

9th Meeting of the Canadian Oxidative Stress Consortium

**University of Guelph
Guelph, Ontario, Canada
June 1st to 3rd, 2016**



**UNIVERSITY
of GUELPH**



UNIVERSITY
of GUELPH

9th Meeting of the Canadian Oxidative Stress Consortium

June 1st-3rd, 2016 - Guelph Canada
www.carleton.ca/cosc/9th-meeting

Table of Contents

Welcome from the Local Organizing Committee Chairs	1
Program at a Glance	2
Canadian Oxidative Stress Consortium Executive Committee	3
COSC 9 th Meeting Local Organizing Committee	4
Exhibitors & Workshops	5
Scientific Program	6
Keynote Speakers & Abstracts	13
Speakers Abstracts	15
Symposium I Metabolism	15
Symposium II Graduate Student Symposium A	19
Symposium III DNA Repair	23
Symposium IV Plants.....	28
Symposium V Graduate Student Symposium B	31
Symposium VI Cancer	35
Symposium VII Neuroscience	38
Symposium VIII Diabetes and Kidney Disease.....	41
Symposium IX Transcriptional Control and Immunology	44
Poster Titles	47
Poster Abstracts	51
Participants List	68



9th Meeting of the Canadian Oxidative Stress Consortium

June 1st-3rd, 2016 - Guelph Canada
www.carleton.ca/cosc/9th-meeting

Welcome to the 2016 Canadian Oxidative Stress Consortium

On behalf of the Local Organizing and Executive Committees, we are happy to welcome you to the **9th Meeting of the Canadian Oxidative Stress Consortium**, at the University of Guelph. This meeting boasts an outstanding scientific program that brings together Canada's leading researchers in the field of oxidative stress. The 2016 COSC meeting will consist of symposia focused in the following areas: 1) DNA repair 2) Regulation of Transcription 3) Neuroscience 4) Diabetes & Kidney Disease 5) Cancer 6) Metabolism 7) Plants.

One of the primary goals of The COSC is to improve training opportunities for graduate students and postdoctoral fellows in Canada. The 2016 COSC meeting will therefore highlight the work of both graduate and postdoctoral trainees, and offer awards to support travel as well as awards for outstanding presentations in student symposium and poster competitions. Moreover, the COSC strives to strengthen the ties between our academic members and our industry partners. We have therefore invited members of the biotechnology sector to showcase exciting new technology and offer workshops to encourage networking with our attendees. Indeed, this meeting would not be possible were it not for our sponsors, to whom we would like to thank for significant donations. We hope you enjoy the meeting and also take the time to enjoy the city of Guelph and its surrounding areas.

We look forward to you joining us for a meeting filled with opportunities for discussion and rich scientific exchange.

Sincerely,

Dr. Scott Ryan & Dr. Jim Uniacke
COSC 2016 Meeting Co-Chairs
University of Guelph

Mrs. Wafaa H. Antonious
COSC 2016 Meeting Organizer
Rofail Conference and Management Services

