damage repair processes.

by
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Note: *Interested readers are suggested to submit the similar articles. This column is aimed to highlight the salient points and significance of a seminal research article/event, which has in further changed substantially the understanding in that particular research field.*

5. NEWS AND VIEWS

Radiation and Cancer Biology

- **Nobel in Chemistry 2008 to Green Tag**

  Nobel prize in Chemistry awarded to **Osamu Shimomura**, Marine Biological Laboratory (MBL), Woods Hole, MA, and Boston University Medical School, MA, USA, **Martin Chalfie**, Columbia University, New York, NY, USA and **Roger Y. Tsien**, University of California, San Diego, La Jolla, CA, USA for their discovery of green fluorescent protein (GFP), which has revolutionized the biomedical and especially cancer biology research to visualize the cells, molecules and their functions!! Read the Press Release of Nobel Foundation on October 8, 2008…

  http://nobelprize.org/nobel_prizes/chemistry/laureates/2008/press.html

- **Yttrium-90 microsphere induced gastrointestinal tract ulceration**

  ^{90}Y has been used to treat primary and secondary hepatic malignancies. However, patient studies shows increase in gastric ulcerations after ^{90}Y microsphere immobilization. Read the full article on

  http://www.wjso.com/content/6/1/93

- **The survival of cancer patients**

  The chance of survival in cancer patients varies in different parts of world, which came out of a survey of 2 million cancer patients.
  http://www.newscientist.com/article.ns?id=dn14331

- **Vitamin C: Cancer patients' friend or foe?**

  It seems controversy about antioxidants in cancer therapy would end. It has been shown that large doses of vitamin C would help the cancer patients.

  http://www.newscientist.com/channel/health/mg19926683.700?DCMP=NLC-nletter&nsref=mg19926683.700

- **Vitamin C and cancer revisited**

  Further to the story of vitamin C in cancer treatment, a recent article from *Proc. National Academy of Sciences, USA* showed that cancer cells could be killed at millimolar concentrations of Vitamin C, the doses not toxic to cancer cells. But, to achieve this, dietary dose may be not sufficient and patients have to undergo perfusion.

  http://www.pnas.org/content/105/32/11037.extract?etoc

- **Anti-angiogenic effect of high doses of ascorbic acid**

  http://www.translational-medicine.com/content/6/1/50

- **Experts urge a more measured look at antioxidants**

  http://www.nature.com/nm/journal/v14/n8/full/nm0808-795a.html

- **Natural selection: The evolution of cancer**

  http://www.nature.com/news/2008/080827/full/4541046a.html

- **National Cancer Institute helps businesses cross 'the valley of death'**

  http://www.nature.com/nm/journal/v14/n8/full/nm0808-795b.html

- **The scientific contributions of M. Judah Folkman to cancer research: Reviews**

  http://www.nature.com/nrc/journal/v8/n8/abs/nrc2458.html

  http://www.pnas.org/content/105/36/13203.full

Nuclear Technology & Safety

- **Indo-US nuclear deal: Finally Inked!**

  Since recent few months Indo-US nuclear deal has been in news highlights and intense political debate. A lot has been said in pro and cons of deal. Finally, after passing many steps, it is a reality on Oct. 9, 2008. The eNewsletter provides links to read articles related to this issue:

  http://in.news.yahoo.com/48/20081009/1246/twl-bush-signs-n-deal-bill-into-law-assu.html

  http://www.nature.com/news/2008/080723/full/news.2008.973.html

  http://sify.com/news/nuclear_deal/index.php

  Nuclear group to rule on Indian trade

  http://www.nature.com/news/2008/080827/full/4541041b.html

- **The first Proton Test in Large Hadron Collider**

  September 10, 2008 has been historic day for mankind, when it has circulated proton in 27 km long tunnel in LHC. However, the cloud of fear and apprehension about the safety issues loomed over the project. Read the articles related to the event, images and videos…

  http://en.wikipedia.org/wiki/LHC
  http://www.sciencemag.org/content/vol321/issue5894/index.dtl?etoc
  http://www.newscientist.com/article/dn14699

  http://www.newscientist.com/video.ns?bctid=1785292087&DCMP=ILC-hmts&nsref=specrt10_head_Inside%20the%20LHC

  http://sciencenow.sciencemag.org/cgi/content/full/2008/910/1?etoc&eaf

  http://www.nature.com/news/2008/080813/full/454815a.html

  Safety Related Articles / Press Release
  http://press.web.cern.ch/press/PressReleases/Releases2008/PR07.08E.html
  http://public.web.cern.ch/public/en/LHC/Safety-en.html
  http://lsag.web.cern.ch/lsag/LSAG-Report.pdf

