



## The Chemical Biology of Sulfur

July 10 - 15, 2022

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### Chair

Kate S. Carroll

### Vice Chair

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### Rey Don Jaime Grand Hotel

Avinguda de l'Hotel

Castelldefels, B, Spain

### Conference Description

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The past 25 years of research demonstrates that redox sensing, signaling, adaptation and associated disorders are inextricably linked to the site-specific covalent modification of the cysteinyl proteome also known as the cysteinome. Early genetic and biochemical studies identified sentinel cysteinyl-based sensors that provide an interface for organisms to sense and adapt to its environment, including resources such as food and oxygen, and threats such as infection and toxicants. New methods are available to define thiol reactivity, types of cysteinyl modifications, and quantify stoichiometry to elucidate the myriad mechanistic details that underlie sulfur-based redox biology. These capabilities and advanced computational models, together with omics platforms offer unprecedented possibilities to realize the therapeutic potential available through targeting redox networks. This GRC/GRS will bring together scientists whose approaches have significantly advanced our understanding of the biological basis of thiol-based redox regulation and signaling. The focused presentations of unpublished data and the abundant opportunities for informal discussion make this conference a unique opportunity to generate new ideas and initiate new collaborations.

### Related Meeting

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This GRC will be held in conjunction with the "Thiol-Based Redox Regulation and Signaling" Gordon Research Seminar (GRS). Those interested in attending both meetings must submit an application for the GRS in addition to an application for the GRC. