

RADIATION SCIENCE TODAY

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Radiation Science Today

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EDITORIAL

Looking a year back!!

Dear Readers,

On behalf of Editorial Board of the eNewsletter, let me wish you a happy new year 2009. The journey of eNewsletter has completed about one year and it is a right time to look back the distance, self-assess and to future plan for the eNewsletter. We have been receiving the feedback about the eNewsletter from you time to time in many ways. However, we formally invited the feedback through ten questions from all the readers irrespective of their association with Indian Society of Radiation Biology (ISRB) and a comprehensive analysis of feedback is presented here. We would like to thank the readers for their overwhelming response to submit the feedback, majority of them (66 %) were members of ISRB. Regarding the up-to date information of news and events, 66 % rated the eNewsletter 'Excellent' however, 34 % rated it 'Good'. About the scientific content of the eNewsletter, 46 % rated it 'Excellent' but 54 % rated it 'Good'. Similar opinion was expressed by readers about the information about the career of young researchers. In response to question of 'whether eNewsletter acting as bridge of flow of information between senior and young researchers' the 'Excellent', 'Good' and 'Average' rating was from 53, 40 and 7 % readers, respectively. About, 60 % readers rated the eNewsletter 'Excellent' that it is assisting ISRB to achieve its objectives, however, 40 % rated it 'Good'. It was very encouraging to notice that many readers responded to contribute many ways to the eNewsletter especially through submission of articles. It was interesting to know that some of readers also showed their willingness to work for the eNewsletter. Our readers suggested different ways to improve the eNewsletter like more information about career opportunities, scientific news of training and workshops being organized, details of conferences, seminars and workshops, provide links to all journals of interest, more short scientific articles of current research interest, to publish radiation biology related protocols etc.

After reviewing the results, which were anonymous to web page, it was matter of great satisfaction and more importantly it was an opportunity to know our weaknesses especially like improvement of scientific content, to provide more information related to career to young researchers. We have already added the some of the features suggested in feedback, which would be further improved wherever possible. In this direction, I urge to all readers to take active part in the eNewsletter through submission of more and more articles of diverse taste and various categories. Moreover, it would be my special request and open invitation to senior members of ISRB, to come forward to share their knowledge and expertise to their juniors. They should use the eNewsletter platform to communicate the vacancies in their laboratories/Institutes, write articles which may help to shape the career of young researchers.

We have taken note all suggestions from you, small or big, appreciation or criticism. It would be our effort to meet your expectation and to improve the eNewsletter to best with our limited resources.

B. N. Pandey Editor

1. REVIEW ARTICLE

RADIOPROTECTIVE POTENTIAL OF *Mentha piperita* (Linn): MECHANISMS AND FUTURE PERSPECTIVES

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INTRODUCTION

Radiation exposure as well as a number of natural or synthetic radio-protectors can alter the balance of endogenous protective systems, such as glutathione and antioxidant enzyme systems (Weiss and Kumar, 1988). This could be due to the enhanced utilization of the antioxidant system as an attempt to detoxify the free radicals generated by radiation. GSH offers protection against oxygen-derived free radicals and cellular lethality following exposure to ionizing radiation (Biaglow et al., 1987). The depletion of GSH promotes generation of reactive oxygen species and oxidative stress with cascade of effects thereby affecting functional as well as structural integrity of cell and organelle membranes (De Leve et al., 1996). Several pathways of radioprotection have been suggested for the mechanism of protective action in mammalian cells against the damaging effects of ionizing radiation (Weiss and Landauer, 2000). The mechanisms implicated in the protection of cells by radioprotectors include free radical scavenging that protects against reactive oxygen species (ROS) generated by ionizing radiation or chemotherapeutic agents, and hydrogen atom donation to facilitate direct chemical repair at sites of DNA damage (Bump and Brown, 1990). ROS generated by ionizing radiation are scavenged by radio-protectors before they can interact with biochemical molecules, thus reducing the harmful effects of radiation. It has also been considered possible that radiation therapy for cancer patients could be improved by the use of

radio-protectors to protect normal tissues. The application of antioxidant radio-protectors to various human exposure situations has not been extensive although it generally accepted that is endogenous antioxidants such as cellular non-protein thiols and antioxidant enzymes provide some degree of protection (Weiss and Landauer, 2003). A number of phytochemicals, including caffeine, genistein and melatonin, have multiple physiological effects, as well as antioxidant activity, which result in radioprotection in vivo (George et al., 1999, Landauer et al., 2000 and Karbownik and Reiter, 2000). Several plant extracts such Adhatoda as



Fig. 1. Mentha piperita plant

vasica, Amaranthus paniculatus, Brassica compestris, Mentha piperita and *Spirulina fusiformis* have been found to have radical scavenging activities and have radio-protective effects in mammals (Samarth et al., 2008).

Mentha piperita Linn.

Mentha piperita Linn. belong to the family *Labiatae* is a perennial, glabrous, strongly scented herb, which grows to a height of 30-90 cm, popularly called as peppermint (Fig. 1). The other common names include candymint, brandymint, lambmint, lammmint, american mint, gamathi phudina, vilayati podina, paparaminta etc. Peppermint propogates by means of its long running roots from which are produced smooth square stems from 1-3 feet in height, erect and branching. The leaves are from 1-2 inches long, about half as wide, pointed and sharply toothed margins. The plant is in flower from July to September. Peppermint is intensively cultivated in India, China, Europe, America, Australia and South Africa. India occupies first position with respect to area and production of essential oils in the World, followed by China. It is also largely cultivated in Indiana, Michigan, Oregon, Washington and California for the production of peppermint oil.

PHYTOCHEMICALS/CHEMICAL CONSTITUENTS

Antioxidants	α -tocopherol, β -carotene, eugenol, caffeic acid, rosmarinic acid, rutin, thiamin, riboflavin, limolene, betaine, niacin, vanillin, choline, tannins.
Elements	Aluminum, Calcium, Chromium, Cobalt, Iron, Magnesium, Manganese, Phosphorus, Potassium, Selenium, Silicon, Tin, Zinc.
Essential oil Constituents	Menthol, menthone, menthoside, methyl acetate, methyl-valerate, Pinene, piperitone, piperitonene, piperitone oxide, terpinolene, Transpiperitol, cadenene, carotene, trpinene, camphene, carvacrol, Carveol, carvone, jasmone, pulegone, viridifloral, menthofuran, Ledol, cineole.
Others	Acetaldehyde, acetic acid, amyl alcohol, benzoic acid, citronellol, Isobutyric acid, pectin, peryallyl alcohol, phellandrene, pyridine, Thymol, xanthomicrol, cinnamic acid.