Leakage in World's Biggest Particle Smasher Springs a Leak

After few days of circulation of proton, there was technical snag in one of superconducting magnet..

http://sciencenow.sciencemag.org/cgi/content/full/2008/919/2?etoc
http://www.telegraph.co.uk/earth/main.jhtml?view=DETAILS&grid=&xml=/earth/2008/09/20/scilhc120.xml

- **How war debris could cause cancer**

  There is a risk of depleted uranium to cause cancer especially in war affected areas

  http://www.newscientist.com/channel/health/mg19926723.800?DCMP=NLC-nletter&nsref=mg19926723.800

- **Are 'disposable' reactors a safe energy solution?**

  http://technology.newscientist.com/channel/tech/mg19926671.700?DCMP=NLC-nletter&nsref=mg19926671.700

- **Electronic nose radiation sniffer**

  A new device to detect and search nuclear material...

  http://www.newscientist.com/blog/invention/2008/08/electronic-radiation-sniffer.html?DCMP=NLC-nletter&nsref=bloginv

- **Evolutionary Radiation for Dinosaurs**

  http://www.sciencemag.org/cgi/content/abstract/321/5895/1485?sa_campaign=Email/toc/12-September2008/10.1126/science.1161833&eaf

Science and Society

- **Paper Retraction Puts Focus on Informed Consent Rules**

  http://www.sciencemag.org/cgi/content/summary/321/5888/474

- **India Hopes New Fellowships Will Attract Scientists**

  http://www.sciencemag.org/cgi/content/summary/321/5895/1431a?eaf

6. LETTERS FROM THE READERS

- I have enjoyed going through the September Issue of RST. I find hard to resist my commendation to you and editorial team though I am a part of the team. It is great to find that radiation researchers can find a wealth of relevant information at one location. Some of the new features are indeed superb and praiseworthy. While I assure you of my fullest support, I urge colleagues from radiation research fraternity from world over to give inputs and constructive suggestions. It was one of my dreams to start this news bulletin during my Presidency and I feel extremely happy that the dream has come true. My heartiest complements to you.

  -***Prof. K.P. Mishra***, *Former Head, Radiation Biology and Health Sciences Division, Bhabha Atomic Research Center, Mumbai, Director, United Research Center (URC), Allahabad, Principal, United Institute of Technology, Allahabad*

- I am happy to receive the online Newsletter. Its contents are informative and up-to-date. My congratulations and best wishes for its continued success.
  -Prof. P. Uma Devi

- Happy to know that our ISRB is coming out with an eNewsletter to the readers in the field of Radiation Biology. I have seen the recent issues and it is excellent. I congratulate you and the team behind this effort. Your idea of having a page on 'Positions Available' in our web site itself is a good idea. Here, one can give information about the faculty vacant positions, SRF, JRF and post -doctoral openings etc at the national and international institutes and universities. Well we can also get upto date details about the available positions in "rrs" news letter. I really appreciate your interest in running this activity.

  -***Dr. Satish Rao B.S.,*** *Professor and Head, Division of Radiobiology & Toxicology, Manipal Life Sciences Center, Manipal University, Manipal -576 104, Karnataka, India.*

- It gives e great pleasure to acknowledge the receipt of Radiation Science Today. I find it refreshingly edited and well structured Newsletter with very useful information. I express my sincere thanks for the same.

  -Prof. S N Sanyal, *Chandigarh University, Chandigarh*

- I am very glad to know that 'Radiation Science Today' eNewsletter of Indian Society for Radiation Biology is being published under your dynamic leadership.

