Radiation Research Society

Scholars In Training (SIT)

Newsletter – March 2013, Issue 127

Registration for RRS 2013 in New Orleans opens in April!

SIT REGISTRATION RATES

REGISTRATION TYPES	EARLY REGISTRATION until June 10, 2013	ADVANCE REGISTRATION until July 19, 2013	LATE REGISTRATION until September 14, 2013	ONSITE REGISTRATION September 15-18, 2013
SIT MEMBER	$285	$335	$400	$450
SIT MEMBER PRESENTING ABSTRACT	$185	$235	$300	$350
STUDENT NON-MEMBER	$550	$600	$675	$725

Tentative SIT Workshop Schedule RRS 2013

Theme: Low dose

8:30 am - 9:00 am: Registration/breakfast

9:00 am – 9:55 am: **Yosef Shiloh**, Tel Aviv University – Introductory speaker – “How I made my career accomplishments”

10:00 am – 10:40 am: **Doug Boreham**, McMaster University – bystander effect for low LET gamma-radiation

10:45 am – 11:00 am: Coffee Break

11:00 am – 12:00 pm: Interactive session

Career development: Training opportunities for radiation scientists in the US and Europe

– **Ming Lei**, National Cancer Institute National Institutes of Health
– **Iris Eke**, National Center for Radiation Research in Oncology, Dresden

12:15 pm – 1:15 pm: Lunch

1:30 pm – 1:55 pm: **Paul Wilson**, BNL – Effects of low LET ionizing radiation on normal, tumor and DNA damage signaling and repair-deficient cells, tissues and animal models

2:00 pm – 2:25 pm: **George Iliakis**, University of Duisburg-Essen – DNA damage from the perspective of a physicist

2:30 pm – 2:55 pm: **Carmel Mothersill**, McMaster University – Risks of very low doses of ionizing radiation to humans and the environment

3:00 pm – 3:15 pm: Coffee Break

3:15 pm – 3:40 pm: **Don Jones**, University of Leicester – Mechanisms, measurement and consequences of radiogenic, oxidative and drug- induced damage to DNA

3:45 pm – 4:10 pm: **Charles Limoli**, University of California, Irvine – The adverse effects of exposure to the space radiation environment, where in vitro and in vivo models are used to define biological responses to charged particle irradiation

4:15 pm – 4:40 pm: **Bill Morgan**, Pacific Northwest National Laboratory – Discussion session – Wrap up

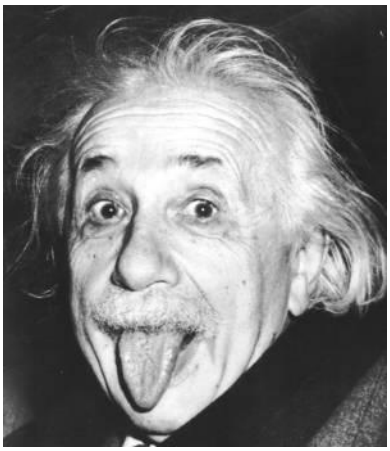
4:45 pm: Adjourn

Don’t forget we will have a SIT social following the workshop. Look for upcoming details!

New this year:

Ask you mentor and/or affiliation (University, hospital, etc) to contribute to the support of our workshops and SITs.

The pictures of supporters/institutions will be featured in the upcoming workshop.



Mentors Lunch Suggestions!

Do you have any suggestions for potential mentors for the “Mentors Lunch” event?

All SITs who contribute will have their names featured during this event!

Please send your suggestions to Elizabeth Moore; elmoore2@wakehealth.edu

New Website!

RRS has launched a new website!

We are still at the old address but now there are many new features, including a career section for SITs!

Please take the time to go through the website and explore the new networking opportunities we have for you!

SIT Publications

Are you a SIT member and just had a publication accepted?

