

*The 5th International Conference on*

# **HORMESIS:**

**IMPLICATIONS FOR TOXICOLOGY,  
MEDICINE AND RISK ASSESMENT**

*The Annual Meeting of the  
International Hormesis Society*

**June 6 -8, 2006**

**University of Massachusetts, Amherst, MA**

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

**THRESHOLD • ADAPTIVE • BIDIRECTIONAL • BIPHASIC  
HORMETIC • NON-MONOTONIC • U/J-SHAPED • PARADOXICAL**



## DEAR COLLEAGUE,

The Hormesis Conference addresses some of the most critical challenges facing the field of toxicology, pharmacology, radiation biology and medicine today, that is, the significance of the biological effects of low level exposures. Toxicology is in rapid transition from that of a high dose hazard assessment profession to one that addresses the nature of more realistic exposures, which are predominantly in the low dose zone. Knowledge of low dose effects is becoming a driving force in the field of risk assessment and chemotherapeutics. This conference provides a significant opportunity to bring together leading scientists across the broad range of biological disciplines to seek common understandings on how biological systems respond to low level stresses and their implications within society. One of the critical goals of the conference is to recognize that professionals in different fields of biology have utilized different terminologies for similar appearing dose response phenomena. These terms include adaptive, bidirectional, dual effects, opposite effects, biphasic, hormetic, non-monotonic, u-shaped, j-shaped, and paradoxical. The convergence of scientists from multiple disciplines on this topic is designed to provide a greater interactive focus on the topic of low dose responses and hopefully prevent further professional/academic isolation with respect to language, concept and interpretation of low dose effects. The conference will also provide the most current advances in the areas of nature of the dose response with respect to chemical and radiation induced stresses as well as a host of effects of pharmaceutical agents that have profound biomedical and risk assessment implications. It is our hope that you share the belief that determining the nature of the dose response in the low-dose zone will drive the future of toxicology, pharmacology and risk assessment and will take the opportunity to attend this conference on **HORMESIS: IMPLICATIONS FOR TOXICOLOGY, MEDICINE AND RISK ASSESSMENT**

Edward J Calabrese, Ph.D.  
Paul T. Kostecki, Ph.D.  
*Conference Directors*

# INTERNATIONAL HORMESIS SOCIETY

A growing number of scientists, including toxicologists, pharmacologists, biostatisticians, epidemiologists, occupational and environmental medical researchers and others have begun to display considerable interest in the topic of hormesis, a dose response phenomenon characterized by a low dose stimulation and a high dose inhibition. While there are many professional societies that have a general interest in dose response relationships, none explicitly is devoted to the topic of understanding the nature of the dose response in general and hormesis in particular. The diversity of professional societies that may consider dose response issues, including hormesis is nonetheless quite broad ranging from the agricultural to the biomedical and clinical sciences. However, nearly without exception, these societies tend to be strongly organized around professional advancement and not focused on specific scientific concepts. This makes the issue of hormesis one of diffuse interest across a broad range of professions. The present situation represents a major obstacle for the integrated assessment of the dose response in general and hormesis in particular. In order to provide intellectual and research leadership on the topic of hormesis, a new professional association has been created called the International Hormesis Society (IHS).

The Society is dedicated to the enhancement, exchange and dissemination of ongoing global research efforts in the field of hormesis. In addition, the Society also strongly encourages the assessment of the implications of hormesis for such diverse fields as toxicology, risk assessment, risk communication, medicine, numerous areas of biomedical research, and all other biological disciplines including relevant engineering domains dealing with the dose response.

The International Hormesis Society is administered by the School of Public Health & Health Sciences at the University of Massachusetts at Amherst.

If you would like additional information about the society including information on becoming a member, please contact Judith Sanders at [JudithSanders@HormesisSociety.org](mailto:JudithSanders@HormesisSociety.org) or visit the society webpage [www.hormesisociety.org](http://www.hormesisociety.org).

# INTERNATIONAL HORMESIS SOCIETY MEMBERSHIP

The IHS 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 will be eligible for membership. Applications for membership can be found at [www.hormesisociety.org](http://www.hormesisociety.org). Annual membership rates are as follows: Corporate Membership \$5000 (US), Sustaining Membership \$1000 (US), Individual Membership \$125 (US), Retiree Membership \$75 (US), Post-Graduate Membership (up to three years post-graduation) \$75 (US) and Student Membership \$10 (US).

As part of IHS membership, each corporate and individual member will receive a subscription to the journal *Nonlinearity in Biology, Toxicology and Medicine*, which is a peer-reviewed quarterly journal. In addition there will be a Society Newsletter developed for the membership. Members will receive a 25% reduction in registration fees to the International Conference on Hormesis: Implications for Toxicology, Medicine and Risk Assessment, the Annual Meeting of the International Hormesis Society.

To Become a Member, Visit  
[www.hormesisociety.org](http://www.hormesisociety.org)

## PLATFORM PRESENTATIONS

### TUESDAY, JUNE 6, 2006

#### Morning

8:30am – Noon

#### Session I: PLENARY

**Moderator:** Paul Kostecki, *University of Massachusetts, Amherst, MA*

##### Phytochemical Hormesis

Mark P. Mattson, *Laboratory of Neurosciences, National Institute on Aging Intramural Research Program, Baltimore, MD*

##### Biphasic Dose-efficacy in Antiangiogenic Therapy

Judah Folkman, *Children's Hospital Boston, Boston, MA*

##### How Does the Concept of Adaptive Response In Radiation Relate to the Concept of Radiation Hormesis?

Ron Mitchel, *Chalk River Laboratories, Chalk River, Ontario, Canada*

##### Hormesis in Carcinogenesis: Evidence for a Threshold in Carcinogenicity of Non-genotoxic Environmental Carcinogens

Shoji Fukushima, *Osaka City University Medical School, Osaka, Japan*

#### LUNCHEON SPEAKER

Noon

##### THREE MILE ISLAND: A CASE FOR WHY WE NEED GOOD HISTORY

J. Samuel Walker, Ph.D., *Historian, US Nuclear Regulatory Commission, Washington DC*

#### Afternoon

1:30pm – 5:30pm

#### Session II: RADIATION

**Moderators:** Bobby Scott, *Lovelace Respiratory Research Institute, Albuquerque, NM*

##### Protective Bystander Effects Following Low Dose Ionizing Radiation Exposure

Carmel Mothersill, M. Kilemade, W. Prestwich, Alicia O'Neill, Zhengfeng Liu, and CB Seymour, *McMaster University, Hamilton, Ontario, Canada*

##### Adaptive Response in pK21 Mouse Prostate after Whole Body Exposure to Very Low X-Radiation Doses

Tanya Day, Gouxin Zeng, Antony M. Hooker, *Flinders University and Medical Centre, Bedford Park, SA; Australia* Madhava Bhat, *Adelaide Radiotherapy Centre, Adelaide SA, Australia; David R. Turner, Pamela J. Sykes, Flinders University and Medical Centre, Bedford Park, SA, Australia*

##### Radiation-Induced Neoplastic Transformation In Vitro, Hormesis and Risk Assessment

Leslie Redpath, *University of California Irvine, Irvine, CA*

##### Low Dose Radiation Exposure and Modulation of High Dose Effects on Embryogenesis and Heritable Mutations

Douglas R. Boreham, *McMaster University, Hamilton, Ontario, Canada*

##### Prolongation of Life Span of Disease Model Mice by Low Dose Rate Irradiation

Kazuo Sakai, *Central Research Institute of Electric Power Industry, Tokyo, Japan*

##### Biological System Response to Ionizing Radiation Invalidates the Linear-no-Threshold-Hypothesis

Ludwig F. Feinendegen, *Brookhaven National Laboratory, Upton, NY and Heinrich-Heine-University, Dueseldorf, Germany*

##### Smoking and Hormesis as Confounding Factors in Radiation Pulmonary Carcinogenesis

Charles L. Sanders, *Korea Advanced Institute of Science and Technology, Daejeon, Republic of Korea; Bobby Scott, Lovelace Respiratory Research Institute, Albuquerque, NM*

#### DINNER

6:30PM

##### Dinner Panel Discussion: The Media and Hormesis

Several journalists who have published articles on hormesis in leading national publications will discuss strategies, goals and challenges when writing about controversial topics such as hormesis. Participating Journalists:

Trevor Knoblich, *Associate Editor, Risk Policy Report, Inside EPA News*

Rebecca Renner, *freelance science writer*

David Stipp, *Fortune*

# PLATFORM PRESENTATIONS (cont.)

## WEDNESDAY, JUNE 7, 2006

Morning

8:30am – Noon

### Session III: TOXICOLOGY

**Moderator:** James E. Klaunig, *Indiana University of Medicine, Indianapolis, IN*

#### Oxidative Stress: Dose Responses and Application to Hormesis

Lisa Kamendulus, *Indiana University School of Medicine, Indianapolis, IN*

#### Activation of Adaptive Cellular Networks and Hormetic Dose Responses Relationships

Mel Anderson, Harvey J. Clewell, Annie M. Jarabek, Qiang Zhang, *CIIT Centers for Health Research, Research Triangle Park, NC*

#### Arsenic Induced Hormesis: Underlying Mechanisms and Timing

Elizabeth T Snow, Troy R Durham, Robert M Kozlovski, Peter Sykora, *Deakin University, Burwood, VIC Australia*

#### Unraveling the Mechanisms behind Hormesis in Plants

Nina Cedergreen, Jens C. Streibig, *The Royal Veterinary and Agricultural University, Tårstrup, Denmark*; Stephen O. Duke, *USDA, University of Mississippi, University, MS*

#### Hormesis Model Dominates Threshold Model in Large Scale NCI Anti-tumor Drug Screening Data

Edward J. Calabrese, Ph.D., Edward J. Staneck III, Ph.D., John W. Staudenmayer, Ph.D., *University of Massachusetts, Amherst, MA*; George Hoffman, *Holy Cross, Worcester, MA*

#### Nonlinear Dose-Response Mechanisms – Simulation with Bio-Mathematical Models

Helmut Schöllnberger, *University of Salzburg, Salzburg, Austria*; Ronald E.J. Mitchel, *Chalk River Laboratories, Chalk River, Ontario, Canada*; Douglas J. Crawford-Brown, *UNC, Chapel Hill, NC*; W. Hofmann, *University of Salzburg, Salzburg, Austria*

Afternoon

1:30pm – 5:00pm

### Session IV: PRACTICAL ISSUES WHEN USING HORMESIS IN RISK ASSESSMENT

**Chair:** Mike Dourson, *TERA, Cincinnati, OH*

#### Risk Assessment and Recognizing Hormesis During Hazard Identification

Beth Doyle, *EPA, Washington D.C.*

#### Mode of Action Understanding of Hormesis for Dose Response Assessment

Lynne Haber, *TERA, Cincinnati, OH*

#### Fluoridation as a Case Study in Hormesis

Chris DeRosa, *ATSDR, Atlanta, GA*

#### Meta-Hormesis for Uncertain Risks: Arsenic as a Case Study

Louis Anthony (Tony) Cox, Jr., *Cox Associates, Denver, CO*

#### Detailed Case Study of Hormesis for Radiation

Colin Seymour, *McMaster University, Hamilton, Ontario, Canada*

#### Open and Panel Discussion on the Practical Issues of using Hormesis in Risk Assessment

Lead by Michael Dourson, *Cincinnati, OH*

### LUNCHEON SPEAKER

Noon

#### STRESS RESPONSE MECHANISMS: FROM SINGLE CELLS TO MULTINATIONAL ORGANIZATIONS

**Richard J. Pech, Ph.D.,** *Director of Research at the Graduate School of Management, La Trobe University, Melbourne, Australia*

## DINNER

6:00PM

## ANNUAL MEETING OF THE INTERNATIONAL HORMESIS SOCIETY

## THURSDAY, JUNE 8, 2006

Morning

8:30am – Noon

### Session V: BIOMEDICAL

**Moderator:** Wayne Jonas, *Samueli Institute, Alexandria, VA*

#### Memory Molecules and Hormones

John E. Morley, M.B., B.Ch, Susan A. Farr, Ph.D., *Saint Louis University Health Sciences Center, St. Louis, MO*

#### Biphasic Dose Response of Steroid Hormone Action

Roberta Diaz Brinton, Ph.D., *University of Southern California, Los Angeles, CA*