  -Dr. S. N. Pandey, *Assistant Professor, Department of Physics, Motilal Nehru National Institute of Technology, Allahabad*

7. UPCOMING CONFERENCE & WORKSHOP OF ISRB

ICRB 2008

The Organizing Committee of ISRB 2008 invites you to participate in International Conference of Radiation Biology and Translational Research in Radiation Oncology, Nov. 10-12, 2008, Jaipur, near Delhi, India. The Conference would provide unique opportunity to participants for scientific presentations and interaction with eminent scientists from India and abroad. In addition, Jaipur, also known as '**Pink City',** is famous for its historical monuments, traditional culture, and one of the most attractive tourist sites in India.

Major Topics:

Radiation Biology

- Interaction of Radiation with biological systems
- Molecular basis of radiation induced apoptosis
- Radiation induced genomic instability
- Use of genomic and proteomic technologies in radiation biology
- Cytogenetic and molecular markers of radiation damage
- Radiation protection and modification of radiation injuries
- Bystander effects of radiation
- Radiation and human environment
- Radiation effects on population and risk assessment
- Nutraceuticals and anti-oxidants in radiation medicine
- Adaptive response by low dose and low dose rates
- Ayurvedic research for radiation protection
- Models of Radiation bio-dosimeter and biological monitoring
- Biology of non ionizing radiation
- Radiation protection and safety regulations
- Novel alternative radiation modalities
- Biological hazards of radiation terrorism
- Industry / Academic collaborations- The ins and outs
- Radiation biology teaching - current status & future prospects

Translational Radiation Oncology

- New data for cancer risk assessment
- Imaging for radiation therapy and cancer biology
- Targeting tumor hypoxia for therapeutic gain
- Molecular image-guided radiotherapy
- How to translate molecular targeting into radiotherapy?

- Oxidative radicals as signaling agents
- Tumor micro environment, immunity and radiation
- Tumor metabolism and metastases
- Cancer initiating stem cells and radiation resistance
- Radiation-induced signal transduction pathways
- Influence of the tumor vasculature on response to therapy
- Angiogenesis and gene expression
- Brachy therapy
- Role of biomarkers / molecular markers in the management of radiation therapy
- Nanotechnology in radiation oncology
- Chemotherapy and radiation therapy
- Chemoprevention in cancer management
- Radiation Oncology & Cancer biotechnology
- New radio therapy approaches & treatment protocols
- Traditional medicine in the management of Cancer
- Emerging trends in Radiation Oncology
- X-rays/CT/MRI
- Image processing , data analysis & visualization

Abstract submission deadlines: September 30, 2008

Awards:
Indian Society for radiation Biology (ISRB) has the following awards. The application may be sent to Convener, **ICRB-2008** on the address of Conference Secretariat. Details of award is available on www.icrb2008.org

- **Life time Achievement Award** : 1
- **M. R. Raju Award** : 1
- **Young Scientists Award** : 3
- **Poster Award** : 5

Present a good poster/oral presentation at the ISRB Meeting and you might be one of the award winners! For details log on **www.icrb2008.org**

Contact Person:
Dr. P.K. Goyal, The Convener
Radiation & Cancer Biology Laboratory
Department of Zoology, University of Rajasthan, Jaipur (INDIA)
Tel : +91-141-2651199, 98291-34133
Email : pkgoyal2002@rediffmail.com; info@icrb2008.org
For more details, abstract submission, registration and time to time update about the Conference visit Conference Web page: www.icrb2008.org

Pre-Conference Satellite Workshop on Bystander effect

International Workshop on Radiation-induced Bystander Effects & their Implications in Cancer Research

November 9, 2008, Jaipur, India

The pre-conference satellite meeting of "**International Conference on Radiation Biology and Translational Research in Radiation Oncology"** will be held in Jaipur on Nov. 9, 2008 as **International Workshop on Radiation-induced Bystander Effects & their Implications in Cancer Research** .

This workshop will discuss the possible role of non-targeted effects of radiation in the clinics. The heavy reliance of modern medicine on CT scans, MRI and other diagnostic imaging techniques means that patients are being exposed to much more medical radiation than in previous times. Modern radiotherapy treatment planning also results in low doses to greater volumes of normal tissue than was usual in the past. Coupled with these changed practices, there has been a major paradigm shift in radiobiology. Low dose exposures are now considered to lead to fundamentally different effects to the well known DNA damage related high dose effects. Non targeted effects including bystander effects, genomic instability, adaptive responses and low dose hypersensitivity predominated at low doses but we know very little about the complex mechanisms which underlie the final expression of low dose radiation effects.

