

The 18th Annual International Conference on Dose-Response

PRECONDITIONING
IN BIOLOGY
AND MEDICINE

Adaptive Responses/
Preconditioning

The Annual Meeting of the
International **DOSE-RESPONSE** Society
www.Dose-Response.org

Conference Directors: Edward J. Calabrese, Ph.D., Paul Kostecki, Ph.D

April 16-17, 2019
University of Massachusetts
Amherst, MA

Adaptive
Bidirectional
Biphasic
Hormetic
Non-Monotonic
Yerkes-Dodson Law (Psychology)
U-Shaped
J-Shaped
Subsidiy-Stress Gradient (Ecology)
Reverse Dose-Responses



*Approved for CPH Recertification by the
National Board of Public Health Examiners*

PLATFORM PRESENTATIONS

TUESDAY, APRIL 16, 2019

8:00am: WELCOME/CONFERENCE OVERVIEW Edward J. Calabrese, Conference Director, *UMass/Amherst*
Day 1 Moderator: Edward J. Calabrese, *Environmental Health, University of Massachusetts, Amherst, MA*

PLENARY SESSION

8:30am Hormesis: Its Impact on Biology, Toxicology, and Medicine

Walter J. Kozumbo, *Hormesis Project, University of Massachusetts, Amherst, MA*

9:15am Radiation Hormesis: Its Significance and Applications

Douglas R. Boreham, *Northern Ontario School of Medicine, Sudbury, Ontario, Canada*

10:00am Break

10:30am Cancer as a Metabolic Disease

Thomas Seyfried, *Biology Department, Boston College, Chestnut Hill, MA*

11:15am Transposable Elements, Genomic Instability and Radiation; Barbara McClintock's Legacy in Modern Radiobiology

Carmel Mothersill, Andrej Rusin, and Colin Seymour, *McMaster University, Hamilton, Ontario, Canada*

LUNCH Noon - 1:30pm • Amherst Room, 10th Floor Campus Center

Session I: EXERCISE

1:30pm Digitizing Physical Activity Dose: Step Counting and Cadence Tracking

Catrine Tudor-Locke, *Department of Kinesiology, School of Public Health and Health Sciences, University of Massachusetts Amherst, Amherst, MA*

2:00pm Exercise-Induced Hormesis and Immobilization-Induced Dehormesis in Skeletal Muscle

Li Li Ji, *Laboratory of Physiological Hygiene and Exercise Science, University of Minnesota, Twin Cities, MN*

Session II: INTERMITTENT FASTING

2:30pm Harnessing the Benefits of Intermittent Fasting by Targeting Lysosomes

Abhinav Diwan, *Department of Internal Medicine, Washington University, St. Louis, MO*

3:00pm Break

3:30pm Prolonged Fasting Regulates Human CD4+ T Effector Cell Activation Via Novel Transcriptional Networks

Michael N. Sack, Kim Han, and Komudi Singh, *Laboratory of Mitochondrial Biology and Metabolism, NHLBI, Bethesda, MD*

TUESDAY EVENING POSTER SESSION & SOCIAL 5:30pm – 6:30pm • 10th Floor Campus Center

DINNER & AWARDS 6:30pm • Amherst Room, 10th Floor Campus Center

DINNER SPEAKER: Paul B. Selby, *Retired, Upper Arlington, OH*

The Selby-Russell Dispute Regarding the Non-Reporting of Critical Data in the Mega-Mouse Experiments of Drs. William and Liane Russell that Spanned Many Decades: What Happened, Current Status, and Some Ramifications.

PLATFORM PRESENTATIONS (cont.)