Program at a Glance

Day 1	Wednesday, June 1, 2016	Location	Session
8:00 AM	On-Site Registration	Rozanski Concourse	Coffee & tea will be served
8:50 AM	Opening Remarks	Rozanski 102	Jim Uniacke and Scott Ryan, COSC 2016 Meeting Co-Chairs
9:00 AM	Keynote Address	Rozanski 102	Alicia Kowaltowski
10:00 AM	Coffee & Tea Break	Rozanski Concourse	Refreshments will be served
10:30 AM	Symposium I	Rozanski 102	Metabolism
12:30 PM	Lunch/ Exhibitors/Open Poster viewing I	Rozanski Concourse	
	COSC Executive Meeting	Room 108	
2:00 PM	Symposium II	Rozanski 102	Graduate Student Symposium A
3:20 PM	Coffee & Tea Break	Rozanski Concourse	Refreshments will be served
3:50 PM	Symposium III	Rozanski 102	DNA Repair
6:30 PM	Opening Reception	Science Complex Atrium	Hors d'oeuvres and drinks will be served
Day 2	Thursday, June 2, 2016	Location	Session
8:30 AM	On-Site Registration	Rozanski Concourse	Coffee & tea will be served
9:00 AM	Keynote Address	Rozanski 102	Christine Foyer
10:00 AM	Coffee & Tea Break	Rozanski Concourse	Refreshments will be served
10:30 AM	Symposium IV	Rozanski 102	Plants
12:30 PM	Lunch/ Exhibitors/Open	Rozanski Concourse	
1:30 PM	Poster viewing II	Rozanski 102	Horiba Workshop
2:00 PM	Symposium V	Rozanski 102	Graduate Student Symposium B
3:05 PM	Coffee & Tea Break	Rozanski Concourse	Refreshments will be served
3:35 PM	Symposium VI	Rozanski 102	Cancer
6:00 PM	Banquet & Awards Presentations	Creelman Hall	Creelman Hall, 99 College Ave E, Guelph, ON N1G 1Y4
Day 3	Friday, June 3, 2016	Location	Session
8:30 AM	Information Desk Open	Rozanski Concourse	Coffee & tea will be served
9:00 AM	Symposium VII	Rozanski 102	Neuroscience
10:20 AM	Coffee & Tea Break	Rozanski Concourse	Refreshments will be served
10:50 AM	Symposium VIII	Rozanski 102	Diabetes and Kidney disease
12:10 PM	Lunch	Rozanski Concourse	
1:10 PM	Symposium IX	Rozanski 102	Transcriptional Control and Immunology
2:30 PM	End of COSC 9th Meeting		Closing Remarks/Conference Evaluation/Wrap-Up

**Canadian Oxidative Stress Consortium
Executive Committee**



Dr. Richard Austin
McMaster University
Department of Medicine
Rick.Austin@taari.ca



Dr. Diana Averill-Bates
Université du Québec à Montréal
Département des Sciences
biologiques averill.diana@uqam.ca



Dr. Brian Hasinoff
University of Manitoba
Department of Medicinal
Chemistry
B_Hasinoff@UManitoba.ca



Dr. Neelam Khaper
Lakehead University Campus
Northern Ontario School of
Medicine
nkhaper@nosm.ca



Dr. Christopher Perry
York University
School of Kinesiology & Health
Science, Muscle Health Research
Centre
cperry@yorku.ca



Dr. Richard Schulz
University of Alberta
Departments of Paediatrics and
Pharmacology
rschulz@ualberta.ca



Dr. Pawan Singal
St. Boniface Hospital Research
Centre
University of Manitoba, Institute
of Cardiovascular Sciences
psingal@sbrc.ca



Dr. Arno Siraki
University of Alberta
Department of Pharmacy &
Pharmaceutical Sciences
siraki@ualberta.ca



Dr. William Willmore
Carleton University
Department of Biochemistry
Bill_Willmore@carleton.ca

**Canadian Oxidative Stress Consortium 9th Meeting
Local Organizing Committee**



Dr. Scott Ryan
Co-Chair of 9th Meeting of COSC
College of Biological Science
University of Guelph
Department of Molecular and
Cellular Biology
sryan03@uoguelph.ca



Dr. Jim Uniacke
Co-Chair of 9th Meeting of COSC
College of Biological Science
University of Guelph
Department of Molecular and
Cellular Biology
juniacke@uoguelph.ca



Dr. David Josephy
College of Biological Science
University of Guelph
Department of Molecular and
Cellular Biology
djosephy@uoguelph.ca



Dr. Nina Jones
College of Biological Science
University of Guelph
Department of Molecular and
Cellular Biology
jonesmcb@uoguelph.ca



Dr. Bettina Kalisch
Ontario Veterinary College
University of Guelph
Department of Biomedical Sciences
bkalisch@uoguelph.ca



Dr. Gale Bozzo
Ontario Agricultural College
University of Guelph
Department of Plant Agriculture
gbozzo@uoguelph.ca



Mrs. Wafaa H. Antonious
COSC Conference Organizer
Rofail Conference and Management
Services
wantonious@rogers.com

Exhibitors

Please visit our exhibits at Rozanski Concourse



The **Ruskinn** brand, your trusted source for precise environmental control technologies, has now evolved into **Baker Ruskinn**, developing solutions for cell biology, stem cell and regenerative medicine, including accurate and stable anaerobic and hypoxia workstations, and precise oxygen regulation in culture media.

Visit them at: <https://www.bakerco.com/baker-ruskinn-welcome>



HORIBA Scientific manufactures the most sensitive, flexible, simple and affordable fluorimeters, including the products of Photon Technology International (PTI), for steady state and lifetime, including Modular, expandable open architecture, tabletop systems & ion ratio imaging microscopy solutions and tabletop systems including TCSPC and EEM/UV-VIS and CDOM analysis.

Visit them at: <http://www.horiba.com/scientific/>



A part of **Agilent Technologies**

Seahorse Bioscience metabolic analyzers and XF stress test kits are the industry standard for measuring cell metabolism, in real-time, in a microplate. XF Extracellular Flux Analyzers simultaneously measure the two major energy pathways of the cell - mitochondrial respiration and glycolysis - providing a full bioenergetic profile. Established in 2001, Seahorse Bioscience is a privately owned company, with headquarters in Billerica, Massachusetts, US, and regional offices in Copenhagen, Denmark and Shanghai, China

Visit them at www.seahorsebio.com



The world leader in serving science

Thermo Fisher Scientific Inc. (NYSE: TMO) is the world leader in serving science, with revenues of \$17 billion and approximately 50,000 employees in 50 countries. Our mission is to enable our customers to make the world healthier, cleaner and safer. We help our customers accelerate life sciences research, solve complex analytical challenges, improve patient diagnostics and increase laboratory productivity. Through our premier brands – Thermo Scientific, Applied Biosystems, Invitrogen, Fisher Scientific and Unity Lab Services – we offer an unmatched combination of innovative technologies, purchasing convenience and comprehensive support.

Visit them at www.fishersci.ca

9th Meeting of the COSC
Scientific Program

Wednesday – June 1, 2016	
8:00 – 9:00 AM Rozanski Concourse	On-Site Registration <i>Coffee & tea will be served</i>
8:50 – 9:00 AM Rozanski 102	Opening Remarks <i>By: Jim Uniacke and Scott Ryan, COSC 2016 Meeting Co-Chairs</i>
9:00 – 10:00 AM Rozanski 102	<p>KEYNOTE ADDRESS</p> <p>Sponsored by: CIHR – Institute of Genetics</p> <p>Mitochondria, the Flexible Alicia Kowaltowski, University of Sao Paolo, Sao Paolo, Brazil</p> <div style="text-align: right;">  <p>CIHR IRSC <small>Canadian Institutes of Health Research / Instituts de recherche en santé du Canada</small> Institute of Genetics</p> </div>
10:00 – 10:30 AM Rozanski Concourse	<i>Coffee & Tea Break</i> <i>Refreshments will be served</i>
10:30 AM – 12:30 PM Rozanski 102	<p style="text-align: center;">SYMPOSIUM I: Metabolism</p> <p style="text-align: center;"><i>Chair: Chris Perry, York University, Toronto, ON</i></p> <p>10:30 – 10:50 AM Function of redox buffering networks in controlling mitochondrial ROS production Ryan J. Mailloux, Memorial University, St. John's, NL</p> <p>10:50 – 11:10 AM Mechanisms and implications of mitochondrial dysfunction in the skeletal muscle aging process Gilles Gousspillou, Université du Québec à Montréal, Montréal, QC</p> <p>11:10 – 11:30 AM The roles of the stress adaptor protein p66Shc during early embryo development Dean Betts, Western University, London, ON</p> <p>11:30–11:50 AM Salicylate-based drugs: The mechanism of action revisited Brennan Smith, McMaster University, Hamilton, ON</p> <p>11:50 AM – 12:10 PM Mechanisms linking mitochondrial hydrogen peroxide production to skeletal muscle insulin resistance in vivo Daniel Lark, Vanderbilt University, Nashville, TN, USA</p> <p>12:10 – 12:30 PM Human mesenchymal stem cell isolation and culture: Are hypoxia mimetic agents' suitable alternatives to engineered oxygen control measure Nicholas Forsyth, Keele University, Stoke on Trent, Staffordshire, United Kingdom</p> <div style="text-align: right;">  </div>