The workshop will start with reviews of the phenomenology and mechanisms followed by thoughtful presentations from imaging and therapy clinicians and scientists who will indicate where these mechanisms might impact therapeutic outcome. The workshop will then consider major questions in the field such as the factors which determine whether non-targeted effects lead to adaptive responses or genomic instability and will attempt to suggest research programmes which could resolve some of these issues.

It will bring together the various disciplines, including Radiation physics, chemistry & biology, that collectively comprise the field of radiation damage to DNA. The Programme is comprised of oral presentations & poster session, and time for open discussion. The goals of this meeting are to stimulate interdisciplinary thinking and synergistic interaction between the participants and to foster the long-term development this research area by encouraging participation of young investigators and their interaction with senior scientists. **The number of participants is limited to 150 so that participants are able to enjoy opportunities for intimate interactions and informal discussions.**

Registration:

- A token of Registration (Fee up to) 31st August, 2008 Rs. 300/-
- After 31st August, 2008 Rs. 500/-

Registration & accommodation form along with Fee should be sent to:

Dr. P.K. Goyal, Convener, ICRB 2008
Radiation & Cancer Biology Laboratory
Department of Zoology, University of Rajasthan
Jaipur – 302 004 (India) Tel. : 0091 141 – 2651199, 929134133
E mail : info@icrb2008.org, pkgoyal2002@rediffmail.com,
Fax : 0091 141 2656273

Post-Conference Satellite Meeting

International Conference on Emerging Challenges in Science and Technology (ICECST) November 13-14, 2008 at United Institute of Technology, Allahabad, India

THEME AND TOPICS

The aim of the Conference is to provide a forum to scientists, academicians and young researchers to present views on developing new challenges in science and technology for applications in the service of mankind. The major topics of topical importance would be covered in the conference. The challenges in innovations in engineering and technology are rapidly expanding and new strategies are needed to tackle the problems of human developments in 21st century. The tools of modern science must be expanded and tactically employed to make visible impact in the quality of life of people. This dream is possible with the development of goal-oriented and problem solving technology. It is fondly hoped that Speakers will present state of the art account of their specialization in scientific and technological research. The Conference is indented to discuss new ideas and stimulate thoughts on prospects to developing novel technology for the benefit of mankind. It is hoped to achieve close interactions among experts and young investigators enabling exchange of views, sharing of experiences and developing collaborations in the forefront areas of science, technology and engineering.

Major topics are

- Health and disease
- Computers and applications
- Stem cell technology
- Environmental engineering
- Cancer diagnosis and treatment
- Disaster management
- Biotechnology and applications
- Nuclear science and technology
- Innovations in engineering
- Nano Science and technology
- Herbal drug research
- Special hot topics

CONFERENCE CITY

Allahabad is an important city of India in the state of Uttar Pradesh situate at the confluence of the holy Ganga, the historic Yamuna and the mythological Saraswati and is an attraction for tourists from the world over. The confluence is called Sangam which is considered a holy place for many in the world. The city. The city has glorious history and has produced many illustrious scientists, academicians and political leaders including first Prime Minister of India, Pt Jawahar Lal Nehru. The University of Allahabad is popularly known as Oxford University of East.

The temperature at Allahabad is mild (15-20 ^{0}C) during middle of November but winter sets in thereafter. Months of December and January are cold; temperature dipping to 2-3 degree C for days.

Varanasi city is about 2-3 h by road from Allahabad.

UNITED GROUP OF INSTITUTIONS

The United Group was founded in 1951 which has grown as a reputed Group in technical and business education. The Group has established 8 Institutions approved by All India Council of Technical Education (AICTE) and affiliated to Uttar Pradesh Technical University (UPTU) giving Bachelor of Technology, Bachelor of Pharmacy, Master of Technology, Bachelor of Business Administration, Bachelor of Computer Application, Master of Business Administration in the campuses at Allahabad and Greater Noida, Delhi. These Institutions are providing quality technical education to over 6000 students with the help of more than 350 faculty members apart from many Guest Professors drawn from National Universities/Institutions. Some of the Courses offered are accredited by NBA and some others by Tata Consultancy Services (TCS).The Group has proceeded to establish a research Center, named United Research Center with a view to promote excellence in research in science and technology and is actively engaged in the process of developing partnership with some of the reputed Institutions/Universities from overseas.

TRAVEL

Allahabad is well connected by train from Delhi, Mumbai, Japer, Lucknow, Kolkata and other important cities of India. There are 2nd class sleeper coaches and upper class AC sleeper compartments in most of the trains. Reservation is required for long distance travels. The reservation can be made through internet reservation services by logging on to Indian Railway Catering and Tourism Corporation, "IRCTC".

Allahabad is connected by air from New Delhi. There are daily flights (except on Sunday) of Air India (**IC 7801/02**) and JetLite Airline flight (**S2-324/S2-6125**) on alternate days (1,3,5) during the week.

ACCOMMODATION

Delegates will be offered accommodation in the Guest House of our Institute. In addition, there are very comfortable Hotels in Allahabad which can be reserved online. Hotel reservation can also be arranged on request (self payment basis) by the Organizers.

REGISTRATION

All participants are required to register. A registration fee of US $ 100.00 for foreign delegates and Rs 500.00 for Indian participants is required to be paid in favor of Chairman, Organizing Committee, ICECST, payable at Allahabad. The registration fee will cover conference material, meals , local transportation and accommodation in our Guest House. Spot registration would be acceptable.

ABSTRACT SUBMISSION

Those interested in attending must submit their abstract on A 4 size paper limited to 250 words indicating in bold the presenting author. Last date for acceptance of abstract is October 31, 2008. A book of abstract will be published. The invited talks and some of the selected other presentations will be published. Invited speakers are requested to submit full paper limited to 5-7 printed pages preferably before the Conference.

CONFERENCE VENUE

Auditorium, United Institute of Technology, Naini, Allahabad 211010 India

SECRETARIAT AND CONTACT

Prof K. P. Mishra
Chairman, Organizing Committee
International Conference on Emerging Challenges in Science and Technology (ICECST) &
Director, United Research Center, Allahabad 211010
Tel. & Fax: +91-532-2687654
Tel.: +91-532-3249931 (PA)
Mob.: +91-9320466999/9305837559
Email: mishra_kaushala@rediffmail.com; mishradrkp@gmail.com

8. UPCOMING MEETINGS/ WORKSHOPS

- The **12th International Congress of International Radiation Protection Association (IRPA)** to be held in Buenos Aires, October 19-24, 2008. For details login to: **www.irpa.net**

- **In conjunction with the Israel Cancer Association Translational Cancer Medicine 2008: Bridging the Lab and the Clinic in Cancer Medicine,** November 3 – 6, 2008, Jerusalem, Israel**; Abstract Submission Deadline:** September 2, 2008**,** For more information, please visit: **http://www.aacr.org/page13863.aspx**

- **International Conference on Radiation Biology and Translational Research in Radiation Oncology**, in collaboration with 9th Biennial Meeting of the Indian Society for Radiation Biology (ISRB), Nov. 10-12, 2008, Jaipur, India. **Contact Person:** Dr. P.K. Goyal, Convener, ICRB 2008, **Email: info@icrb2008.org**, **pkgoyal2002@rediffmail.com**, **Web page: http://www.icrb2008.org/**

  Pre-Conference Workshop on Radiation-induced Bystander Effects and their Implications in Cancer Research, Nov. 9, 2008, Contact Person: Dr. P.K. Goyal, Convener, ICRB 2008, **Email: info@icrb2008.org, pkgoyal2002@rediffmail.com Web page**: **http://www.icrb2008.org/**

  Post-Conference International Conference on Emerging Challenges in Science and Technology (ICECST), Nov. 13-14, 2008, **Contact Person**: Dr K. P. Mishra, **Email: mishra_kaushala@rediffmail.com, mishradrkp@gmail.com Web page: http://www.icrb2008.org/**

- **AACR's Conference on Frontiers in Cancer Prevention Research**, Washington D.C., USA November 16-19, 2008 **Web page**: **www.aacr.org**