Highlight your accomplishments here in the SIT Newsletter! Just email your citation and abstract to: **sit@radres.org**

Evidence for involvement of cytosolic thioredoxin peroxidase in the excessive resistance of sf9 lepidopteran insect cells against

radiation-induced apoptosis

Hambarde S, Singh V, Chandna S

PLoS ONE 8(3): e58261. 2013. doi:10.1371/journal.pone.0058261

Natural Radiation Response Mechanisms Group, Division of Radiation Biosciences, Institute of Nuclear Medicine and Allied Sciences, Delhi, India

Lepidopteran insect cells display 50–100 times higher radioresistance compared to human cells, and reportedly have more efficient antioxidant system that can significantly reduce radiation-induced oxidative stress and cell death. However, the antioxidant mechanisms that contribute substantially to this excessive resistance still need to be understood thoroughly. In this study, we investigated the role of thioredoxin peroxidase (TPx) in high-dose c-radiation response of Sf9 cell line derived from Spodoptera frugiperda, the Fall armyworm. We identified a TPx orthologue (Sf-TPx) in Spodoptera system, with primarily cytosolic localization. Gamma-irradiation at 500 Gy dose significantly up-regulated Sf-TPx, while higher doses (1000 Gy–2000 Gy) had no such effect. G2/M checkpoint induced following 500 Gy was associated with transition of Sf-TPx decamer into enzymatically active dimer. Same effect was observed during G2/M block induced by 5 nM okadaic acid or 10 mM CDK1 (cycline dependent kinase-1) inhibitor roscovitine, thus indicating that radiation-induced Sf-TPx activity is mediated by CDKs. Accumulation of TPx dimer form during G2/M checkpoint might favour higher peroxidase activity facilitating efficient survival at this dose. Confirming this, higher lethal doses (1000 Gy–2000 Gy) caused significantly less accumulation of dimer form and induced dose-dependent apoptosis. A ,50% knock-down of Sf-TPx by siRNA caused remarkable increase in radiation-induced ROS as well as caspase-3 dependent radiation-induced apoptosis, clearly implying TPx role in the radioresistance of Sf9 cells. Quite importantly, our study demonstrates for the first time that thioredoxin peroxidase contributes significantly in the radioresistance of Lepidopteran Sf9 insect cells, especially in their exemplary resistance against radiation-induced apoptosis. This is an important insight into the antioxidant mechanisms existing in this highly stress-resistant model cell system.

CyclinB1/Cdk1 phosphorylates mitochondrial antioxidant MnSOD in cell adaptive response to radiation stress

Candas D, Fan M, Nantajit D, Vaughan AT, Murley JS, Woloschak GE, Grdina

DJ, Li JJ.

J Mol Cell Biol 2013 [Epub ahead of print]

Department of Radiation Oncology, University of California at Davis, Sacramento, CA 95817, USA.

Manganese superoxide dismutase (MnSOD), a major antioxidant enzyme within the mitochondria, is responsible for the detoxification of free radicals generated by cellular metabolism and environmental/therapeutic irradiation. Cell cycle-dependent kinase Cdk1, along with its regulatory partner CyclinB1, plays important roles in the regulation of cell cycle progression as well as in genotoxic stress response. Herein, we identified the presence of the minimal Cdk1 phosphorylation consensus sequence ([S/T]-P; Ser106) in human MnSOD, suggesting Cdk1 as a potential upstream kinase of MnSOD. A substantial amount of CyclinB1/Cdk1 was found to localize in the mitochondrion upon irradiation. The enhanced Cdk1/MnSOD interaction and MnSOD phosphorylation were detected in both the irradiated human cells and mouse tissues. We report that CyclinB1/Cdk1 can regulate MnSOD through reversible Ser106 phosphorylation, both in vivo and in vitro. The CyclinB1/Cdk1-mediated MnSOD Ser106 resulted in increased MnSOD activity and stability, along with improved mitochondrial function and cellular resistance to radiation-induced apoptosis. These results demonstrate a unique pro-survival mechanism by which cells enhance the survival via CyclinB1/Cdk1-mediated MnSOD activation under genotoxic stress conditions.

Apoptosis is signalled early by low doses of ionising radiation in a radiation-induced bystander effect