RADIOPROTECTIVE EFFECTS & DOSE REDUCTION FACTOR (DRF)

 Table 1: Dose reduction factor (DRF) values of certain synthetic and natural radio-protectors

S No	Dadioprotoctor	Doco [®] routo of		Tovicit	Deferences
<u>5. NO.</u>	Radioprotector	Dose & Toule of	DRF	TOXICIL	References
		administration	value	У	
1.	Cysteine	1200 mg/kg (iv)	1.4	Toxic	Patt, 1969
Synthetic	Cystamine	150 mg/kg (ip)	1.6	Toxic	Bacq et al., 1951
compounds	Isothiourea	400 mg/kg (ip)	2.1	Toxic	Doherty &
	dibromide (AET)				Burnett, 1955
	WR-2721	500 mg/kg (ip)	2.7	Toxic	Yuhas & Storer, 1969
	MPG	200 mg/kg (ip)	1.4	Toxic	Sugahara et al., 1970
2. Natural	Chlorella	500 mg/kg (po) pre	1.11	Non-	Singh et al.,
(Plant	vulgaris	500 mg/kg (po) post	1.15	toxic	1995
extracts)	(E-25)			Non-	
				toxic	
	Ocimum				
	sanctum	50 ug/kg (ip)	1.3	Non-	Uma Devi &
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 Orientin vicenin	50 ug/kg (ip)	1.37	toxic Non- toxic	Ganasuondari, 1995; Uma Devi et al., 2000
Spirulina fusiformis	400 mg/kg (po) 800 mg/kg (po)	1.15 1.3	Non- toxic	Kumar et al., 2002
Amaranthus paniculatus	800 mg/kg (po)	1.36	Non- toxic	Maharwal et al., 2005
Mentha piperita Adhatoda vesica	1000 mg/kg (po) 800 mg/kg (po)	1.78 1.6	Non- toxic Non- toxic	Samarth & Kumar, 2003 Kumar et al., 2005

The efficacy of any radio-protective agent is evaluated by the determination of its dose reduction factor (DRF). The DRF is based on $LD_{50}/_{30}$ survivability experiments, and can be calculated after irradiating a large number of animals to different doses (i.e. 4, 6, 8 & 10 Gy) of gamma rays in the presence (experimental) or absence (control) of radio-protective drug. The percentage of mice surviving at each radiation dose till 30 days following exposure was used to construct survival-dose-response curves. Regression analysis can be used to obtain LD50/30 and to determine dose reduction factor (DRF). DRF can be computed by the formula:

DRF = LD50/30 [Experimental animals] LD50/30 [Control animals]

TOXICITY AND OPTIMUM DOSE

Oral administration of Mentha extract was non-toxic and well tolerable up to 4000 mg/kg b.wt. in Swiss albino mice. Optimum dose of Mentha extract for radioprotection is 1000 mg/kg b.wt./day for three consecutive days prior to radiation exposure. The radio-protective effect of Mentha was demonstrated by determining the LD50/30 values (DRF=1.78). Aqueous extract of *Mentha piperita* Linn. provide significant radioprotection in vivo at non-toxic doses against lethal gamma irradiation in Swiss albino mice (Samarth 2001).

MENTHA PIPERITA & SERUM PHOSPHATASES ACTIVITY

Mentha extract (1 g/kg body wt) and oil (40 μ L/animal/day) given orally for three consecutive days prior to whole body irradiation (8 Gy) showed the modulation of activity of serum phosphatases in Swiss albino mice. Irradiated animals pretreated with Mentha extract or oil showed significant decline in acid phosphatase activity as compared to control animals. However, values of alkaline phosphatases activity remained significantly higher than control animals (Samarth et al., 2001, Samarth et al., 2002a).

INTESTINAL PROTECTION

Intestinal protection in mice against radiation injury by M. piperita was studied from day 1 to day 20 after whole body gamma irradiation (8 Gy). Mentha pretreatment provides protection against radiation-induced alterations in intestinal mucosa of Swiss albino mice. Mentha pretreatment resulted in a significant increase in villus height, total cells and mitotic cells, whereas goblet cells and dead cells showed a significant decrease from respective irradiated controls (Samarth et al., 2002b).

PROTECTION AGAINST CHROMOSOMAL DAMAGE

Mentha piperita treatment before exposure to gamma radiation was also found to be effective in protecting against the chromosomal damage in bone marrow of Swiss albino mice. Animals

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exposed to 8 Gy gamma radiation showed chromosomal aberrations in the form of chromatid breaks, chromosome breaks, centric rings, dicentrics, exchanges and acentric fragments. Mentha pretreatment provides protection against radiation induced chromosomal damage in bone marrow of Swiss albino mice. A combination of antioxidative and antimutagenic activities via modulation of DNA repair processes may be held responsible for the radio-protective effects of M. piperita (Linn.) leaf extract (Samarth and Kumar, 2003a).

PROTECTION AGAINST HEMATOPOIETIC DAMAGE

Oral administration of Mentha extract to mice before radiation exposure is effective in increasing the frequency of radiation induced endogenous spleen colony forming units (CFU-S). Mentha pretreatment protects these animals from weight loss and inhibits the signs and symptoms of radiation sickness. Mentha extract protects/stimulates the hematopoietic system in mice against lethal effects of ionizing radiation as evident in spleen colony assay. The enhanced survival observed in treated mice may be probably due to accelerated hematopoietic regeneration. The possible mechanism of radiation by Mentha may be by stimulating/protecting the hematopoietic stem cells against the radiation induced free radical damage by Mentha extract. The radio protective effect of *Mentha piperita* may be attributed to the antioxidant and anti-peroxidant properties due to the presence of eugenol, caffeic acid, rosmarinic acid and α - tocopherol (Samarth and Kumar, 2003b).