12:30 – 2:00 PM Rozanski Concourse	Lunch – Poster Session and Exhibits
12:30 – 2:00 PM Room 108	COSC Executive Meeting
2:00 – 3:20 PM Rozanski 102	<p style="text-align: center;">SYMPOSIUM II: Graduate Student Symposium A <i>Chair:</i> Ann English, Concordia University, Montreal, QC</p> <p style="text-align: center;">2:00 – 2:20 PM <u>Plenary Talk:</u> Cytochrome C Peroxidase (CCP1), a protein at the crossroads of the stress response and heme trafficking in yeast Ann English, Concordia University, Montreal, QC</p> <p style="text-align: center;">2:20 – 2:35 PM Early onset of muscle-specific alterations in mitochondrial bioenergetics in the D2.B10-DMDmdx/2J mouse model of Duchenne Muscular Dystrophy. Megan Hughes, York University, Toronto, ON</p> <p style="text-align: center;">2:35 – 2:50 PM Epithelial DUOX2 regulates a specific subset of antiviral and proinflammatory cytokines during virus infection Natalia Zamorano, University of Montreal, Montreal, QC</p> <p style="text-align: center;">2:50 – 3:05 PM Reactive carbonyl species and the heat stress response during plant reproduction Vanessa Lundsgarrd-Nielsen, University of Toronto, Toronto, ON</p> <p style="text-align: center;">3:05 – 3:20 PM Reduced subcellular levels of breast cancer 1 protein (BRCA1) and increased DNA damage in embryonic tissue and fetal brain of untreated and ethanol-exposed BRCA1 knockout progeny Danielle Drake, University of Toronto, Toronto, ON</p>
3:20 – 3:50 PM Rozanski Concourse	<i>Coffee and Tea Break</i> <i>Refreshments will be served</i>

<p>3:50 – 5:50 PM Rozanski 102</p>	<p style="text-align: center;">SYMPOSIUM III: DNA Repair <i>Chair:</i> Louise Winn, Queen’s University, Kingston, ON</p> <p>3:50 – 4:10 PM Finally, a non-cardiotoxic doxorubicin analog Brian Hasinoff, University of Manitoba, Winnipeg, MB</p> <p>4:10 – 4:30 PM Oxoguanine glycosylase 1 (Ogg1) and methylmercury-induced DNA damage? Gimme a break! Peter McPherson, University of Toronto, ON</p> <p>4:30 – 4:50 PM Exercise-induced mitochondrial p53 repairs mtDNA mutations in mutator mice Adeel Safdar, McMaster University, Hamilton, ON</p> <p>4:50 – 5:10 PM Neurotoxicity initiated by nucleotide excision repair DNA lesions is rescued by 2’-deoxynucleosides Rebecca Laposa, University of Toronto, Toronto, ON</p> <p>5:10 – 5:30 PM CUX1 functions as an accessory factor in the repair of oxidative DNA damage Alain Nepveu, McGill University, Montreal, QC</p> <p>5:30 – 5:50 PM The effect of deletion of 8-oxoguanine glycosylase on aflatoxin B1 tumorigenicity in mice Jeanne Mulder, Queen’s University, Kingston, ON</p>
<p>6:30 – 8:30 PM Science Complex Atrium</p>	<p>Opening Reception <i>Come and join us for hors d’oeuvres and drinks</i></p> 