Furlong H, Lyng F, Mothersill C, Howe O

Mutat Res. 2013 Feb 20. doi: 10.1016/j.mrfmmm.2013.02.001

It is known that ionising radiation (IR) induces a complex signalling apoptotic cascade post-exposure to low doses ultimately to remove damaged cells from a population, specifically via the intrinsic pathway. Therefore, it was hypothesised that bystander reporter cells may initiate a similar apoptotic response if exposed to low doses of IR (0.05Gy and 0.5Gy) and compared to directly irradiated cells. Key apoptotic genes were selected according to their role in the apoptotic cascade; tumour suppressor gene TP53, pro-apoptotic Bax and anti-apoptotic Bcl2, pro-apoptotic JNK and anti-apoptotic ERK, initiator caspase 2 and 9 and

effector caspase 3, 6 and 7. The data generated consolidated the role of apoptosis following direct IR exposure for all doses and time points as pro-apoptotic genes such as Bax and JNK as well as initiator caspase 7 and effector caspase 3 and 9 were up-regulated. However, the gene expression profile for the bystander response was quite different and more complex in comparison to the direct response. The 0.05Gy dose point had a more significant apoptosis gene expression profile compared to the 0.5Gy dose point and genes were not always expressed within 1h but were sometimes expressed 24h later. The bystander data clearly demonstrates initiation of the apoptotic cascade by the up-regulation of TP53, Bax, Bcl-2, initiator caspase 2 and effector caspase 6. The effector caspases 3 and 7 of the bystander samples demonstrated down-regulation in their gene expression levels at 0.05Gy and 0.5Gy at both time points therefore not fully executing the apoptotic pathway. Extensive analysis of the mean-fold gene expression changes of bystander data demonstrated that the apoptosis is initiated in the up-regulation of pro-apoptotic and initiator genes but may not very well be executed to final stages of cell death due to down-regulation of effector genes.

Radiation damage on sub-cellular scales: beyond DNA

Byrne HL, McNamara AL, Domanova W, Guatelli S, Kuncic Z.

Phys Med Biol 2013: 58, 1251-1267, doi:10.1088/0031-9155/58/5/1251

Institute of Medical Physics, School of Physics, University of Sydney, Australia; Department of Physics, Technical University of Munich, Germany, Centre for Medical Radiation Physics, University of Wollongong, Australia

This study investigates a model cell as a target for low-dose radiation using Monte Carlo simulations. Mono-energetic electrons and photons are used with initial energies between 10 and 50 keV, relevant to out-of-field radiotherapy scenarios where modern treatment modalities expose relatively large amounts of healthy tissue to low-dose radiation, and also to microbeam cell irradiation studies which show the importance of the cytoplasm as a radiation target. The relative proportions of number of ionizations and total energy deposit in the nucleus and cytoplasm are calculated. We show that for a macroscopic dose of no more than 1 Gy only a few hundred ionizations occur in the nucleus volume whereas the number of ionizations in the cytoplasm is over a magnitude larger. We find that the cell geometry can have an appreciable effect on the energy deposit in the cell and can cause a nonlinear increase in energy deposit with cytoplasm density. We also show that changing the nucleus volume has negligible effect on the total

energy deposit but alters the relative proportion deposited in the nucleus and cytoplasm; the nucleus volume must increase to approximately the same volume as the cytoplasm before the energy deposit in the nucleus matches that in the cytoplasm. Additionally we find that energy deposited by electrons is generally insensitive to spatial variations in chemical composition, which can be attributed to negligible differences in electron stopping power for cytoplasm and nucleus materials. On the other hand, we find that chemical composition can affect energy deposited by photons due to non-negligible differences in attenuation coefficients. These results are of relevance in considering radiation effects in healthy cells, which tend to have smaller nuclei. Our results further show that the cytoplasm and organelles residing therein can be important targets for low-dose radiation damage in healthy cells and warrant investigation as much as the conventional focus of a high-dose radiation DNA target in tumour cells.

Upcoming Professional Meetings and Courses

It is with great pleasure to announce **the 8th European Molecular Imaging Meeting** - the EMIM 2013 and to invite you to Torino, Italy!

As in previous years, this high-level meeting will foster the strong network of the Molecular Imaging Community. EMIM 2013 will bring together top scientists from various disciplines, working in diverse fields of Molecular Imaging, provide a platform for knowledge exchange between the disciplines, generations, and societies, strengthen the interaction between the groups and everybody who is sharing our vision that interdisciplinary knowledge exchange is the basis for innovation.