PROTECTION AGAINST BONE MARROW DAMAGE

An exposure to gamma radiation resulted in a significant decline in the number of bone marrow cells. Pretreatment with leaf extract of M. piperita followed by radiation exposure resulted in significant increases in the numbers of leucoblasts, myelocytes, metamyelocytes, band/stab forms, polymorphs, pronormoblasts and normoblasts, lymphocytes, and megakaryocytes in bone marrow as compared to the control group. Pretreatment with leaf extract of M. piperita followed by radiation exposure also resulted in significant decreases in micronucleus frequencies in bone marrow of mice. A significant increase in erythropoietin level was observed at all the studied intervals in leaf extract of M. piperita pretreated irradiated animals as compared to control animals. The protective effects of leaf extract of M. piperita against radiation induced hematopoietic damage in bone marrow may be attributed to the maintenance of EPO level in Swiss albino mice (Samarth, 2007).

ANTIOXIDANT ACTIVITY

A significant decrease in the activities of glutathione content, glutathione peroxidase, glutathione reductase, glutathione-S-transferase, superoxide dismutase and catalase were observed in the liver of mice exposed to 8.0 Gy gamma radiation. Also, a significant increase in malondialdehyde formation in liver was observed in these animals. However, animals pretreated with Mentha extract and exposed to 8.0 Gy gamma radiation showed a significant increase in the activities of reduced glutathione content, glutathione peroxidase, glutathione reductase, glutathione S-transferase, superoxide dismutase and catalase. Mentha extract pretreated irradiated group showed significant decrease in malondialdehyde formation in liver, suggesting its role in protection against radiation induced membrane damage. Mentha extract has significantly induced the activities of glutathione peroxidase and superoxide dismutase in the present study. It has been revealed that Mentha extract can significantly attenuate radiation induced oxidative stress by modulating cellular enzymatic and non-enzymatic antioxidant defense system (Samarth et al., 2005).

RADICAL SCAVENGING ACTIVITY

In cell-free assays, Mentha extract showed strong scavenging activity for both the DPPH* and ABTS* + radicals. The extracts of *M. piperita*, *A. vasica* and *B. compestris* showed very strong

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radical-scavenging activity in both the assays. However, extracts of *A. paniculatus* and *S. fusiformis* showed moderate radical-scavenging activity. The IC_{50} values of these plant extracts were: *M. piperita* – 273 µg/ml, *A. vasica* – 337 µg/ml, *B. compestris* –398 µg/ml, *A. paniculatus* – 548 µg/ml and *S. fusiformis* – 620 µg/ml, respectively. The differential radio-protective and antioxidant activity of these plant extracts observed may be assigned to different chemical constituents present in the different plant extracts. These result indicates that the antioxidant mechanism of radioprotection and free-radical scavenging appear to be likely mechanisms of radiation protection by these plant extracts (Samarth et al., 2008).

POSSIBLE MECHANISM OF RADIOPROTECTION BY Mentha piperita Linn

Leaf extract of M. piperita have shown to provide protection against radiation-induced alterations in Swiss albino mice. Therefore, it is necessary to elucidate possible mechanism of radioprotection by leaf extract of M. piperita. Radiation exposure as well as a number of natural or synthetic radio-protectors can alter the balance of endogenous protective systems, such as glutathione and antioxidant enzyme systems (Weiss and Kumar, 1988). The lower depletion of liver GSH in the leaf extract of M. piperita pretreated irradiated animals could be due to the higher availability of GSH, which increases the ability to cope up with the free radicals produced by radiation. The increased GSH level suggests that protection by leaf extract of *M. piperita* may be mediated through the modulation of cellular antioxidant levels as revealed in glutathione peroxidase, glutathione reductase, superoxide dismutase and catalase activities. Radiation produced a change in antioxidant enzyme levels in the body. The values of SOD were significantly higher in leaf extract of *M. piperita* treated animals. Radiation caused an increase in the levels of superoxide radicals and increased SOD activity seen in leaf extract of M. piperita pretreated irradiated animals was therefore, to eliminate radiation induced superoxide radicals. As a result of dismutation, highly reactive H_2O_2 is formed which was degraded by CAT and GPX, whereas, CAT converts H_2O_2 to H_2O and O_2 , GPx removes H_2O_2 by coupling its reduction to H_2O with oxidation of GSH to GSSG. GSH is a versatile protector and executes its radio-protective function through free radical scavenging, restoration of the damaged molecule by hydrogen donation, reduction of peroxides and maintenance of protein thiols in the reduced state (Bump and Brown, 1990). The basic effect of radiation on cellular membranes is believed to be the peroxidation of membrane lipids. Lipid peroxidation can be initiated by radiolytic products, including hydroxyl and hydroperoxyl radicals (Raleigh, 1987). It was observed that leaf extract of M. piperita pretreatment significantly lower the radiation induced lipid peroxidation in terms of malondialdehyde. It was demonstrated that leaf extract of M. piperita has a strong radical scavenging activity in both DPPH• and ABTS•+ assays. Total phenol content and qualitative and quantitative compositional analysis of aqueous extracts from Mentha species, hybrids, varieties and cultivars were also studied and found that Mentha piperita extract being better than other extracts and it appeared that the level of activity was strongly associated with the phenolic content (Dorman et al., 2003, Romero-Jimenez et al., 2005).

The mechanisms implicated in the protection of cells by radio-protectors include free radical scavenging that protects against reactive oxygen species (ROS) generated by ionizing radiation or chemotherapeutic agents, and hydrogen atom donation to facilitate direct chemical repair at sites of DNA damage (Bump and Brown, 1990). Shimoi et al. (1996) concluded that plant flavonoids which show antioxidant activity in vitro also function as antioxidants in vivo, and their radio-protective effect may be attributed to their radical scavenging activity. ROS generated by ionizing radiation are scavenged by radio-protectors before they can interact with biochemical molecules, thus reducing the harmful effects of radiation. The concept of antioxidant mechanism of radioprotection and free radical scavenging to be a likely mechanism of radiation protection by flavonoids, orientin and vicenin has been suggested (Uma Devi et al., 2000). The result of the present investigation confirms

the concept and free radical scavenging appears to be a likely mechanism of radiation protection by leaf extract of *M. piperita*.