- **International Conference on Medical Physics – 2008 (ACMP-2008) & 29th Annual Conference of Association of Medical Physicists of India, "Advanced Technology of Radiation Medicine and Medical Physics Practice",** Bhabha Atomic Research Centre, Mumbai, India, November 26 - 29, 2008, Multipurpose Hall, BARC Training School Hostel & Guest House, Anushaktinagar, Mumbai - 400094, India**, Contact Person:** Dr. S. D. Sharma, Organizing Secretary, **Email: sdsharma_barc@rediffmail.com; sdsbarc@gmail.com**

  Web: www.icmp2008.com

- **7th LOWRAD International Conference** "The Effects of Low Doses of Ionizing Radiation in Biological Systems: New Perspectives on Human

Exposure"; Lisbon, Portugal, November 27 - 29, 2008: Detail information is available at **www.lowrad2008.itn.pt**

- **International Conference on Medical Physics, Radiation Protection & Radiobiology, XIV Annual Convention of Northern Chapter of AMPI,** 11-13, February 2009 SMS MEDICAL COLLEGE & HOSPITAL,JAIPUR, INDIA, **Last date of abstract submission:** Nov. 15, 2008, **Contact Person:** Dr. Arun Chougule, Organizing Secretary

  Email: arunchougle@rediffmail.com, arunchougule11@gmail.com
  Web: **www.ampi-nc.org**

  For updated information visit the site:

  http://www.ampi-nc.org/events.htm

  Second and Third Announcements are available on following link

  http://www.ampi-nc.org/2ndFinalLetterICMPRPR-2K9.pdf

  http://www.ampi-nc.org/ampicon20093.htm

- **National Seminar on Translational Research in Molecular Oncology on December 6, 2008**. The one day seminar is to be delivered by invited speakers. Interested speakers may contact at the following address. **There is no Registration fee** for the same. Prof. S N Sanyal, Programme Co-ordinator, UGC-SAP Programme, Department of Biophysics, Panjab University, Chandigarh – 160 014, **Email: sanyal@pu.ac.in or sanyalpu@yahoo.co.in**, **Tel.:** +91-172-2534122, 4199 (O) +91-172-2634195 (R)

- **DAE-BRNS 4th Life Sciences Symposium (LSS-2008) on Recent Advances in Immunomodulation in Stress and Cancer**, BARC Guest House and Training School Hostel Auditorium, Anushaktinagar, Mumbai - 400 094, December 22-24, 2008, **Contact Person:** Dr. M. Seshadri (Convenor) or Dr. Bhavani Shankar (Co-Convenor), **Radiation Biology & Health Sciences Division, Bhabha Atomic Research Centre, Mumbai 400085, INDIA, E-mail: barc.lss2008@gmail.com**

  For detail and updated information visit the web page: **http://www.barc.ernet.in/symposium/lss-2008/index.html**

- **International Conference on Advances in Free Radical Research: Natural Products, Antioxidants and Radioprotectors & 8th Annual Meeting of the Society for Free Radical Research – India**, March 19-21, 2009**,** C.S.M. Medical University, Lucknow, India. & Era's Lucknow Medical

College, Lucknow, India., **Contact Person:** Prof. Abbas Ali Mahdi, Professor, Department of Biochemistry C.S.M. Medical University UP, (Formerly - King George's Medical University), LUCKNOW - 226003, INDIA
E-mail: mahdiaa@rediffmail.com

Web: www.sfrrlko2009.com

- **2nd Asia Congress of Radiation Research (ACRR-2009)**, May 17-20, 2009, COEX, Seoul, Korea organized by Korean Association of Radiation Research, **Deadlines:** Abstract Submission- December 31, 2008, Early Registration- January 31, 2009. **Contact Person:** Yun-Sil Lee, ACRR 2009 Organizing Committee, 215-4 Gongneung-dong, Nowon-ku, Seoul, 139-706, Korea, **Email:** yslee@kcch.re.kr, Tel.: +82-2-970-1325, Fax: +82-2-970-2402

- **14th International Congress for Radiation Research** 2011, August 2011 in Warsaw, Poland.
http://www.ptbr.org.pl/icrr2011/icrr2011_venue.htm

- **Molecular Targets for Cancer Therapy: Regulatory Myeloid Suppressor Cells in Health & Disease,** March 12 -15, 2009, Clearwater Beach, FL. **Deadline for Abstracts:** Dec. 15, 2008. **Web page:** www.moffitt.org/continuinged/mt2009

- **Gordon Research Conferences in 2008 and 2009**
Web page: http://www.grc.org/

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**

9. AWARDS/HONORS TO ISRB MEMBERS

Congratulations *to the Member of Indian Society for Radiation Biology for prestigious Awards and Honors!!*
May God bless all of you many more in future!!

Name of the ISRB Member	Affiliation	Award/Honors	Year/ Period
Prof. P. N. Srivastava	Professor Emeritus, JNU, Delhi	Chairman, National Board of Accreditation of the AICTE	2008

10. CAREER FORUM

Positions and Fellowships

- **POSITION VACANT for Senior Lecturer / Assistant Professor Field of specialization: Radiation Biology / Toxicology**

  Job Description: Applications are invited for faculty positions at the level of Senior Lecturer and Assistant Professor in the areas of Radiation biology / Toxicology at Manipal Life Sciences Centre, Manipal a constituent institution of Manipal University. The responsibilities include establishing a successful extramurally supported research program, teaching radiobiology and biotechnology.

  The candidates with Ph.D. or equivalent degree in an associated field are eligible for the above said position. Candidates with Radiation biology / Toxicology background with hands-on experience in molecular biology techniques are preferred. The successful candidate will join the Radiobiology & Toxicology division focusing on basic and translational research in Radiobiology and Toxicology. Positions are open until it is filled. Interested applicants may submit their detailed CV to: **The Deputy Registrar**, HR, Manipal University. Manipal 576 104, Karnataka, India, Email: jobs@manipal.edu

- **Post doctoral Fellowship**

  http://www.nature.com//naturejobs/science/jobs/53406

- **Postdoctoral position in immunology**

  http://www.nature.com/naturejobs/science/jobs/61323

- **Postdoctoral Fellowship in Stem Cell Biology**

  http://www.nature.com//naturejobs/science/jobs/56183

- **Postdoctoral Fellow - Cell Signalling**

  http://www.nature.com//naturejobs/science/jobs/63000

- **Postdoctoral Fellowships for Training in Cancer Research**
  International Agency for Research on Cancer
  Fellowships for junior scientists working in medical or allied sciences and, who wish to pursue their career in cancer research

  http://www.iarc.fr/ENG/Fellowships/postdoc.php

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

Article related to career issues

- **The issues of translation and tough choices in science careers.**

  http://www.nature.com/naturejobs/2008/080731/full/nj7204-661a.html

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

  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**.

11. ARTICLES OF THE ISSUE

- **Oncogenic bystander radiation effects in *Patched* heterozygous mouse cerebellum**

  http://www.pnas.org/content/105/34/12445.full

- **Surgery vs. radiotherapy in localized prostate cancer. Which is best?**

  http://www.ro-journal.com/content/3/1/23

- **Effect of prolonging radiation delivery time on retention of gamma-H2AX**
  Magnitude of DNA damage and its repair in relatively prolonged delivery of radiation dose during Intensity modulated radiation therapy would decide biological response. Read the an open access article from *Radiation Oncology*

http://www.ro-journal.com/content/3/1/18

- **Response of pulmonary artery intimal sarcoma to surgery, radiotherapy and chemotherapy: a case report**
  Journal of Medical Case Reports 2008, 2:217 (25 June 2008)

  http://www.jmedicalcasereports.com/content/2/1/217

- **Cancer and the blood–brain barrier: 'Trojan horses' for courses?**

  http://www.nature.com/bjp/journal/v155/n2/full/bjp2008274a.html

12. OPEN ACCESS ARTICLES/SERIES OF ARTICLES

- **Articles on anti-angiogenesis therapy in cancer**
  http://www.nature.com/nrc/focus/targeting_ang/index.html
- **Development of RNAi as a therapeutic strategy**

  Open access articles on RNAi in basic issues and therapeutic applications

  http://www.nature.com/mt/webfocus/rnai/index.html

- **Cell Signaling Articles**

  Cell Research presents a series of reviews on signal transduction in the context of stem cell self-renewal and differentiation, cancer and other human diseases.

  http://www.nature.com/cr/focus/cell_signaling_review.html

- **Radiation-induced caveolin-1 associated EGFR internalization is linked with nuclear EGFR transport and activation of DNA-PK**

  http://www.molecular-cancer.com/content/7/1/69

- **Mre11–Rad50–Nbs1-dependent processing of DNA breaks generates oligonucleotides that stimulate ATM activity**
  http://www.nature.com/emboj/journal/v27/n14/full/emboj2008128a.html