WEDNESDAY, APRIL 17, 2019

Day 2 Moderator: **Colin Seymour**, *Department of Medical Physics and Applied Radiation Sciences, McMaster University, Hamilton, Ontario, Canada*

Session III: ENHANCING RESILIENCE

8:00am Extending Biological Resilience by Modifying Both the Temporal and Spatial Dimensions of Hormesis/Conditioning

Rehana K. Leak, *Duquesne University, Graduate School of Pharmaceutical Sciences Pittsburgh, PA*

Edward J. Calabrese, *School of Public Health and Health Sciences, University of Massachusetts, Amherst, MA*

Walter Kozumbo, *Hormesis Project, University of Massachusetts, Amherst, MA*

8:30am Remote Ischemic Conditioning: Trials, Tribulations and Clinical Translation

Karin Przyklenk, *Cardiovascular Research Institute and Departments of Physiology & Emergency Medicine, Wayne State University School of Medicine, Detroit, MI*

Peter Whittaker, *Cardiovascular Research Institute and Department of Emergency Medicine, Wayne State University School of Medicine, Detroit, MI*

9:00am Remote Ischemic Conditioning for Acute Stroke and VCID

David C. Hess, Mohammad B. Khan, Babak Baban, and Krishnan Dhandapani, *Department of Neurology, Medical College of Georgia, Augusta, GA*

9:30am Pharmacological Induction of ER Stress to Model Sporadic ALS. Future Therapeutic Perspectives

Danilo B. Medinas and Claudio Hetz, *Biomedical Neuroscience Institute, University of Chile, Santiago, Chile*

10:00am BREAK and HOTEL CHECK OUT

10:30am Biomarker Development for Aerobic Exercise: Applications for Assessing Performance and Pathology

Michel Modo, *University of Pittsburgh, Pittsburgh, PA*

Co-Authors: Harman Ghuman, Jeffrey Moorhead, Madeline Gerwig, Lauren Grice, Nikhita Perry, Alex Poplawsky, Franziska Nitzsche, Brendon Wahlberg, and Fabrisia Ambrosio, *University of Pittsburgh, Pittsburgh, PA*

11:00am Stress Inducible Evolution from Bacteria to Cancer

Susan M. Rosenberg, *Department of Molecular and Human Genetics, Baylor College of Medicine, Houston, TX*

11:30am CONFERENCE CLOSING REMARKS

Colin Seymour, *Department of Medical Physics and Applied Radiation Sciences, McMaster University, Hamilton, Ontario, Canada*

LUNCH 11:45am - 1:00pm • Amherst Room, 10th Floor Campus Center

5:30pm – 6:30pm • 10th Floor Campus Center

Re-Evaluation of a Low Dose Radiogenic Cancer Database

Maureen A. Cottrell, Edward J. Calabrese, Denise A. Leonard, *University of Massachusetts, Public Health and Health Sciences, Amherst, MA*

Hormesis in Physical Therapy: Using a Manual Ischemic Preconditioning Technique to Improve Outcomes Post Knee Arthroplasty

Vinita Chandra-Mody, *Stroma Physical Therapy, New York, NY*

Reproductive Cell Death Following Low-Dose Ionizing Radiation is Exacerbated by Serotonin in Human Colon Carcinoma Cells

Jacob J. Curtis, **Nguyen T.K. Vo**, *McMaster University, Department of Biology, Hamilton, Ontario, Canada*
Colin B. Seymour, **Carmel E. Mothersill**, *McMaster University, Department of Biology, Radiation Sciences Graduate Program, Hamilton, Ontario, Canada*

Investigating Non-Targeted Effects Following Microbeam Radiation Therapy-Like Treatment in a Mouse Model and Cultured Cells

Rhea Desai, **Nguyen T. K. Vo**, *McMaster University, Department of Biology, Hamilton, Ontario, Canada*
Cristian Fernández-Palomo, **Valentin Djonov**, *University of Bern, Institute of Anatomy, Bern, Switzerland*
Colin B. Seymour, **Carmel E. Mothersill**, *McMaster University, Department of Biology, Radiation Sciences Graduate Program, Hamilton, Ontario, Canada*

The Effects of Low Dose Ionizing Radiation on HUVEC Exosome Cargo

Shay Freger, **Carmel E. Mothersill**, *McMaster University, Department of Biology, Radiation Sciences Graduate Program, Hamilton, Ontario, Canada*
Warren G. Foster, *McMaster University, Department of Obstetrics & Gynecology, Hamilton, Ontario, Canada*
Colin B. Seymour, *McMaster University, Department of Biology, Radiation Sciences Graduate Program, Hamilton, Ontario, Canada*

Non-Targeted Effects of Environmental Radiation Exposure in Insects and Mammals

Samuel J Hancock, *Department of Physics and Astronomy, McMaster University, Hamilton, Ontario, Canada*
Colin B. Seymour, *McMaster University, Department of Biology, Radiation Sciences Graduate Program, Hamilton, Ontario, Canada*
Laila Omar-Nazir, *Department of Physics and Astronomy, McMaster University, Hamilton, Ontario, Canada*
Jordi Vives i Batlle, *Belgian Nuclear Research Centre, Belgium*
Joji M Otaki, *BCPH Unit of Molecular Physiology, Department of Chemistry, Biology and Marine Science, University of the Ryukyus, Okinawa, Japan*
Atsuki Hiyama, *Laboratory of Conservation Ecology, Department of Integrated Science and Engineering for Sustainable Society, Chuo University, Tokyo, Japan*
Soo Hyun Byun, *Department of Physics and Astronomy, McMaster University, Hamilton, Ontario, Canada*
Nguyen T K Vo, *Department of Biology, McMaster University, Hamilton, Ontario, Canada*
Vladimir G Zainullin, *Department of Radioecology, Institute of Biology of Komi Science Centre, Ural Division of the Russian Academy of Science, Syktyvkar, Russia*

Rosa Goncharova, *Institute of Genetics and Cytology of the National Academy of Sciences of Belarus, Republic of Belarus, Minsk, Belarus*
Carmel E. Mothersill, *McMaster University, Department of Biology, Radiation Sciences Graduate Program, Hamilton, Ontario, Canada*

Characterizing the Radio-adaptive Response in The Human Colon Cancer HCT116 p53+/+ Cells

Jigar Lad, *McMaster University, Physics & Astronomy, Hamilton, Ontario, Canada*

Nguyen T. K. Vo, *McMaster University, Biology, Hamilton, Ontario, Canada*

Colin B. Seymour, **Carmel E. Mothersill**, *McMaster University, Department of Biology, Radiation Sciences Graduate Program, Hamilton, Ontario, Canada*

Attenuation of Liver Injury with Hypothermic Conditioning in Acute Hepatotoxicity

Yeong Lan Tan, **Han Kiat Ho**, *NUS Graduate School for Integrative Sciences & Engineering, Centre for Life Sciences, Singapore Department of Pharmacy, National University of Singapore, Singapore*

An Examination of Low Doses of Arsenic Trioxide on Human Keratinocytes with Implications for Homeopathy

Oshin Sharma, **Nguyen T.K. Vo**, *McMaster University, Department of Biology, Hamilton, Ontario, Canada*
Carmel E. Mothersill, **Colin B. Seymour**, *McMaster University, Department of Biology, Radiation Sciences Graduate Program, Hamilton, Ontario, Canada*

Defining the Dose Threshold Eliciting the Protective Radioadaptive Response In an Amphibian Cellular Model

Nguyen T.K. Vo, *McMaster University, Department of Biology, Hamilton, Ontario, Canada*
Colin B. Seymour, **Carmel E. Mothersill**, *McMaster University, Department of Biology, Radiation Sciences Graduate Program, Hamilton, Ontario, Canada*

Effects of Lead Exposure on Radiation Response in Human Colon Tumor Cells

Gary Wong, *McMaster University, Radiation Sciences Graduate Program, Hamilton, Ontario, Canada*
Fiona McNeill, *McMaster University, Department of Physics, Hamilton, Ontario, Canada*
Carmel E. Mothersill, **Colin B. Seymour**, *McMaster University, Department of Biology, Radiation Sciences Graduate Program, Hamilton, Ontario, Canada*

INTERNATIONAL DOSE-RESPONSE SOCIETY MEMBERSHIP

The **INTERNATIONAL DOSE-RESPONSE SOCIETY** is a professional society designed to enhance understanding of the nature of the dose response and its implications for science and society. Those Individuals with a professional interest in these areas are invited to join the Society. Applications for membership can be found at www.dose-response.org.