The ideal radio-protective agent should fulfill several criteria:

(a) It must provide significant protection against the effects of radiation.

(b) It must have a general protective effect on the majority of organs.

(c) It must have an acceptable route of administration (preferably oral, or alternatively intramuscular).

(d) It must have an acceptable toxicity profile and protective time-window effect.

(e) It must have an acceptable stability profile (both of bulk active product and formulated compound).

(f) Have compatibility with the wide range of other drugs that will be available to patients or personnel.

Fortunately *Mentha piperita* have shown most of the above qualities and thus may qualify for an ideal candidate for Radioprotector.

FUTURE PERSPECTIVES

Over the past 50 years, research in the development of radioprotectors worldwide has focused on screening a plethora of chemical and biological compounds. Our study showed the radiomodifying effects of plant extract, especially that from Mentha piperita Linn. in animal model system. It is apparent that many plant exhibit a diverse array of biological activities that may be relevant to the protection/mitigation of ionizing radiation-induced damage in mammalian systems. However, only a fraction of these plants have been investigated. To find novel radioprotectors/mitigators from a large pool of plants, there is a need to develop more efficient and reliable bioassays for large scale rapid evaluation of radio-protective efficacy of plant extracts. It is worthwhile to evaluate efficacy using standardized extracts, and to identify the bioactive compounds responsible for the radio-protective manifestation. In addition, isolation of the bioactive constituents may further potentiate the effects of herbal radio-protective drugs.

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2. PERSPECTIVE ARTICLE

HEPATITIS C VIRUS INDUCED OXIDATIVE STRESS IN MECHANISM OF HEPATOCARCINOGENESIS Suresh D. Sharma, PhD

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Hepatitis C is a very complex disease. The medical importance of this liver disease and the need to rapidly identify new therapeutic approaches has resulted in intensive study of its causative agent, hepatitis C virus (HCV). An amazing fact about this RNA virus is that it can establish chronic infection in 70-80% of the people that come in contact with it, despite the fact that it is detected and targeted by innate and humoral immune mechanisms. An estimate by WHO suggests that a minimum of 3% of the world's population is chronically infected with HCV [1, 2]. At present there is neither a selective antiviral therapy nor a preventive vaccine. The only treatment option is a long-acting interferon-alpha (pegylated interferon) given in combination with nucleoside analog ribavirin. HCV continues to be a cause of concern and a huge burden on public health systems world wide.

The imbalances between oxidant and antioxidant defenses generate a state, popularly called as oxidative stress (OS). At moderate concentrations reactive oxygen species (ROS) act as regulatory mediators in signaling processes and numerous studies point out the role of ROS as intracellular second messengers [3, 4]. However, excessive amounts of ROS can affect many cellular functions by damaging nucleic acids, oxidizing proteins and causing lipid per-oxidation. Overwhelming evidence has accumulated indicating that oxidative stress is a crucial factor in mutagenesis, tumorigenesis, ageing, and age-related diseases. It is now known that oxidative stress results during chronic HCV infection [5].

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A persistent inflammation of the liver due to HCV infection poses a major risk towards the development of hepatocellular carcinoma (HCC) [6]. The mechanisms by which various metabolic disorders and HCC develops in patients with chronic hepatitis C (CH-C) are unknown. Various models have been proposed to elucidate pathways involved in liver damage and in oncogenesis, however, oxidative insult appears to be the key player in CH-C associated liver diseases [6]. Oxidative stress markers have been found to increase in chronic HCV infection [7]. 8-Hydroxydeoxyguanosine (8-OHdG) is a marker of DNA damage induced by oxidative stress. A study found higher amounts of 8-OHdG adducts in patients with CH-C [8]. Elevated levels of malondialdehyde (MDA)-, 4-hydroxy-2-nonenal (HNE)-, and 4-hydroxy-2-hexenal (HHE)-protein adducts have also been detected in the liver infected with HCV [9].

Current research further revealed that HCV proteins localize to endoplasmic reticulum (ER) and mitochondrial membranes and promote oxidative stress. The translation and replication associated with the virus multiplication can activate unfolded protein response and ER-stress. Expression of the HCV core protein in hepatic cells increases ROS-production. Also transgenic mice expressing the HCV structural proteins (core, glycoprotein-E1 and E2) caused increase in ROS production [10]. Furthermore, the expression of HCV non-structural protein 5A (NS5A) lead to activation of NF-mB and induction of ROS [11]. HCV proteins are also known to interact with a vide variety of key host regulatory proteins and nucleic acids [12]. A recent study showed that expression of HCV-viral proteins up-regulated genes involved in innate immune (inflammation) and oxidative stress responses [13]. OS is now reported to be the main cause in development of Insulin resistance, irrespective of obesity in patients with HCV genotype 1 or 2 infection [14].

In conclusion, the mechanisms leading to the hepatic injury are probably multifactorial, as hepatitis C is a very complex disease. Expression of viral proteins may contribute to HCV pathogenesis by producing OS and increasing the expression of genes related to the innate immune response and inflammation. OS in turn can lead to DNA damage and promote chromosomal instability. However, there are still gaps in understanding the molecular mechanisms and precise role of OS in the pathogenesis of the disease. Interplay between virus multiplication and immune responses would ultimately determine the spectrum of possible clinical outcomes. However, recent insights into the pathogenesis of hepatitis C encourages further investigation of antioxidant therapy.

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3. PROFILE of

Dr B. B. Singh

AS A SCIENTIST

Dr. B.B.Singh holds a first class Master's degree in Physics from Lucknow University and is the recipient of the Gold Medal for being the best student of the year. He obtained his Ph. D. degree in Radiation Biology from the RMCS, UK (now Cranfield University) and is Fellow of the Indian Academy of Sciences and also of the National Academy of Sciences of India. He has been President of the Indian Biophysical Society, Indian Society for Radiation Biology, Indian Association for Hyperthermic Oncology and Medicine and is Hon. Member of International Clinical Hyperthermia Society.

Dr. Singh joined Bhabha Atomic Research Centre, then known as Atomic Energy Establishment Trombay, in 1959 held several important positions in India & abroad more particularly:

(1991-1998) - Bhabha Atomic Research Centre Mumbai as the Head Radiation Biology & Biochemistry Divisions.