- **Beyond tumor necrosis factor receptor: TRADD signaling in toll-like receptors**

  http://www.pnas.org/content/105/34/12429.full

- **Bioelectrical impedance phase angle as a prognostic indicator in breast cancer**

http://www.biomedcentral.com/1471-2407/8/249/abstract

- **Breast cancer, psychological distress and life events among young women**

  http://www.biomedcentral.com/1471-2407/8/245/abstract

- **Comparison of prognostic gene expression signatures for breast cancer**

  http://www.biomedcentral.com/1471-2164/9/394/abstract

- **Health-related quality of life in breast cancer patients: A bibliographic review of the literature from 1974 to 2007**

  http://www.jeccr.com/content/27/1/32

Note: *Some of the open access articles are only for limited period.*

13. 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. Log on to

  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/ECOMradres/timssnet/common/tnt_frontpage.cfm

  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

14. IMPORTANT JOURNALS

- **Annals of Oncology**

  http://annonc.oxfordjournals.org/

- **Acta Oncologia**

  http://www.informaworld.com/smpp/title~content=g779470932~db=all

- **BMC Cancer**

  http://www.biomedcentral.com/bmccancer/

- **Cancer Epidemiology Biomarkers & Prevention**

  http://cebp.aacrjournals.org/

- **Cancer Prevention Research**

  http://cancerpreventionresearch.aacrjournals.org/

- **Cancer Research**

  http://cancerres.aacrjournals.org/

- **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

- **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

- **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/

- **Journal of Cancer Research and Therapeutics**

  http://www.cancerjournal.net/

- **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

15. RECENT BOOKS

- **Cancer proteomics: from bench to bedside**

  http://www.nature.com/bjc/journal/v99/n4/abs/6604537a.html

- **The Animal Research War**
  http://www.sciencemag.org/cgi/content/summary/321/5895/1448a?sa_campaign=Email/toc/12-September-2008/10.1126/science.1165110&eaf

16. CONTENTS OF INDIAN JOURNAL OF RADIATION RESEARCH

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17. 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 download from following link **http://www.freewebs.com/isrbenewsletter/ISRB%20Membership%20Application%20Form.pdf**

• Awards / Honors to ISRB Members

Editorial Board 'Radiation Science Today' is pleased to launch a new column "**AWARDS/HONORS to ISRB Members**". 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:

• 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**!!!

Coming Soon

The following new column is considered to be launched soon in upcoming issues of eNewsletter. Your co-operation and contribution is requested.

Welcome to New Members of ISRB
We would like to welcome the new Members joining to ISRB with providing their affiliation, his/her research areas/expertise and recent photograph (if available). Secretary, ISRB is requested to provide their details of new Members joining to ISRB, as and when available.

INDIAN SOCIETY FOR RADIATION BIOLOGY

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INDIAN SOCIETY FOR RADIATION BIOLOGY

(Reg. No. S-19927, dt. May 5, 1989)

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Tel: +91-11-2942418, 2940667 Fax: +91-11-2919509
Web page: **www.icrb2008.org**, **www.isrb-india.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.

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.

Disclaimer: *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
http://www.geocities.com/isrb_india/

Application for Membership

To:

Secretary
Indian Society for Radiation Biology (ISRB)
Department of Medicinal Chemistry, Institute of Medical Sciences
Benaras Hindu University, Varanasi- 221005, India

Dear Sir,

I wish to apply for Life/ Annual/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: ..……………..………………………………………………………………..…...….......

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………..

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

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

8. Registration Fee: Annual Membership : Rs. 100.00 Foreign members: US$ 10
Life Membership : Rs 1000.00 Foreign members: US$ 100

Bank transfer/Draft/Cheque No. …………Date: …………Drawn on Bank. …………………………

……………………………………in favour of 'Indian Society for Radiation Biology' is enclosed.

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 two recent passport size photographs to: Dr Yamini B. Tripathy, Secretary, ISRB, Department of Medicinal Chemistry, Institute of Medical Sciences, Benaras Hindu University, Varanasi- 221005, India. E-mail:yaminiok@yahoo.com