#### Role of Hormesis in Life Extension by Caloric Restriction

Edward Masaro, *University of Texas Health Science Center, San Antonio, TX*

#### Hormesis, Control Theory, and Substance Use Disorders

David B. Newlin, *RTI International, Baltimore, MD*

#### Medical and Therapeutic Radiation Hormesis: Preventing and Curing Cancer

Bobby Scott, Jennifer Di Palma, *Lovelace Respiratory Research Institute, Albuquerque, NM*

#### Streptolysin O Enhances Keratinocyte Migration and Proliferation and Promotes Skin Organ Culture Wound Healing

Marjana Tomic-Canic, *Hospital for Special Surgery, New York, NY*; Stephen W. Mamber, *Beech Tree Labs, Delanson, NY*; Olivera Stojadinovic, *Hospital for Special Surgery, New York, NY*; Brian Lee, *Genentech, San Francisco, CA*; Nadezda Radoja, *NIAMS, Bethesda MD*; John McMichael, *Beech Tree Labs, Delanson, NY*

# CALL FOR PAPERS

*6th International Conference on*  
**HORMESIS: IMPLICATIONS FOR TOXICOLOGY,  
MEDICINE AND RISK ASSESSMENT**  
*The Annual Meeting of the  
International Hormesis Society*

**JUNE 5-7, 2007**

*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:**

- Molecular mechanisms
- Pharmacological effects
- Chemical and radiation toxicology
- Risk assessment implications
- Low-dose modeling
- Evolutionary foundations
- Ecological effects
- Clinical/therapeutic effects
- Psychological/behavioral responses
- Bioengineering processes
- Exercise science
- Epidemiology of low doses
- Industrial hygiene
- Legal implications

*Please visit our website for more information, Abstract Submission Guidelines and Abstract Submission*

**[www.hormesisociety.org](http://www.hormesisociety.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](mailto:edwardc@schoolph.umass.edu)

**DEADLINE FOR SUBMISSION - December 15, 2006**

*Submit online or e-mail to [dleonard@schoolph.umass.edu](mailto:dleonard@schoolph.umass.edu)*

*The 5th Annual International Conference on*  
**HORMESIS: IMPLICATIONS FOR TOXICOLOGY,  
 MEDICINE AND RISK ASSESSMENT**  
*The Annual Meeting of the International Hormesis Society*  
 June 6 - 8, 2006  
 Murray D. Lincoln Campus Center, University of Massachusetts, Amherst, MA

**R E G I S T R A T I O N F O R M**

**To Register:** Form should be received on or before **May 22, 2006** with full payment.  
 Mail or fax to: **University Conference Services - CS06-63**

**918 Campus Center  
 University of Massachusetts  
 Amherst, MA 01003  
 Phone: 413-545-0172 • Fax: 413- 545-0050**

For Office Use _____
Case No. _____
Ref. No. _____
Date _____
Payment _____
Confirmed _____

Mr.     Mrs.     Ms.     Dr.

First: \_\_\_\_\_ MI: \_\_\_\_\_ Last: \_\_\_\_\_

Title: \_\_\_\_\_ Company: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: Country: \_\_\_\_\_

Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_

Email: \_\_\_\_\_

**Registration:** *Includes all sessions and refreshment breaks*

Full Three Days .....	<b>\$399</b>
Full Three Days for International Hormesis Society Members* .....	<b>\$299</b>
Government and Academic Rate .....	<b>\$199</b>
Government and Academic Rate for International Hormesis Society Members* .....	<b>\$149</b>
Student Rate .....	<b>\$99</b>
Student Rate for International Hormesis Society Members* .....	<b>\$74</b>

\*Must be a member at the time of registration to receive the International Hormesis Society Members rate

**Lunch: \$20 each day**     Tuesday     Wednesday    **Lunch Total** \_\_\_\_\_

**Dinner: \$30 each day**     Tuesday     Wednesday    **Dinner** \_\_\_\_\_

**Note:** All registrations received after May 22, 2006, will be assessed a \$50 late fee    **Late Fee** \_\_\_\_\_

**Total** \_\_\_\_\_

Visa     Amex     Master Card     Diners     Discover     Check payable to UMass/Conference Services CS06-63