(1972-73) - Institute of Biophysics, Technical University of Hanover Germany as Visiting Professor

(1975-77) - International Atomic Energy Agency (United Nations) in Vienna as Head of the Section on Radiation Biology & Health Related Environmental Research

Dr. Singh has specialized in free radical biology and radiation therapy of cancer in combination with radiation, radio-sensitising drugs and hyperthermia. He has to his credit 2 books and 163 original scientific papers published in well-reputed scientific journals such as *Nature* (Lond.), *Science* (Wash.), Biophysica Biochimica Acta, Progress in Molecular Biology, Advances in Medical Physics. He has served as the Secretary of the National Committee on Biophysics and also International Commission on Radiation and Environmental Biophysics of IUPAB. He has been associated with several Ethics Committees on experimental animals and





human clinical research. He is also associated with the Homi Bhabha National Institute (deemed University of nuclear sciences) in the field of strategic studies.

Dr. B.B.Singh has been on the Editorial Boards of *International Journal of Radiation Biology*, *International Journal of Hyperthermia* and *Fifth Dimension - A Journal of Holistic Medicine*. He has served as the Regional Editor, *Radiation Physics & Chemistry- An International Journal.*

AS A LAWYER

After his retirement since February 1998, Dr. Singh is a practicing lawyer having obtained the LL.B. degree from Mumbai University (1997) specializing in Environmental Law and Consumer Protection. His thesis on *"Laws Relating to IPR vis-a-vis Biomedical Technologies in India"* has earned him the LL.M. degree from Mumbai University. He is an Advocate & Scientific Advisor at the Bombay High Court and is a registered *Patent Attorney*. He has been a Research Fellow at the Institute of Intellectual Properties, University of Tokyo, Japan in 1999.

Dr. Singh has played a pivotal role in the development of IPR Laws in India and in particular the "Indian Patent Act - 1970 (as amended 2005)", "Biodiversity Act 2002" and "The Plant Variety & Farmers Rights Act 2001".

His experience at various Courts relates not only to IPR issues at the Mumbai Patent Office but other laws also such as Constitutional remedies, Public Interest Litigations, medical negligence, tenancy & cooperative society laws, corporate laws and cases complicated by Indian personal laws for succession, adoption, maintenance & matrimonial disputes. He has indulged in petitions at the Supreme Court of India & in the High Court and other courts of London.

He is currently a member of the Editorial Board of (i) International Journal of Nuclear Law and (ii) Atom For Peace - An international Journal and has written extensively on the legalities of the Indo-US Civil Nuclear Cooperation. He has published 2 review papers and as a Guest Editor he edited a Special Issue of AFP exclusively devote to this controversy.

Dr. Singh is also a social activist involved in national policies through the Swadeshi Jagaran Movement, Bharat Vikash Parishad and Forum for Integrated National Security. He is also a member of various international movements like Rotary Clubs and Masonic fraternities in India and abroad.

Dr. B. Singh is recipient of various Awards most significantly (i) Ward Vidyant Gold Medal, (ii) Jack Goldberg Award, Health Sciences University of Portland, USA, (iii) Society for Cancer Research and Communication Award, (iv) Service to Freemasonry Award, and (v) Swatantryaveer Savarkar Award.

Dr. B.B.Singh was born on 20th January 1938 in the Pratapgarh District of U. P. and had his early education in Rae Bareli. His hobbies include gemology and herbal medicine.

His wife Kajal is an accomplished singer and music composer. She has given numerous stage performances in India, Nepal, USA and Europe. She has worked as Music Director in various Hindi & Bhojpuri films of the Bollywood and in TV serials in India. She was specially required to choreograph for the performance of les pecheurs de perles (The Pearl Fishers), the famous French Opera composed in 1863 by George Bizet in various cities of Europe.

4. FROM ARCHIVES OF RADIATION SCIENCES

Paper: Tumor regression as a guide to prognosis: a study with experimental animals

Source: British Journal of Radiology, 1977, Vol. 50, page 271-278

Author: Juliana Denekamp

Laboratory: Gray Laboratory, Mount Vernon Hospital, Northwood, Middlesex HA62RN

Highlights of the paper: The paper investigates the tumor regression was studied in mammary carcinomas transplanted subcutaneously in C3H mice in ventral thorax region. These tumors were irradiated with 240 kV X-rays when they reach a mean diameter of 6 ± 1 mm. Tumors considered locally controlled, if they were less than 4 mm or less at 150 days. If they were 6 mm or higher at any time before 150 days, they were considered recurrent tumors. A significant correlation was observed between shrinkage and local control after 150 days for the fractionated radiation dose schedule. A weaker correlation was observed for shrinkage within a week after single doses.

Significance of the paper: The paper is one of seminal paper to show and postulate the tumor regression as prognostic marker for therapy. The paper suggested role of reoxygenation during dose fractionation irradiation in determining the radio-sensitivity of tumor cells. Moreover, the paper provided models of kinetics of regression in tumors of different radio-sensitivity. It has been suggested that the tumor types like carcinomas showing faster regression with faster re-oxygenation and hence better response to fractionated doses of radiotherapy. In contrary, the sarcomas, show different (slower) kinetics in tumor regression, hence, slower re-oxygenation and hence, poor clinical outcome of fractionated doses of radiotherapy. The knowledge holds high significance in clinical radiation oncology and suggests requirement of rationale based cancer radiotherapy protocols.

by

Badri N. Pandey

Radiation and Cancer Biology Section Radiation Biology and Health Sciences Division Bhabha Atomic Research Centre, Mumbai-400 085, India **Email:** badrinarain@yahoo.co.in

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

• Fertility drugs increase cancer risk

http://www.newscientist.com/article/mg20026864.700-fertilitydrugs-increase-cancer-risk.html?DCMP=NLCnletter&nsref=mg20026864.700

• Mammographic screening for young women with a family history of breast cancer: knowledge and views of those at risk

http://www.nature.com/bjc/journal/v99/n7/abs/6604672a.html

• Can weight loss prevent cancer?