As part of the **INTERNATIONAL DOSE-RESPONSE SOCIETY** membership, each member will have access to the e-journal Dose-Response, which is a peer-reviewed quarterly journal. Members will receive a 25% reduction in registration fees to Dose-Response 2020: Preconditioning in Biology and Medicine, the Annual Meeting of the International Dose-Response Society.

International **DOSE-RESPONSE** Society
www.Dose-Response.org

To Become a Member, Visit www.dose-response.org

2019 INTERNATIONAL DOSE-RESPONSE SOCIETY AWARDS

OVERVIEW

*The International Dose-Response Society is proud to announce the Recipients of the annual awards for **Outstanding Career Achievement, Outstanding Leadership** and **Outstanding New Investigator**. These Awards are presented to individuals in each category who have made outstanding contributions to the field of Dose-Response.*

*This year's awards go to: **Thomas Seyfried**, for Outstanding Career Achievement. **Robert Golden and Paul Selby** for Outstanding Leadership. **Sujeenthar Tharmalingam** for Outstanding New Investigator. Congratulations to All!*

AWARDEE PROFILE: CAREER ACHIEVEMENT



THOMAS SEYFRIED

Thomas Seyfried, is Professor of Biology at Boston College, and received his Ph.D. in Genetics and Biochemistry from the University of Illinois, Urbana, in 1976. He did his undergraduate work at the University of New England where he recently received the distinguished Alumni Achievement Award. He also holds a Master's degree in Genetics from Illinois State University, Normal, IL. Thomas Seyfried served with distinction in the United States Army's First Cavalry Division during the Vietnam War, and received numerous medals and commendations. He was a Postdoctoral Fellow in the Department of Neurology at the Yale University School of Medicine, and then served on the faculty as an Assistant Professor in Neurology. Other awards and honors have come from

such diverse organizations as the American Oil Chemists Society, the National Institutes of Health, The American Society for Neurochemistry, and the Ketogenic Diet Special Interest Group of the American Epilepsy Society. Dr. Seyfried previously served as Chair, Scientific Advisory Committee for the National Tay-Sachs and Allied Diseases Association. He has received a Lifetime Achievement Award from the Academy of Complimentary and Integrative Medicine, the Mercola Recognition Award, and the Uncompromising Science Award from the American College of Nutrition for his work on cancer. He presently serves on several editorial boards, including those for Nutrition & Metabolism, Neurochemical Research, the Journal of Lipid Research, Frontiers in Nutrition, and ASN Neuro, where his is a Senior Editor. Dr. Seyfried has over 185 peer-reviewed publications and is author of the book, *Cancer as a Metabolic Disease: On the Origin, Management, and Prevention of Cancer* (Wiley Press). His book was recently translated into Chinese, and his full list of peer reviewed publications can be found on PubMed (www.ncbi.nlm.nih.gov/pubmed/?term=Seyfried+TN)

2019 INTERNATIONAL DOSE-RESPONSE SOCIETY AWARDS

AWARDEE PROFILE: LEADERSHIP



ROBERT GOLDEN

Robert Golden. During my 40-year career in Toxicology, I've been a consultant and expert witness in consequential and controversial issues including: **Agent Orange** (dioxin); **Woburn** (organic solvents; memorialized in *A Civil Action*), and **Love Canal**.

After receiving a PhD from the School of Public Health, University of Michigan (1975), I began my career at the National Academy of Sciences (NAS). The Safe Drinking Water Act had recently been passed and a key mandate directed NAS to devise a new way of doing risk assessment for carcinogenic chemicals that had been done by applying safety factors to the lowest dose that did not produce cancer in rodents.

The Biological Effects of Atomic Radiation (BEAR) subcommittee focused on radioactivity in drinking water. Two original members of the committee served with a goal of protecting the previous endorsement of Linear No Threshold (LNT). David Rall, then director of the National Institute of Environmental Health Sciences (NIEHS), and his colleague David Hoel, argued that LNT should be endorsed for chemical risk assessment. They set off a storm of controversy.

Toxicologists reluctantly agreed to endorse LNT based on a series of caveats, none of which were supportable based on present science. The EPA immediately began using LNT for chemical cancer risk assessment. Not generally appreciated, the next Safe Drinking Water Committee (SDWC), chaired by John Doull, rescinded their endorsement of LNT but reluctantly re-endorsed by the next SDWC.

In 2011-12, Ed Calabrese wrote about the dubious history of LNT prompting the initiation of the LNT Project. I contacted scientists in toxicology, radiation biology, epidemiology, risk assessment and an evolutionary biologist whose conclusion is most relevant:

"... If LNT were a biologically valid dose-response model, evolution of life on the earth would not have occurred."

Distorting LNT has staggering and unnecessary economic consequences. Millions of people refuse medically necessary diagnostic imaging due to LNT-driven fears of radiation while thousands of contaminated sites lie fallow due to unrealistic LNT-driven clean up levels.

AWARDEE PROFILE: LEADERSHIP



PAUL SELBY

Paul Selby, Born in 1945 and raised in Medford, Minnesota. Graduated from Medford High School, 1963; B.A., Westmar College (Le Mars, Iowa), 1967; Ph.D., 1972, The University of Tennessee, William L. Russell as dissertation advisor. Postdoctoral research 1972-1975, Gesellschaft für Strahlen- und Umweltforschung mbH in Neuherberg, West Germany. Employed by Oak Ridge National Laboratory (ORNL) in Oak Ridge Tennessee, 1969-1972, 1975-2000. Research topics: induction by radiation of specific-locus mutations, mainly in newborn and juvenile mice; induction in male mice of dominant mutations that cause skeletal malformations, cataracts, or stunted growth by radiation, ethylnitrosourea, or chlorambucil. Worked closely with Drs. William and Liane Russell (1966-1972

and 1975-1995) including providing statistical and database management support. Board certified in general toxicology, 1999-2014. Retired from ORNL in 2000, works part time as a consultant in toxicology primarily for EPA's contract with the Summitec Corporation in Knoxville, Tennessee. Received E.O. Lawrence Award from the Department of Energy in 1982. Served on the USA delegation to the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) for 21 years (1984, 1986-2006). Served on Biological Effects of Ionizing Radiation (BEIR) Committee III and the Committee on Chemical Environmental Mutagens (1983) of the U.S. National Academy of Sciences, and on the National Council on Radiation Protection and Measurement's Committee 89 (Genetic Effects from Internally Deposited Radionuclides). Developed the direct method of hereditary risk estimation that was applied in all five UNSCEAR annexes on hereditary effects from 1977 to 1993 and in the BEIR III Report. Played a significant role as an expert witness for the Defendants in two major court cases in which the Plaintiffs claimed that children of radiation-exposed fathers had hereditary effects: Hope Punnett et al. versus Jimmy Carter et al. and Reay and Hope versus British Nuclear Fuels plc.

AWARDEE PROFILE: NEW INVESTIGATOR



SUJEENTHAR THARMALINGAM

Dr. Sujeenthar Tharmalingam completed his PhD from the Department of Pharmaceutical Sciences at the University of Toronto where he specialized in molecular cancer biology and developmental neurobiology. Dr. Tharmalingam undertook postdoctoral fellowships at the University of Toronto (2014) and York University (2015) where he specialized in the molecular mechanisms that mediate autism and angiogenesis respectively. From 2016 – 2018, Dr. Tharmalingam has been actively involved in radiation biology research through a MITACS-funded postdoctoral fellowship under

the guidance of Dr. Douglas Boreham (world renowned radiobiologist) and Dr. T.C Tai (expert stress and developmental biologist). Throughout Dr. Tharmalingam's research training, he has developed expertise in multi-omics driven approach for understanding the molecular mechanisms that underlie biological systems. Starting January 2019, Dr. Tharmalingam has been appointed as Assistant Professor at the Northern Ontario School of Medicine (NOSM, Sudbury, Ontario, Canada). Dr. Tharmalingam is currently an independent early-career researcher in radiation sciences and will be developing a research program in molecular radiobiology. Dr. Tharmalingam's overall research interest lies in utilizing high-throughput "omics" based approaches to identify novel molecular effects of both low and high doses of radiation on cellular transformation and tumorigenesis.

ANNOUNCEMENT

*The 19th International Conference on
Adaptive Responses/Preconditioning
The Annual Meeting of the International Dose-Response Society
APRIL 14-15, 2020*

University of Massachusetts at Amherst

- *Adaptive • Bidirectional • Biphasic • Hormetic • Non-Monotonic • Yerkes-Dodson Law (Psychology)*
- *U-Shaped • J-Shaped • Subsidy-Stress Gradient (Ecology) • Reverse Dose-Responses*

TOPICS WILL INCLUDE:

PRE- POST-CONDITIONING

- Alzheimer's Disease/Dementia
- Parkinson's Disease
- Depression and PTSD
- Concussions/Traumatic Brain Injury
- Improving Surgical Outcomes
- Stroke/Cardiovascular Disease
- Diabetes
- Glaucoma
- Stem Cell Transplantation Therapy

HEALTHY LIFESTYLES, AGING AND LIFE EXTENSION

- Intermittent Fasting
- Exercise
- Chemical/Nutritional Supplements
- Low Dose Radiation and Longevity
- Adaptive response-based cosmetics

ENHANCING HUMAN PERFORMANCE

- Cognition
- Endurance, Strength and Speed
- Fatigue/Jet Lag: Prolong Onset/Speed Up Recovery
- Wound Healing Acceleration - skin, tendon, muscle, bone, and vascular

ENHANCING HEALTHY LIVING AND PERFORMANCE

Please visit our website for more information on Abstract Submission Guidelines

www.dose-response.org

For further Information contact: Edward J. Calabrese, Ph.D. or Paul T. Kostecki, Ph.D.
Environmental Health Sciences, Morrill I, N344, University of Massachusetts Amherst, MA 01003
Phone: (413) 545-3164 • FAX: (413) 545-4692 • edwardc@schoolph.umass.edu

DEADLINE FOR SUBMISSION: January 31, 2020

E-mail to mbglavin@umass.edu

INTERNATIONAL DOSE-RESPONSE SOCIETY

2019 Membership Form for New and Renewing Members

Please choose one membership category (Payment in US Funds):

- Individual Membership–1 year \$125–1 year
Individual Membership–2 years \$225–2 years
Retiree Membership–1 year \$75–1 year
Retiree Membership–2 years \$125–2 years
Post-Graduate Membership–1 year \$75–1 year (up to three years post-graduation)
Post-Graduate Membership–2 years \$125–2 years (up to three years post-graduation)
Student Membership–1 year \$10–1 year
Student Membership–2 years \$15–2 years
Sustaining Member \$1000/year
Corporate Membership \$5000/year

Additional Donation \$25 \$50 \$100 \$200

Renewal Membership New Membership

Please type or print clearly in ink only:

Last Name: _____ Middle Initial(s): _____

First Name: _____ Date of Birth: _____

Title: _____

Organization: _____

Department: _____

Street/PO Box: _____

City: _____ State: _____

Country: _____ Postal Code: _____

Telephone: _____ / _____ / _____
Country code Area code Number

Fax: _____ / _____ / _____
Country code Area code Number

Email Address: _____

Completed application form along with a check or money order in US dollars should be mailed to:

Dose-Response/BELLE Offices

Environmental Health Sciences Program, School of Public Health

Morrill 1, Room N344, University of Massachusetts

Amherst, MA 01003

Telephone: 413-545-3164 Email: Sorensen@ehs.umass.edu

Signature of Applicant

Date