Date: 26 to 28 May, 2013
Venue: Torino Incontra - Centro Congressi, Torino, Italy

Call for late-breaking abstracts: April 9th – 15th

For more information and registration, please see the website;
http://www.e-smi.eu/index.php?id=2504

The Sixth Annual World Molecular Imaging Congress

September 18-21, 2013, Savannah, Georgia

2013 World Molecular Imaging Congress

The World Molecular Imaging Congress (WMIC) is led by the senior academic and industry professionals who have widely recognized expertise in molecular imaging. The scientific sessions held at the conference cover a broad spectrum of basic and translational sciences (pre-clinical to clinical) forming a Discovery-to-Delivery (D2D) process that helps facilitate academic and industrial partnerships. Through innovation, our goal is to optimize the D2D efforts leading to new medical and molecular imaging discoveries, greater linkages between research and market outcomes, and significant improvements in healthcare.

The World Molecular Imaging Society (WMIS) is a unique organization dedicated to developing and promoting preclinical and clinical multi-modal molecular imaging to understand and effectively treat life-threatening diseases. The field of molecular imaging is an exciting fusion of many different scientific fields including imaging technologies, molecular biology, and chemistry that is providing major new insights and advances into these diseases.

The Early Bird registration deadline is July 9th.
For more information, please see the website; http://www.wmicmeeting.org/

European Radiation Research Society

On behalf of the Irish Radiation Research Society, we invite you to attend the **40th Annual Meeting of the European Radiation Research Society** in Dublin from Sunday 1st to Thursday 5th September 2013.

The European Radiation Research Society (formerly the European Society of Radiation Biology) was founded in 1959 with the aim of promoting radiation research. The Annual Meeting of the Association for Radiation Research (UK) will be held jointly with ERR2013.

The scientific programme will cover all of the major disciplines of radiation science including physics, chemistry, biology, medicine, and radiation protection.

We look forward to welcoming you to Dublin!

Deadline for early registration: 6th June 2013

Conference dates: 1st – 5th September 2013

Submissions for the scientific programme are invited from interested participants. Proposals for oral and poster presentations will be accepted. Please see the conference website for details on the format of submissions and abstracts.

Please see the conference website www.err2013.ie for regular updates.

For further information on accommodation, social programme and registration please contact: Elva Hickey, Conference Partners Ltd, 2nd Floor, Heritage House, Dundrum Office Park Dundrum, Dublin 14, Ireland. Tel: + 353 1 296 9391 Fax: +353 1 296 8678 Email: elva@conferencepartners.ie

If you would like further information on the programme or the call for abstracts, please contact:

Fiona Lyng, DIT Kevin Street, Dublin 8. Tel: +353 402 7972 Email: fiona.lyng@dit.ie

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2013 ASTRO Annual Meeting

September 22 - 25, 2013

Georgia World Congress Center, Atlanta

ASTRO's Annual Meeting is the premier radiation oncology scientific event in the world and draws more than 11,000 attendees each year. During the 2013 Annual Meeting, we will look at patient-centered care and the importance of the physician's role in helping with patient reported outcomes and the quality and safety of patient care.

For more information, please see the website;

https://www.astro.org/Meetings-and-Events/2013-Annual-Meeting/Index.aspx

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2nd ESTRO Forum 2013

April 19-23, 2013

Geneva, Switzerland

Built on the success of the London Anniversary in 2011, the ESTRO Forum is following the concept of gathering several meetings reflecting the various aspects of the radiation oncology arena.

The Clinical & Translational meeting, the GEC-ESTRO-ISIORT meeting, the Physics Biennial meeting, the RTT meeting, and the PREVENT (Prediction, Recognition, EValuation and Eradication of Normal Tissue effects of radiotherapy) meeting will altogether foster interdisciplinarity and exchanges between the professionals of radiotherapy.

For more information, please see the website;
http://www.estro-events.org/ESTROevents/Pages/2eiof2013.aspx

RRS Resources

SIT Discussion board **SIT Facebook page** **RRS Podcast** **RRS BR-IDGE program**

Postdoctoral Fellowship Opportunities

Many different fellowships are being offered at the following websites. Check them out often!

http://www.kumc.edu/rrsnews/JobMart.htm

http://dceg.cancer.gov/reb/fellowships/generalinformation

Career Forum

Visit these links for job search opportunities and career information:
www.radres.org/jobs.htm, www.postdocjobs.com
www.nationalpostdoc.org/site/c.eoJMIWOBIrH/b.1464039/
www.nature.com (click on "job search" then "career magazine")
www.sciencemag.org (click on "Find a new job" under "careers")

SIT Contact Details

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