http://www.nature.com/bjc/journal/v99/n7/abs/6604623a.html

• DNA Test for Breast Cancer Risk Draws Criticism

http://www.sciencemag.org/cgi/content/summary/322/5900/357?sa _campaign=Email/toc/17-October-2008/10.1126/science.322.5900.357

• Cancer special: Old killer, new hope

http://www.newscientist.com/article/dn15013?DCMP=NLCnletter&nsref=dn15013

- Performance of mitochondrial DNA mutations detecting early stage cancer
 BMC Cancer 2008, 8:285
 http://www.biomedcentral.com/1471-2407/8/285/abstract
- Treatment of diffuse large B-cell lymphoma of the liver with yttrium-90 microsphere embolization http://www.nature.com/ncponc/journal/v5/n11/full/ncponc1227.ht ml
- Management of cardiovascular disease in patients with cancer and cardiac complications of cancer therapy http://www.nature.com/ncponc/journal/v5/n11/full/ncponc1225.ht ml

• Combination therapy of established cancer using a histone deacetylase inhibitor and a TRAIL receptor agonist

http://www.pnas.org/content/105/32/11317

• Complexities in the estimation of over diagnosis in breast cancer screening

http://www.nature.com/bjc/journal/v99/n7/abs/6604638a.html

- Radiation oncology health technology assessment? the best is the enemy of the good http://www.nature.com/ncponc/journal/v5/n10/full/ncponc1203.ht ml
- Vitamin D concentration does not affect the risk of prostate cancer http://www.nature.com/ncponc/journal/v5/n10/full/ncpuro1159.ht ml
- Strategies for discovering novel cancer biomarkers through utilization of emerging technologies

http://www.nature.com/ncponc/journal/v5/n10/full/ncponc1187.ht ml

• Anticancer drugs: Partnering to promote apoptosis

http://www.signalinggateway.org/update/updates/200810/nrd2687.html

• Resistance of human glioblastoma multiforme cells to growth factor inhibitors is overcome by blockade of inhibitor of apoptosis proteins

http://www.jci.org/articles/view/34120

Nuclear Technology & Safety

Bush signs off on nuclear combat ships

http://www.newscientist.com/blogs/shortsharpscience/2008/10/bus h-signs-off-on-nuclear-comb.html?promcode=nletter&DCMP=NLCnletter&nsref=blog1

- Gulf states plan for nuclear future http://www.nature.com/news/2008/080924/full/455438a.html
- Energy: time to consider heavy-metal nuclear coolants?

http://www.nature.com/nature/journal/v455/n7212/full/455461b.ht ml

Large Hadron Collider gears up for July restart

http://www.newscientist.com/article/mg20026854.400-large-hadroncollider-gears-up-for-july-restart.html?DCMP=NLCnletter&nsref=mg20026854.400

Science and Society

• Nobel Award 2008 in Physiology or Medicine to HIV and Physics in particle Physics

HIV, HPV Researchers Honored with Nobel prize in Physiology or Medicine. Read the Press Release of Nobel Foundation on http://nobelprize.org/

Nobel Prize in physics 2008 honors Yoichiro Nambu, Makoto Kobayashi, and Toshihide Maskawa for discoveries in particle physics. http://nobelprize.org/nobel_prizes/physics/laureates/2008/announcement.html

• India's rise to the Moon

http://www.nature.com/nature/journal/v455/n7215/full/455874a.ht ml

http://www.isro.org/chandrayaan-1/announcement.htm

What are India's future space plans?

http://www.newscientist.com/blogs/shortsharpscience/2008/10/wh at-are-indias-future-space-p.html?DCMP=NLC-nletter&nsref=blog3

• Humble sticky tape emits powerful X-rays

http://www.newscientist.com/article/dn15016?DCMP=NLCnletter&nsref=dn15016

- Global warming: Stop worrying, start panicking? http://www.pnas.org/content/105/38/14239.full
- Unknown Earth: Our planet's seven biggest mysteries http://environment.newscientist.com/article.ns?id=mg19926751.300
- The Misused Impact Factor

http://www.sciencemag.org/cgi/content/summary/322/5899/165?sa _campaign=Email/toc/10-October-2008/10.1126/science.1165316

6. LETTERS FROM THE READERS

- You are doing a great job with the news letter. This month's newsletter showed some of the conferences that are being held during the next 3 months.
 Dr. Srinivas Pentyala, Director of Translational Research & Associate Professor in Anesthesiology, Faculty Member in Urology, Physiology & Biophysics and Health Sciences, Stony Brook University Medical Center, Stony Brook, NY
- Thank you very much for the copy of issue 4 of Radiation Sciences Today that is quite informative.
 Prof. Jean Cadet, Scientific Adviser, French Atomic Energy Commission, CEA/Grenoble France
- This issue (Sept.) of the Newsletter is really great. Excellent work!!!! Well done!

-Dr CKK Nair, Professor, Dept.Radiation Biology, Amala Cancer Research Centre, Trichur, Kerala, India. Formerly, Scientific Officer (H) Head, Radiation Biochemistry Section, Radiat. Biol. & Health Sci.Div., BARC, Mumbai, India.

7. REPORTS OF MEETINGS/EVENTS ORGANIZED BY ISRB

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

The workshop was organized as pre-conference satellite meeting on Nov. 9, 2008 at Jaipur. The workshop was co-sponsored by Indo-Canadian Shastri Institute, Mc Master University, Ontario, Canada & International College for Girls, Jaipur.

The inauguration of the workshop took place at 9 am. The inaugural address was delivered by **Dr. P. P. S. Mathur**, Vice chancellor, Rajasthan University of Health Sciences, Jaipur. **Dr. P. K. Goyal**, Convener of the Workshop highlighted the activities of Indian Society for Radiation Biology (ISRB) and discussed about the workshop/ Symposia organized by the Society in the past as awareness programmes about Radiation & Cancer Research as well as the brief outline about the significance of the current International workshop.

Dr. Carmel Mothersill, Co-ordinator of workshop, presented the relevance of such workshop for scientific exchange among the participants of various countries & the need for radiation- induced bystander research.

Dr. M.R. Raju, Fellow Los Alamos, National Laboratory USA & Director of Mahatma Gandhi Memorial Medical Trust, Pedaamiram (A.P.) delivered the presidential address in which he highlighted radiation- induced bystander effects & their implication in cancer research. **Dr. P. K. Goyal** presented the vote of thanks at the end of inaugural function.

