



**XXth Meeting of the
International Society of Arterial Chemoreception (ISAC)**

July 23 - 27, 2017

**Charles Commons, Johns Hopkins University
3301 N Charles St, Baltimore, Maryland 21218, USA**

**Making Sense Out of Sensing Hypoxia:
New Directions and Translational Perspectives throughout the Lifespan**

ISAC 2017 Organizing Committee:

Estelle B. Gauda, M.D.
Professor of Pediatrics, University of Toronto
President, ISAC 2014-2017
Director, Toronto Centre for Neonatal Health
Head, Division of Neonatology
Senior Associate Scientist, Research Institute
The Hospital for Sick Children, Toronto

Nanduri Prabhakar, Ph.D., D.Sc
Harold Hines Professor of Medicine
Director, Institute for Integrative Physiology and Center for Systems Biology of Oxygen Sensing
University of Chicago

Harold Schultz, Ph.D.
Professor of Physiology
Department of Cellular and Integrative Physiology
University of Nebraska College of Medicine

Chris Wyatt, Ph.D.
Associate Professor of Neuroscience, Cell Biology and Physiology
Wright University

2017 ISAC CONFERENCE PROGRAM

Sunday, July 23, 2017

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| 16:00 | Registration - Charles Commons, Johns Hopkins University (3301 N Charles St, Baltimore, MD 21218, USA) |
| 17:30-18:00 | Welcome Remarks <i>E. B. Gauda, President ISAC XX 2017</i> |
| 18:00 | Opening Reception with Dinner ♦ Tribute to Constancio González, M.D., Ph.D. (1949-2015) <i>N. Prabhakar</i> |

Monday, July 24, 2017

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| 7:15-8:10 | Breakfast (Posters to be placed on poster boards) |
| 8:15-8:30 | Open Remarks and Housekeeping <i>E. B. Gauda</i> |
| 8:30-9:30 | Keynote Speaker: Role of the Hypoxia-Inducible Factors in the Carotid Body <i>G. Semenza, 2016 Lasker Awardee</i> |

SESSION 1: Molecular Responses to Hypoxia - New Perspectives

Chair: C. Wyatt

ORAL COMMUNICATIONS

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| 9:30-9:45 | Dopamine and Histamine Inhibit Purinergic Calcium Signaling in Type II Cells of the Rat Carotid Body <i>E. M. Leonard, C. A. Nurse</i> |
| 9:45-10:00 | A Novel Index of Steady-State Respiratory Chemoreflex Drive During Incremental Ascent to High Altitude: Relationship to Acute Mountain Sickness <i>J. R. Pfoh, C. D. Bruce, E. R. Vanden Berg, E. M. de Freitas, K. Borle, L. R. Lavoie, G. Saran, A. Linares, R. Brandt, K. Tjandra, T. A. Day</i> |
| 10:00-10:15 | Hypoxia Regulates MicroRNA Expression in the Human Carotid Body <i>S. Mkrtchian, K. L. Lee, J. Kåhlin, A. Ebberyd, L. Poellinger, M. Jonsson Fagerlund, L. I. Eriksson</i> |
| 10:15-10:30 | Spinal Oxygen Sensors (SOS) - The Lost Central Cardiovascular Oxygen Sensor? <i>N. Barioni, F. Derakhshan, A. Roy, M. Baghdadwala, F. B. McDonald, E. C. Scheibli, M. B. Harris, M. Dutschmann, R. J. A. Wilson</i> |
| 10:30-11:15 | Coffee Break and Poster Viewing |

SESSION 2: Central Chemoreception - Oxygen*Chair: R. Wilson***11:15-12:15**

Plenary Lecture:
Oxygen Sensing in the Central Respiratory Network: Relevance to Disordered Breathing and Cardiorespiratory Control
J. M. Ramirez

ORAL COMMUNICATIONS**12:15-12:30**

CNS Mechanisms of Cardiorespiratory Homeostasis During Hypoxia in Conscious Rats
I. C. Wenker, R. L. Stornetta, P. G. Guyenet

12:30-12:45

Pro-Inflammatory Cytokines in the Nucleus of the Solitary Tract of Hypertensive Rats Exposed to Chronic Intermittent Hypoxia
M. P. Oyarce, R. Iturriaga

12:45-13:00

Acute Hypoxia Reveals a Developmentally-Inhibited Rhythm Generator for Lung Breathing in Pre-Metamorphic Tadpole Brainstem Preparations
T. A. Janes, J. P. Rousseau, S. Fournier, R. Kinkead

13:05-13:55

Lunch - Charles Commons

SESSION 3: Hypoxia Sensing in the Carotid Body - New Directions*Chair: A. Obeso***14:00-15:00**

Plenary Lecture:
Acute Oxygen-Sensing by the Carotid Body: A Rattlebag of Molecular Mechanisms
C. N. Wyatt

ORAL COMMUNICATIONS**15:00-15:15**

Evidence for Dopaminergic Inhibitory Cell-Cell Interactions in the Rat Carotid Body
E. M. Leonard, C. A. Nurse

15:15-15:30

Cysteine Oxidation in the Underlying Pathophysiological Mechanisms of Kidney Fibrosis Induced by Chronic Intermittent Hypoxia
N. R. Coelho, S. A. Pereira, M. Correia, A. R. Lemos, C. G. Dias, E. C. Monteiro, L. N. Diogo

15:30-15:45

Molecular Characterization and Localization of Ectonucleotidases in the Rat Carotid Body: Regulation by Chronic Hypoxia
S. Salman, C. Vollmer, G. B. McClelland, C. A. Nurse

15:45-17:00

Coffee and Poster Viewing

17:15-20:30

BUS PICKUP TIME FROM CHARLES COMMONS IS 17:15
 Evening Dinner Group: Crab Feast
 BO BROOKS Restaurant, Baltimore, Maryland

Tuesday, July 25, 2017

7:15-8:10 Breakfast

8:10-8:15 Housekeeping

SESSION 4: (Mal)adaptive Responses to Hypoxia - New Perspectives

Chair: C. Di Giulio

8:15-9:15 **Plenary Lecture:**
Epigenetics Regulation of Carotid Body Oxygen Sensing: Physiological Consequences from Fetus to Adult
J. Nanduri

ORAL COMMUNICATIONS

9:15-9:30 **Carotid Body Long-Term Facilitation Without CIH Preconditioning: Primarily a Post-Synaptic Mechanism Involving Phosphorylation of TRPV1 and other Post-Synaptic Receptors, Independent of H₂O₂**
A. Roy, R. J. A. Wilson

9:30-9:45 **Contribution of Relative Leptin and Adiponectin Deficiencies to Chronic Intermittent Hypoxia in Premature Infants**
E. B. Gauda, A. Mason, E. Paragon, M. K. Shin, S. Polotsky

9:45-10:00 **A New Role of Chronic Intermittent Hypoxia on Pathology: Spontaneous Tumorigenesis and Consequences**
M. T. Gallego-Martin, E. Gonzalez-Obeso, E. Olea, I. Docio, A. Rocher, A. Obeso

10:00-10:30 Coffee Break and Poster Viewing

SESSION 5: Role of Chemoreception in Disease - New Perspectives

Chair: J. Kåhlin

10:30-11:30 **Plenary Lecture:**
Translating Carotid Body Function in Clinical Medicine
R. Iturriaga

ORAL COMMUNICATIONS

11:30-11:45 **Lysophosphatidic Acid Stimulates the Carotid Body: Linking Inflammation and Carotid Sinus Nerve Activity**
N. G. Jendzjowsky, A. Roy, R. J. A. Wilson

11:45-12:00 **Carotid Sinus Nerve Resection Decreases Weight Gain and Fat Mass in a Rodent Model of Obesity**
B. F. Melo, C. S. Prego, M. C. Correia, M. D. Cabral, J. F. Sacramento, S. V. Conde

12:00-12:15 **Overactivation of Carotid Sinus Nerve Activity in High-Fat Animals is Mediated by A₂ Adenosine Receptors**
J. F. Sacramento, J. Prieto-Lloret, S. V. Conde

12:15-12:30 **Therapeutic Targeting of Carotid Body for Treating Sleep Apnea in a Pre-Clinical Model**
Y-J. Peng, X. Zhang, I. Chupikova, A. Gridina, J. Nanduri, S. H. Snyder, D. McCormick, M. Muzzio, N. R. Prabhakar

12:30-13:30 Lunch

SESSION 6: Role of Chemoreception in Disease - New Directions*Chair: S. Conde***13:30-14:30**

Plenary Lecture:
What Else Do the Carotid Bodies Do?
M. Joyner

ORAL COMMUNICATIONS**14:30-14:45**

Contrasting Effects of Acute and Chronic Progesterone Administration on Apnea Frequency in Newborn Male and Female Rats
N. P. Uppari, H. Kouchi, V. Joseph, A. Bairam

14:45-15:00

Erythropoietin Protects Against the Stress-Related Respiratory Dysfunction in Mice: Neural Control of Ventilation and Sex Dimorphism
E. Elliot-Portal, R. Kinkead, J. Soliz

15:00-15:15

Leptin Increases Blood Pressure Acting in the Carotid Body
M. K. Shin, C. Caballero, W-Y. Tang, B. Yeung, J. Sham, M. Shirahata, V. Y. Polotsky

15:15-16:30

Coffee and Poster Viewing

16:30-17:30

Business Meeting

17:30

Free Evening – Dinner on your own
Recommended city areas to visit: Fells Point, Inner Harbor, Harbor East, Canton or Charles Village (area outside Charles Commons)

Wednesday, July 26, 2017**9:30-20:30**

Site Seeing Group Activity (Washington DC and Dinner)

- ◆ 9:30 - Meet at Bus: Charles Commons
- ◆ To Washington - Mall, Museums, Galleries (free admission)
- ◆ 17:30 - Meet at Bus in DC
- ◆ 18:15-20:30 - Sequoia Restaurant on the Potomac River, Washington, DC (Happy Hour followed by Dinner)

Thursday, July 27, 2017**8:15-9:00**

Breakfast

SESSION 7: Role of Chemoreception in Disease - Early Development*Chair: A. Bairam***9:00-10:00**

Plenary Lecture:
Peripheral and Central Chemoreceptors in Sudden Infant Death Syndrome
A. Porzionato

ORAL COMMUNICATIONS**10:00-10:15**

Divergent Effects of Myo-Inositol on Respiratory Neural Control During Postnatal Development
P. M. MacFarlane, J. M. Di Fiore, R. J. Martin, A. Mayer, I. R. Bederman

10:15-10:30

Protection from SIDS: Perhaps it is in the Milk
E. B. Gauda

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| 10:30-11:15 | Coffee and Poster Viewing |
| SESSION 8: Role of Chemoreception in Disease - Aging <i>Chair: H. Schultz</i> | |
| 11:15-12:15 | Plenary Lecture: The Aging Carotid Body <i>C. Di Giulio</i> |
| 12:15-13:30 | Lunch and Poster Viewing |
| SESSION 9: Central Chemoreception - Carbon Dioxide <i>Chair: E. Monteiro</i> | |
| 13:30-14:30 | Plenary Lecture: Homeostatic Regulation of Arterial PCO₂ by the Retrotrapezoid Nucleus (RTN): Neural Circuits and Molecular Mechanisms of CO₂ Sensing <i>P. Guyenet</i> |
| SESSION 10: Molecular Responses to Hypercapnia - New Directions <i>Chair: R. Iturriaga</i> | |
| 14:45-15:45 | Plenary Lecture: Regulation of Inflammatory Gene Expression by Hypoxia and Hypercapnia <i>C. Taylor</i> |
| 16:00-16:10 | Announcements by E. B. Gauda Organizing Committee – Selection of Award Recipients (De Castro, Heyman, Neil Awards) |
| 16:10-17:30 | Free Time |
| 17:30 | Coach Bus - Leaves from Charles Commons to Peabody Library for GALA |
| 18:00-18:30 | Pre-Dinner Reception |
| 18:30-20:30 | GALA – Peabody Library, Johns Hopkins University Tribute to Machiko Shirahata, M.D. (1950-2016) <i>J. Sham</i> Machiko Shirahata ISAC Trainee Travel Awardees: Recognition of Awardees by Estelle Gauda, M.D. and Seva Polostky, M.D., Ph.D. De Castro Awards – Presentation of Certificates |
| 21:00 | Board Bus to Return from GALA |

POSTER PRESENTATIONS

PLEASE NOTE: Many talks will also be presented as posters. The list below represents only abstracts that will be presented as posters. Please can the numbered poster boards be left for the posters (1 through 15) noted below. Any other free poster boards are available for use by those who are providing posters as well as talks. All posters can remain on display for the duration of the meeting.

- P1. Hypoxia-Induced Rise in [Ca²⁺] in Rat Carotid Body Glomus Cells: Does it Involve Inhibition or Activation of BK/Kv?**
J. Wang, D. Kim
- P2. Expression and Function of TASK-1 and TASK-3 in Rabbit Carotid Body Glomus Cells**
D. W. Kang, J. Wang, J. O. Hogan, D. Kim
- P3. Molecular and Functional Analysis of T-Type Ca²⁺ Channels in Rat Carotid Body**
A. Rocher, I. Docio, T. Gallego, A. I. Caceres, E. Olea, E. Geijo-Barrientos, L. Almaraz
- P4. Mitochondrial Complex I Dysfunction and Oxygen Sensing in a FASTK-Deficient Mice Model**
A. Gomez-Niño, I. Docio, J. Prieto-Lloret, M. Simarro, A. Orduña, M.A. De la Fuente, A. Rocher
- P5. Topical Application of Connexin-Based Hemichannel Blocker Reduces Carotid Body-Mediated Chemoreflex Drive in Rats**
D. C. Andrade, R. Iturriaga, C. Toledo, C. M. Lucero, H. S. Díaz, A. Arce-Álvarez, M. Retamal, R. Del Rio
- P6. Guinea Pig as a Negative Model to Study the Carotid Body Mediated Chronic Intermittent Hypoxia Effects**
Docio, E. Olea, J. Prieto-Lloret, R. Rigual, A. Obeso, A. Gomez-Niño, A. Rocher
- P7. Lactate Sensing by Carotid Body Glomus Cells**
H. Torres-Torrel, I. Arias-Mayenco, P. Ortega-Sáenz, J. López-Barneo
- P8. Acute Effects of Systemic Erythropoietin Injections on Carotid Body Chemosensory Activity Following hypoxic and Hypercapnic Stimulation**
R. Iturriaga, D. C. Andrade, F. Jeton, N. Voituron, R. Del Rio
- P9. Leptin in the commissural nucleus tractus solitarii increases the glucose responses to carotid chemoreceptors activation by cyanide**
M. Lemus, C. Mojarro, S. Montero, V. Melnikov, M. Ramírez-Flores, E. Rocas de Álvarez-Buylla
- P10. High Fat Feeding in Rats Alters Respiratory Parameters by a Mechanism that is Unlikely to be Mediated by Carotid Body Type I Cells**
R. Rakoczy, R. L. Pye, T. H. Fayyad, J. M. Santin, B. L. Barr, C. N. Wyatt
- P11. Increased Day/Night Changes in Hypoxic Ventilatory Response in Chronic Heart Failure**
R. Lewis, B.T. Hackfort, H.D. Schultz
- P12. Effect of Chronic Hypoxia on Pulmonary Hypertension and Endothelial Function in the Rat**
Prieto-Lloret, I. Docio, E. Olea, A. Gomez-Niño, A. Rocher
- P13. Sexual Dimorphism on the Effects of Chronic Hypoxia in Rat**
E. Olea, I. Docio, J. Prieto-Lloret, T. Gallego, M. T. Agapito, A. Obeso, A. Rocher
- P14. Chronic Heart Failure Abolishes Circadian Rhythms in Chemoreflex Breathing**
R. Lewis, B. T. Hackfort, H. D. Schultz
- P15. Focusing on a Non-Invasive Measurement of Sympathetic Reactivity to Central and Peripheral Chemoreceptor Stimulation in Humans**
N. G. Jendzjowsky, C. D. Steinback, R. J. Herman, W. H. Tsai, F. E. Costello, R. J. A. Wilson