Thursday — June 2, 2016

<p>9:00– 10:00 AM Rozanski Concourse</p>	<p>KEYNOTE ADDRESS Glutathione: From the chloroplast to the nucleus Christine Foyer, University of Leeds, Leeds, UK</p>
<p>10:00 – 10:30 AM Rozanski Concourse</p>	<p><i>Coffee and Tea Break</i> <i>Refreshments will be served</i></p>
<p>10:30 AM – 12:30 PM Rozanski 102</p>	<p style="text-align: center;">SYMPOSIUM IV: Plants <i>Chair: Gale Bozzo, University of Guelph, Guelph, ON</i></p> <p>10:30 – 10:50 AM Stress and gamma-aminobutyrate metabolism in plants: An update Barry Shelp, University of Guelph, Guelph, ON</p> <p>10:50 – 11:10 AM The control of reactive oxygen species generation by terminal oxidase Allison McDonald, Wilfrid Laurier University, Waterloo, ON</p> <p>11:10 – 11:30 AM Localized control of oxidized DNA William Zerges, Concordia University, Montreal, QC</p> <p>11:30 – 11:50 AM Uriede metabolism in Arabidopsis in response to abiotic stress Chris Todd, University of Saskatchewan, Saskatoon, SK</p> <p>11:50 AM – 12:10 PM Plant cellular redox response to caterpillar herbivory: A tale of two cities Jacqueline Bede, McGill University, Montreal, QC</p> <p>12:10 – 12:30 PM Alternative oxidase respiration preserves both mitochondrial and chloroplast function during drought stress Greg Vanlerberghe, University of Toronto, Scarborough, Toronto, ON</p>
<p>12:30– 2:00 PM Rozanski Concourse</p>	<p>Lunch – Poster Session and Exhibits</p>
<p>1:30 – 2:00 PM Rozanski 102</p>	<p>WORKSHOP Quantitative Fluorescence Ratio Imaging in the Biosciences Michael Kovach, Horiba Canada, Inc.</p>  <p>The workshop will cover the principle of operation of the ratiometric technique and its various applications in biology. Topics include the required hardware and software, data acquisition and analyses and the key advantages of using a fast-scanning excitation monochromator. At the end of the workshop, attendees will have a good grasp of Ratiometric Ion Imaging and may perhaps find applications of the technique in their own work.</p>

<p>2:00 – 3:05 PM Rozanski 102</p>	<p style="text-align: center;">SYMPOSIUM V: Graduate Student Symposium B <i>Chair: Gale Bozzo, University of Guelph, Guelph, ON</i></p> <p>2:00 – 2:20 PM Plenary Talk: Is oxidative stress metabolism associated with physiological injuries in pome fruit? Gale Bozzo, University of Guelph, Guelph, ON</p> <p>2:20 – 2:35 PM S-gluthathionylation of two Cys residues in Arabidopsis thaliana cytosolic triphosphate isomerase Sébastien Dumont, University of Montréal, Montreal, QC</p> <p>2:35 – 2:50 PM Metabolic alterations in aging neurons: evidence linking plasma membrane lipid peroxidation and mitochondrial dysfunction Jonathon Lee, University of Calgary, Calgary, AB</p> <p>2:50 – 3:05 PM Amelioration of neurodegenerative disease related symptoms and pathology by Ubisol – Q10 Krithika Muthukumaran, University of Windsor, Windsor, ON</p>
<p>3:05 – 3:35 PM Rozanski Concourse</p>	<p><i>Coffee and Tea Break</i> <i>Refreshments will be served</i></p>
<p>3:35 – 5:15 PM Rozanski 102</p>	<p style="text-align: center;">SYMPOSIUM VI: Cancer Sponsored by CIHR Institute of Cancer Research <i>Chair: Gurmit Singh, McMaster University, Hamilton, ON</i></p> <p>3:35 – 3:55 PM The oncodynamic role of oxidative stress Gurmit Singh, McMaster University, Hamilton, ON</p> <p>3:55 – 4:15 PM Oxygen as a regulator of tumor cell plasticity Lynne-Marie Postovit, University of Alberta, Edmonton, AB</p> <p>4:15 – 4:35 PM Modulation of reactive oxygen species production by intergrin-like kinase Lina Dagnino, Western University, London, ON</p> <p>4:35 – 4:55 PM Inhibition of fatty acid oxidation selectively eliminates acute myeloid leukemia cells and leukemia stem cells through ROS-mediated apoptosis Paul Spagnuolo, University of Waterloo, Kitchener, ON</p> <p>4:55 – 5:15 PM Inhibition of autophagy sensitizes cells to hydrogen peroxide-induced apoptosis: Protective effect of thermotolerance acquired at 40°C Diana Averill-Bates, Université du Québec à Montréal, Montréal, QC</p> <div style="text-align: right;">  <p>CIHR IRSC Canadian Institutes of Health Research / Instituts de recherche en santé du Canada Institute of Cancer Research</p> </div>
<p>6:00 PM – 12:00 AM Creelman Hall</p>	<p>Banquet & Awards Presentation Reception & jazz band from 6:00 – 7:00PM - <i>Dinner will be served at 7:00 PM</i></p>

Friday – June 3, 2016	
<p>9:00 – 10:20 AM Rozanski 102</p>	<p>SYMPOSIUM VII: Neuroscience <i>Chair:</i> Robert Cumming, Western University, London, ON</p> <p>9:00 – 9:20 AM Aerobic glycolysis: food for thought or Achilles heel for Alzheimer’s disease Robert Cumming, Western University, London, ON</p> <p>9:20 – 9:40 AM Scavenging reactive oxygen species initiates GABAA receptor-mediated electrical suppression in anoxia-tolerant turtle neurons Leslie Buck, University of Toronto, Toronto, ON</p> <p>9:40 – 10:00 AM Lipid per oxidation, free fatty acids and neuronal aging Willem Wildering, University of Calgary, Calgary, AB</p> <p>10:00 – 10:20 AM Oxidative DNA damage and repair in embryopathies and neurodevelopmental deficits Peter Wells, University of Toronto, Toronto, ON</p>
<p>10:20 – 10:50 AM Rozanski Concourse</p>	<p><i>Coffee and Tea Break</i> <i>Refreshments will be served</i></p>
<p>10:50 AM – 12:10 PM Rozanski 102</p>	<p>SYMPOSIUM VIII: Diabetes and Kidney Disease <i>Chair:</i> Chris Kennedy, University of Ottawa, Ottawa, ON</p> <p>10:50 – 11:10 AM The role of Nox family members in diabetic kidney disease Chris Kennedy, University of Ottawa, Ottawa, ON</p> <p>11:10 – 11:20 AM Absence of TDAG51 confers protection against vascular calcification Gabriel Gyulay, McMaster University, Hamilton, ON</p> <p>11:20 – 11:50 AM The ShcD protein sensitizes the epidermal growth factor response (EGFR) to oxidative stress Melanie Wills, University of Guelph, Guelph, ON</p> <p>11:50AM – 12:10 PM Toll-like receptors and NADPH oxidase 5 activity; oxidative stress takes a toll on renal function Chet Holterman, Ottawa Hospital Research Institute, Ottawa, ON</p>
<p>12:10– 1:10 PM Rozanski Concourse</p>	<p>Lunch</p>

<p>1:10– 2:30 PM Rozanski 102</p>	<p style="text-align: center;">SYMPOSIUM IX: Transcriptional Control and Immunology <i>Chair:</i> Nathalie Grandvaux, Université de Montréal, Montreal, QC</p> <p>1:10 - 1:30 PM Regulation of NFE2L3 (NRF3) transcription factor degradation by FBW7 and GSK3 Volker Blank, McGill University, Montreal, QC</p> <p>1:30 – 1:50 PM NRF1: The lesser-known player in the antioxidant response William Willmore, Carleton University, Ottawa, ON</p> <p>1:50 – 2:10 PM Is DNA methylation dependent on the redox potential value of glutathione Jean-Claude Lavoie, Université de Montréal, Montreal, QC</p> <p>2:10 – 2:30 PM Anti-MPO produced from MPO-based protein free radicals. Implications for drug-induced agranulocytosis & lupus Arno Siraki, University of Alberta, Edmonton, AB</p>
<p>2:30 PM</p>	<p>Closing Remarks</p>

Looking forward to seeing you at the 10th COSC Meeting!

Keynote Lecture:



Dr. Alicia Kowaltowski, Universidade de São Paulo,
São Paulo, Brazil

Wednesday, June 1st, 2016 @ 9:00 AM

Dr. Kowaltowski is a prominent researcher in the field of free radical biology. She frequently chairs major meetings including the recent Gordon Research Conference on Oxygen Radicals: From Detection to Disease. Her research focuses on changes in mitochondrial energy metabolism, ion transport, and redox state are associated with a variety of physiological and pathological conditions including aging, obesity and heart attack. The central aim of this research group is to analyze the role of these alterations in physio-pathological conditions. A better understanding of the molecular mechanisms underlying the mitochondrial involvement in these processes will allow the development of interventions capable of controlling these unwelcome effects.

ABSTRACT

Mitochondria, the Flexible

Alicia Kowaltowski, Departamento de Bioquímica, Universidade de São Paulo, São Paulo, Brazil

We will discuss how mitochondrial form and function are altered in caloric restriction, a dietary intervention that enhances lifespan and healthspan. Caloric restriction protects the brain against excitotoxic stimuli by increasing Ca²⁺ uptake in mitochondrial. Caloric restriction also regulates insulin release by modulating islet mitochondrial dynamics. Finally, mitochondrial morphological changes are central for the differentiation of stem cells. Overall, our results show that mitochondrial form and function are intimately interconnected, and present central regulatory roles in energy metabolism.

Keynote Lecture:



Dr. Christine Foyer, University of Leeds,
Leeds, United Kingdom

Thursday, June 2nd, 2016 @ 9:00 AM

The Foyer lab is interested in the regulation of growth and development under optimal and stress (drought, chilling, high light, aphid infestation) conditions, with a particular focus on how cellular reduction/oxidation (redox) homeostasis and signalling interact with phytohormone-mediated pathways, particularly involving abscisic acid, auxin and strigolactones. Research focuses on ascorbate and glutathione as key regulators of plant responses to stress and on how redox processes associated with primary metabolism particularly photosynthesis and respiration regulate gene expression. Dr. Foyer directs the Human Health and Food Security Project in sub-Saharan Africa. Foyer's name is included in the "Foyer-Halliwell-Asada" pathway, a cellular process of hydrogen peroxide metabolism in plants and animals.

ABSTRACT

Glutathione: From the Chloroplast to the Nucleus

Christine Foyer, Department of Centre for Plant Sciences, University of Leeds, Leeds, United Kingdom

The low molecular weight thiol antioxidant, reduced glutathione (GSH) is a multifunctional metabolite in plants. GSH is an important redox gatekeeper that maintains redox homeostasis. It also participates in oxidative signalling pathways that regulate gene expression and determine the outcome of plant responses to stress. GSH is synthesised in chloroplasts, from thence is transported to all the compartments of the cell including the nucleus. Inhibition of glutathione synthesis leads to decreases the redox potential of the cytosol and the nuclei and to marked changes in gene expression. Low GSH availability leads to failure of the apical root meristem because of an arrest of the cell cycle at G1. GSH is recruited and sequestered in the nucleus early in the cell cycle by mechanisms that remain to be identified. The glutathione redox potential of the nuclei of root tip cells determined using redox-sensitive (ro-) green fluorescent protein was found to be the same as that of the cytosol (-295 +/- 2.5 mV). Using 3mM hydroxyurea to synchronise the cell cycle, we have followed the redox changes occurring in proliferating plant cells at the various stages of the cell cycle. Data will be presented showing that the glutathione redox potentials of the nuclei become more oxidised relative to the cytosol under different conditions.