Total 210 participants (28 overseas & 182 Indian) attended the workshop. It included the participation from USA, UK, Canada, Japan, France, Germany, Korea as well as from various states of India.

The workshop included two scientific sessions. The pre-lunch session was focused on **Bystander effects & adoptive response**, which was chaired by **Dr. Mansoor M. Ahmed**, USA & **Dr. V. K. Kalia**, Bangalore. In this session, Dr. **Carmel Mothersill**, Mac Master University, Ontario, Canada delivered her talk on bystander effect & adaptive responses induced by radiation exposure. **Dr. M. Mohoiuddin**, Geisinger Clinic, Weis Center for Research, Danville, USA presented a talk on Grid radiation & bystander effects: clinical perspective. **Dr. Collin Seymour,** Mac Master University, Ontario, Canada focused his talk on Bystander effects and adaptive responses induced by radiation exposure. **Dr. Edouard I. Azzam,** New Jersey Medical School, Newark, USA delivered his talk on the impact of Bystander effects and adaptive responses in the health risks of low dose ionization-radiation: the modulating effect of linear energy transfer.

RADIATION SCIENCE TODAY

Post lunch- session was targeted on Bystander effects & radio therapy which was chaired by

Dr. Colin Seymour, Canada & Dr. Rao Pepineni, USA. In this session Dr. Munira Khadim from Oxford Brooks University, Oxford, USA. Presented her talk on Bystander mechanisms mediate the induction of genomic instability. Elisabeth Schultke, Dr. University of Saskatoon, Canada, focused her talk on Synchrotron radiotherapy for patients with malignant

लम्बे समय से हैं प्रयासरत

भाभा एटॉमिक रिसर्घ सेंटर, मुम्बई के बी. एन. पांडे ने बताया कि रेडिएशस

10 NOVEMBER 200R

'कैंसर रिसर्च एवं उपचार में रेडिएशंस का प्रभाव' विषय पर इंटरनेशनल वर्कशॉप रिएक्शन का सम

र्भण्टन तत्र क मुख्य अठाव राज्यस्थानं युजवाराटा आफ (कुरसपठि ग्रो. दी.पी. एस. साथुर वे। कार्यसाल के दौरान प्रथीय की जाने वाली अत्याधिक विकरण तकर्तक एवं अनियारित प्रभावों पर वर्च्य की गई। विशेषद्यों ने बतावा में कम रीडिजर वह प्रदर्शनाल बजके स्थाने जेने जले

प्रभावें में बचा जा सकता है। माथ ही रेडि

मानसरोवर स्थित आई.आई.आई. एम. संस्थान में रविवार को इंडियन सोसायटी फॉर रेडिएशन बायोलॉजी (आई.एस. आर. बी.) एवं डंटरनेशनल कॉलेज फॉर गर्ल्स के संयुक्त तत्वावधान में अंतरराष्ट्रीय स्तर की कार्यशाला में कैंसर रिसर्च एवं उपचार में रेडिएशंस का प्रभाव' विषय पर चर्चा की गई। बाहर से आए कई विशेषज्ञों ने इसमें अपना प्रजेंटेशन दिया।



DAILY NEWS IC NOVEMBER 2008



tumors-concept & brain challenges. Dr. Mansoor A Ahmed, University of Miami, Florida, USA, delivered lecture on Bystander therapy: a novel mode of treatment for lung cancer. Dr. B. N. Pandey, BARC, Mumbai presented his talk on Radiation induced bystander effects in improvement of cancer radiotherapy. Dr.

Lina Singh from Canada, delivered her talk on Radiation induced bystander effects in vivo in female mice and heir fetuses.

All the lectures were found to be very informative & followed with vital discussion. The deliberations of workshop were extensively covered by electronic as well as paper media in the form of personal interviews of faculty on various topics related to workshop.

A panel discussion was arranged at 4.10 pm in which Dr. Mansoor Ahmed, Dr. Edward Azzam, Dr. Carmell Mothersill & Dr. Colin Seymour were the panelists. At the end of the day, Dr. P. K. Goyal Convener extended thanks to all invited speakers, participants, colleagues, research students, volunteers, media people & others.

8. UPCOMING CONFERENCE & WORKSHOP OF ISRB

International Conference on Radiation Biology 2010

International Conference on Radiation Biology, 2010 (ICRB-2010) would be organized at Shri Ramachandra Medical College and Research Institute, Shri Ramachandra University, Porur, Chennai (Madras), India. The Conference would provide unique opportunity to participants for scientific presentations and interaction with eminent scientists from India and abroad. In addition, Chennai and surroundings cities, are famous for its historical monuments, temples, traditional culture, and are attractive tourist sites in India.

Date of Conference: To be announced, likely to be in Nov. 2010 **Abstract submission deadline:** To be announced **Registration deadline:** To be announced

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

Contact Person: Dr Solomon F.D. Paul, Email: wise_soly@yahoo.com

For more details, abstract submission, registration and time to time update about the Conference please contact on the email or see update in upcoming issues of eNewsletter.

9. UPCOMING MEETINGS/ WORKSHOPS

- National Conference on Bio-functions, Bio-diversity and Plant Resources Utilization, Dept of Botany, DDU Gorakhpur University, Jan 30-31, 2009, Contact Person: Dr V. N. Pandey/Dr M. Srivastava, Email: bbpru2009@yahoo.com, bbpru2009@gmail.com
- Workshop on Radiation and Multidrug Resistance Mediated via the Tumor Microenvironment, Dresden, Germany. February 9 10, 2009 www.oncoray.de

 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

- 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
- 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

- Annual Meeting of Society for Thermal Medicine, Tucson, AZ. April 3- 7, 2009
 www.radres.org/ECOMradres/timssnet/RadeFTP/STM_2009%20Meeting%2
 OAnnouncement.htm
- 100th Annual Meeting of American Association for Cancer Research, Denver, CO. April 18 – 22, 2009. www.aacr.org/home/scientists/meetings-workshops/aacr-100th-annual-meeting-2009.aspx
- Spatio-temporal Radiation Biology: Transdisciplinary Advances for Biomedical Applications Symposium, Sant Feliu de Guixols, Spain. May 16 – 21, 2009. www.esf.org/index.php?id=5241

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

10th International Conference on Health Effects of Incorporated Radionuclides (HEIR)

The HEIR 2009 conference will address subjects related to Early and lateoccurring health effects of radionuclides in man, including knowledge being gained from epidemiological investigations, cell and molecular studies, and measurement, bioassay and dose assessment methods relevant to human populations.

Information from experimental animal studies concerning mechanisms of deterministic and stochastic biological effects, dose-response relationships, uniformity of radiation dose distribution including microdosimetry, will be included.

New aspects of the use of radionuclides, particularly alpha-emitters, in medical therapy will also be addressed.

Important Dates

July 15, 2008: Announcement of the conference and call for papers

February 6, 2009: Deadline for receipt of abstracts

March 6, 2009: Notification of acceptance of abstract

April 17, 2009: Deadline for registration

May 11, 2009: Deadline for receipt of paper for publication

Web page: http://www.lrri.org/heir/

- Annual Meeting of Association for Radiation Research, Scotland. June 22

 24, 2009. www.arr2009.co.uk
- 55th Annual Meeting of Radiation Research Society, Savannah, GA. October 3 – 7, 2009.
 www.radres.org/ECOMradres/timssnet/common/tnt_frontpage.cfm
- 16th Annual Meeting of Society for Free Radical and Radiation Biology and Medicine (SFRBM), San Francisco, CA. November 18 - 22, 2009 www.sfrbm.org/annualMeetings.cfm

- Gordon Research Conferences in 2009 Web page: http://www.grc.org/
- 14th International Congress for Radiation Research 2011, August 2011 in Warsaw, Poland. http://www.ptbr.org.pl/icrr2011/icrr2011_venue.htm

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

AWARDS/HONORS TO ISRB MEMBERS 10.

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
Shri Amit Kumar	Radiation Biology and Health Sciences Division, Bhabha Atomic Research Centre, Mumbai	Best Poster Award for the paper 'Mechanism of Aggregation and Hemolysis in Human Erythrocytes by thorium' during Life Sciences Symposium, 2008, Bhabha Atomic Research Centre, Mumbai, Dec. 21-23, 2008	2008
Dr Ravindra M. Samartha	Senior Research Associate, Radiation & Cancer Biology Laboratory, Dept. of Zoology, Univ. Rajasthan Jaipur	Young Scientist Award, Indian Society for Radiation Biology at ICRB 2008, Nov. 10-12, 2008, Jaipur	2008

11. CAREER FORUM

Positions and Fellowships

NIH Director's New Innovator (DP2) Award program to support new investigators of exceptional creativity, which have the potential to produce a major impact on broad, important problems in biomedical and behavioral research. For more information visit the link **http://nihroadmap.nih.gov/newinnovator/** and to view the 2009 Program Announcement **http://grants.nih.gov/grants/guide/pa-files/PAR-09-013.html**.

• 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_JobsFundinga ndFellowships.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**.

12. 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

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- Response of pulmonary artery intimal sarcoma to surgery, radiotherapy and chemotherapy: a case report 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

• Classification of tumours

http://www.jeccr.com/content/27/1/70

• Ovarian cancer: emerging concept on cancer stem cells

http://www.ovarianresearch.com/content/1/1/4

13. OPEN ACCESS ARTICLES/SERIES OF ARTICLES

• Free Access to Featured Cell Research Articles

Featured articles cover topics including but not limited to: apoptosis, stem cells, cell growth and differentiation, signal transduction, immunology, neurosciences and much more!

http://www.nature.com/content/cr/best_of/index.html

• 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

• Bone Marrow Transplantation delivers articles in areas:

Hematopoietic stem cell transplantation, stem cell biology, transplantation immunology, kinetics and cytokine control, HLA and matching techniques, translational research, clinical results.

Visit www.nature.com/bmt

- IKKa, a critical regulator of epidermal differentiation and a suppressor of skin cancer http://www.nature.com/emboj/journal/v27/n20/abs/emboj2008196a.html
- Post-irradiation cutaneous angiosarcoma

http://www.casesjournal.com/content/1/1/241

 Tumor volume in subcutaneous mouse xenografts measured by microCT is more accurate and reproducible than determined by ¹⁸F-FDG-microPET or external caliper

http://www.biomedcentral.com/1471-2342/8/16/abstract

• Amplification of HER2 is a marker for global genomic instability

http://www.biomedcentral.com/1471-2407/8/297/abstract

• Triphala inhibits both *in vitro* and *in vivo* xenograft growth of pancreatic tumor cells by inducing apoptosis

http://www.biomedcentral.com/1471-2407/8/294/abstract

• Lung cancer response to treatment

http://www.nature.com/clpt/journal/v84/n4/pdf/clpt2008173a.pdf

• p21Cip1 restrains pituitary tumor growth

http://www.pnas.org/content/105/45/17498.abstract?etoc

 Dose volume histogram analysis of normal structures associated with accelerated intracavitary partial breast irradiation delivered by high dose rate brachytherapy and comparison with whole breast external beam radiotherapy fields

http://www.ro-journal.com/content/3/1/39/abstract

• Gamma probes and their use in tumor detection in colorectal cancer

http://www.issoonline.com/content/5/1/25/abstract

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

14. 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_RelatedSocieti es.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

15. 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/d escription#description

• Free Radical Biology and Medicine

http://www.elsevier.com/wps/find/journaldescription.cws_home/525469/d escription#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/d escription#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=jrr19 60

• 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/desc ription#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/d escription#description

16. RECENT BOOK

• ENERGY: Promising the Sun

Focusing on scientists who have attempted to harness fusion to generate power, Seife sketches the history of fusion research over the past six decades. http://www.sciencemag.org/cgi/content/summary/322/5906/1328a

17. CONTENTS OF INDIAN JOURNAL OF RADIATION RESEARCH

Indian Journal of Radiation Research (IJRR)

Volume: 5, No.:3-4, Year: 2008

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	This issue includes the abstracts of ICRB-2008. The complete list could not be included in the eNewsletter.	

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

18. 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%20Ap plication%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.

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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.

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INDIAN SOCIETY FOR RADIATION BIOLOGY

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