Card Number: \_\_\_\_\_ Expiration Date: \_\_\_\_\_

Name on Card (print): \_\_\_\_\_

Signature (all charges must be signed): \_\_\_\_\_

**Hotel Reservations: CONFERENCE ATTENDEES ARE RESPONSIBLE FOR THEIR OWN HOTEL RESERVATIONS**

Encumbered Purchase Orders will be accepted from institutions and agencies for the purpose of pre-registration only. Full payment including those pre-registrations secured by P.O. must be remitted at the on-site registration. Non-compliance will result in a \$35 processing fee for any resulting billings. Phone-in registrations will not be accepted. Cancellations made on or before May 30, 2006 will receive a full refund minus a \$35 cancellation fee. Cancellations after May 30, 2006 will be charged the \$35 cancellation fee plus any food service charge. Checks must be redeemable at US banks. Any processing fees will be billed to registrant. In order to process refunds we will need your personal social security number or your business identification number. There will be no refunds for cancellations made after June 2, 2006.

**For more conference information contact: INTERNATIONAL HORMESIS SOCIETY**  
**Phone: 413-545-3164 • Fax: 413-545-4692 • Email: dleonard@schoolph.umass.edu**

**Area Hotel Information** Registrants are responsible for making their own hotel arrangements. (We recommend you make reservations early)

<b>Amherst</b>	<b>Single/Double</b>	<b>Holyoke (cont.)</b>	<b>Single/Double</b>
Allen House Inn (413) 253-5000	\$85-135	Holyoke Holiday Inn (413) 534-3311	\$120-150
Amherst Motel (413) 256-8122	\$59-99	<b>Hadley</b>	<b>Single/Double</b>
Black Walnut Inn (413) 549-5649	\$95-120	Econo Lodge (413) 582-7077	\$73-160
Campus Center Hotel* (UMass) (413) 549-6000	\$86-105	Holiday Inn Express (413) 582-0002	\$109-169
Lord Jeffrey Inn (413) 253-2576	\$79-239	Howard Johnson (413) 586-0114	\$90-169
University Motor Lodge (413) 256-8111	\$59-139	Norwottuck Inn (413) 587-9866	\$65-139
<b>Deerfield</b>	<b>Single/Double (per adult)</b>	Quality Inn (413) 584-9816	\$75-145
Deerfield Inn (413) 774-5587	\$149-188	<b>Northampton</b>	<b>Single/Double</b>
Red Roof Inn (413) 665-7161	\$66-106	Autumn Inn (413) 584-7660	\$109-165
Yellow Gable (413) 665-4922	\$85-135	Best Western (413) 586-1500	\$79-129
<b>Holyoke</b>	<b>Single/Double</b>	Clarion Hotel (413) 586-1211	\$109-169
Country Inn & Suites (413) 533-2100	\$109-179	Hotel Northampton (413) 584-3100	\$160-215

\*For those attendees wishing to stay at the Campus Center Hotel where the conference will be held, telephone the hotel directly at (413) 549-6000.

IDENTIFY THE CONFERENCE AS HOTEL BLOCK 759.

University Conference Services does not guarantee the accuracy of any of the rates listed above. (Updated 6/2005)

**LOCATION AND TRAVEL INFORMATION**

The conference will take place in the Murray D. Lincoln Campus Center, University of Massachusetts at Amherst, located in the scenic Connecticut River Valley. Amherst is served by major airlines through Bradley International Airport in Windsor Locks, Connecticut (about 1 1/4 hours by car) and Logan Airport in Boston (about 2 1/2 hours by car). Rental cars and bus service are available from both airports.

The Valley Transporter provides a shuttle service to and from airports, Amtrak and bus stations to the University of Massachusetts. RESERVATIONS ARE REQUIRED for the Valley Transporter, call (800) 872-8752 or (413) 253-1350 for details.

**REGISTRATION**

All Registrations for the conference must be received by the University Conference Services no later than May 22, 2006 in order to avoid late registration fee of \$50.

To register for the conference please fill out and return the accompanying registration form to

**University Conference Services - CS06-63**

**918 Campus Center**

**University of Massachusetts**

**Amherst, MA 01003**

**Phone: 413-545-0172**

**Fax: 413- 545-0050**

For further information contact us at:

**INTERNATIONAL HORMESIS SOCIETY**

**Phone: 413-545-3164**

**Fax: 413-545-4692**

**Email: dleonard@schoolph.umass.edu**

**www.hormesissociety.org**

**FOR CONFERENCE INFORMATION** Please contact the conference coordinator: Denise Leonard 413-545-1239

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University of Massachusetts  
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