

WELCOME ADDRESS

The 1st International Conference on Persulfide and Sulfur Metabolism in Biology and Medicine is held at Tohoku University Graduate School of Medicine in Sendai, Japan, on September 9-11, 2019. We are most grateful to all invited speakers and participants attending this meeting, despite their busy schedules.

Persulfide signaling and metabolism are now rapidly developing in line with the chemical biology of reactive sulfur species, which are currently recognized worldwide as a brand-new, emerging scientific discipline of systematically combined fields of chemistry, biology, physiology, pathophysiology, and medicine. Several breakthroughs achieved by many researchers in this field now expanding the frontiers in basic research and clinical medicine including the topics of inflammation, immunity, cancer biology, metabolic syndromes, ageing, and even stem cell research. More importantly, this research area on persulfides can greatly promote the progress in various life science fields including agricultural and medical sciences, and human health.

The 1st Persulfide Conference promises to be an outstanding scientific event for all redox and sulfur researchers from all over the world, with exciting and productive possibilities for attendees to share the most up-to-date findings on persulfides. Participants will no doubt appreciate the high academic standards of the Conference and Japanese culture as well. We sincerely hope that you enjoy your stay and the rewarding scientific sessions and Conference-related events in Sendai.

Please consult the Conference website for further information and last-minutes update: <https://persulfideconference2019.jimdofree.com>.

On behalf of the Conference Organizers,

Takaaki Akaike, M.D., Ph.D.
Main Organizer

ACCESS

Campus in Sendai City



To approach the Seiryō Campus (Conference venue)

- **Sendai City Bus**

From JR Sendai Station: West Exit Bus Pool, No. 10, 15, 16;
Get on a bus for "Daigaku Byoin Keiyu" or "Kotsukyoku Daigaku Byoin Mae"
Get off the bus at "Daigaku Byoin Mae" (ca. 20 min, ¥180)

- **Sendai City Subway**

Take a Sendai Subway Namboku Line at Sendai Station for "Izumi Chuo", and get off the subway at "Kitayobancho" Station (ca. 5 min, ¥200)

- **Taxi**

From JR Sendai Station, Taxi Pool:
Ask for "Tohoku Daigaku Igakubu, Seiryō-chiku, or Tohoku University School of Medicine, Seiryō Campus" (ca. 10 min, ¥1,300)

·Each time varies with traffic situations



東北大学 星陵キャンパス

TOHOKU UNIVERSITY Seiryō Campus



Conference venue: Seiryō Auditorium (B10)
2-1, Seiryō-machi, Aoba-ku, Sendai, JAPAN

Seiryō Auditorium



SCIENTIFIC PROGRAM

Day 1: September 9, 2019

Opening Remarks 8:45-8:55

Takaaki Akaike (Tohoku University)

Session I: Chemistry and Chemical Biology 8:55-11:05

(Chair: Takaaki Akaike)

S-1-1 Control of protein function through oxidation and reduction of persulfidated states

8:55 Péter Nagy (National Institute of Oncology)

S-1-2 Are reactive sulfur species the new reactive oxygen species?

9:25 Kenneth R. Olson (Indiana University School of Medicine)

S-1-3 The interaction of persulfides with metals and metalloproteins

9:55 Jon M. Fukuto (Sonoma State University)

S-1-4 The protective effects of per- and poly-sulfides in cellular systems

10:25 Joseph Lin (Sonoma State University)

S-1-5 The chemical biology of per- and poly-sulfides: Realizing their potential

10:50 **biologic function and therapeutic utility**

Christopher L. McGinity (National Cancer Institute)

Session II: Signal Functions-1 11:15-12:40

(Chair: Péter Nagy)

S-2-1 A screen for small molecule regulators of cellular hydrogen sulfide levels

11:15 **reveals genotoxic stress as a major activator of endogenous H₂S production**

James R. Mitchell (Harvard T.H. Chan School of Public Health)

S-2-2 Red blood cells play a role in systemic sulfide metabolism

11:45 Miriam M. Cortese-Krott (Heinrich Heine University Düsseldorf)

S-2-3 Mitochondria-specific SQR knock-out mice cause lethal impairment of

12:15 **sulfur respiration**

Masanobu Morita (Tohoku University)

Session III: Signal Functions-2

13:40-15:30

(Chair: Miriam M. Cortese-Krott)

S-3-1 Persulfide signaling in LPS-initiated macrophage response

13:40 Yasuo Watanabe (Showa Pharmaceutical University)

S-3-2 Protein disulfide linkages as a target of oxidation

14:05 Koji Uchida (The University of Tokyo)

S-3-3 Integrating redox homeostasis and protein persulfidation activities of

14:30 **the thioredoxin system, the glutathione system, and the transsulfuration pathway**

Edward E. Schmidt (Montana State University)

S-3-4 Protein kinase G oxidation as a mediator of signalling induced by hydrogen

15:00 **sulfide and related molecular species**

Philip Eaton (King's College London)

Session IV: Stress Response and Diseases

15:40-17:45

(Chair: Martin Feelisch)

S-4-1 Genetic deficiency of 3-mercaptopyruvate sulfur transferase impairs

15:40 **mitochondrial function and exacerbates heart failure**

David J. Lefer (Louisiana State University School of Medicine)

S-4-2 Protein cysteine persulfide regulates mitochondrial quality and stress resistance

16:10 **of the heart against environmental stress**

Motohiro Nishida (National Institute for Physiological Science)

S-4-3 Fundamental role of sulfur modification of RNA in protein translation and

16:35 **its implication in human diseases**

Fan-Yan Wei (Kumamoto University)

S-4-4 Development of anti-oxidative intraocular irrigating solution based on

17:00 **reactive persulfides**

Hiroshi Kunikata (Tohoku University)

S-4-5 Disruption of reactive persulfide-dependent redox signal by exposure of

17:25 **electrophile in neuronal cells**

Shingo Kasamatsu (Osaka Prefecture University)

Super Short Talk: Young Scientists Oral Session I

17:50-18:20

(Chair: Akira Nishimura)

SS1-1 Positive regulation of protein-disulfide isomerase activity via S-persulfidation

Honami Ushirokawa (Okayama University)

SS1-2 Characterization of cysteine persulfide synthases in plant cells and cyanobacteria

Kota Kera (Tohoku University)

SS1-3 Chronological aging regulated by persulfide production via mitochondrial cysteinyl-tRNA synthetase expression depending on energy metabolism in yeast

Sunghyeon Yoon (Tohoku University)

SS1-4 Longevity regulation via sulfide: quinone oxidoreductase-dependent energy metabolism in fission yeast

Qamarul Hafiz Zainol Abidin (Tohoku University)

Super Short Talk: Young Scientists Oral Session II

18:20-18:50

(Chair: Hideshi Ihara)

SS2-1 The obligatory role of the S-sulfuration in reversibility of PTP1B activity

Yumi Abiko (University of Tsukuba)

SS2-2 Phase-zero reaction as a primary defense system against electrophilic stress in out of cell: Involvement of reactive persulfides

Masahiro Akiyama (University of Tsukuba)

SS2-3 Nrf2 and CSE act as critical molecules in parallel pathways for repression of environmental electrophile-mediated toxicity in mice

Yasuhiro Shinkai (University of Tsukuba)

Day 2: September 10, 2019

Session V: Signal Functions-3

9:00 -11:40

(Chair: Hozumi Motohashi and Tomohiro Sawa)

S-5-1 Sulfur and the stress of life – What may be the role of persulfides?

9:00 Martin Feelisch (University of Southampton)

S-5-2 Use of the purple photosynthetic bacterium *Rhodobacter capsulatus* as a model to study persulfide metabolism and signaling

9:30 Shinji Masuda (Tokyo Institute of Technology)

S-5-3 Pivotal role of sulfide catabolism in hypoxia tolerance

9:55 Fumito Ichinose (Harvard Medical School)

S-5-4 Role of sulfane sulfur in metallothionein-3 as a model zinc-binding protein

10:25 Yoshito Kumagai (University of Tsukuba)

S-5-5 Promotion of osteoclast differentiation by reactive sulfur species

10:50 Yoichi Miyamoto (Showa University)

S-5-6 Maintenance of ER homeostasis through disulfide reductase

11:15 Ryo Ushioda (Kyoto Sangyo University)

Luncheon Seminar

11:50-12:50

BCRquest.com: Healthcare Network as Big Data - world wide and Japanese potential

Hiroyuki Iwama (BC Platforms K.K)

BCRquest.com: ビッグデータとしてのヘルスケアネットワーク-World wide と日本の可能性

岩間 裕之 (BCプラットフォーム株式会社)

Session VI: Sulfur Methodology

13:00-15:50

(Chair: Jon M. Fukuto)

S-6-1 Persulfide regulation: Chemistry and chemical biology

13:00 Ming Xian (Washington State University)

S-6-2 Development of fluorescent probes for H₂S and sulfane sulfur and their application to the inhibitor screening

13:30 Kenjiro Hanaoka (The University of Tokyo)

S-6-3 Fluorescent probes for selective and reversible imaging of reactive sulfur species

13:50 Keitaro Umezawa (Tokyo Metropolitan Institute of Gerontology)

S-6-4 Chemical tools for sulfur: caged hydrogen sulfide and fluorescence probe for cysteine persulfide

14:10 Hidehiko Nakagawa (Nagoya City University)

S-6-5 Quantitative determination of polysulfide in plasma proteins and biological human fluids using a novel 'Sulfide elimination from polysulfide' (SEP) method

14:35

Yu Ishima (Tokushima University)

S-6-6 Raman scattering techniques and their application to intracellular detection and imaging of persulfides and other polysulfur species

14:55

Sumeet Mahajan (University of Southampton)

S-6-7 Raman imaging: application to detect water and biological molecules within a single cell

15:25

Takakazu Nakabayashi (Tohoku University)

Session VII: Inflammation and Cancer Metabolism

16:00-16:55

(Chair: Albert van der Vliet)

S-7-1 NOS2 and COX2 as major drivers of poor outcome in ER- breast cancer.

16:00 **New therapeutic opportunities in a difficult disease.**

David A. Wink (National Cancer Institute)

S-7-2 Gaseous molecules as an endogenous factor in the inflammation-related carcinogenesis model

16:30

Futoshi Okada (Tottori University)

Day 3: September 11, 2019

Session VIII: Inflammation and immunity

8:45-10:30

(Chair: Philip Eaton)

**S-8-1 The NADPH oxidase DUOX1 mediates innate allergen responses and
8:45 type 2 inflammation: Implications for allergic asthma and metabolic disease**
Albert van der Vliet (University of Vermont)

**S-8-2 N-Acetyl-L-cystine polysulfides act as potent persulfide/polysulfide donors and
9:15 ameliorate lethal endotoxin shock via their anti-inflammatory effects**
Tomohiro Sawa (Kumamoto University)

**S-8-3 Roles of CARS2/CPERS in the elastase-induced pulmonary emphysema and the
9:40 pathophysiology of COPD**
Hisatoshi Sugiura (Tohoku University)

**S-8-4 Deficiency of CARS2, a principal cysteine persulfide synthetase, aggravated house
10:05 dust mite-induced allergic inflammation in a mouse model of bronchial asthma**
Mitsuhiro Yamada (Tohoku University)

Closing Remarks

10:30-10:40

Hozumi Motohashi (Tohoku University)

1st STINT-JSPS Joint Symposium in Sendai

Day 3: September 11, 2019

Opening Ceremony 15:00-15:30

Opening Speech:

YAMAMOTO, Masayuki (Tohoku University)

Guest Speech:

ISOGAI, Keisuke

(Director General, National Institute of Science and Technology Policy, NISTEP)

YAEGASHI, Nobuo

(Dean, Tohoku University Graduate School of Medicine)

Special Lecture 1: 15:30-16:10

Reactive persulfide mediates versatile redox signal functions with canonical signaling mimetics

AKAIKE, Takaaki (Tohoku University)

Break

Special Lecture 2: 16:25-17:10

Multiple cellular effects upon drug targeting of the selenoprotein thioredoxin reductase 1 (TrxR1, TXNRD1) in cancer

ARNER, Elias S.J. (Karolinska Institutet)

Special Lecture 3: 17:15-17:55

On-tissue visualization of polysulfides as a biomarker predicting platinum-based chemosensitivity after debulking surgery of ovarian cancer

SUEMATSU, Makoto (AMED/Keio University)

United Reception 18:00-20:00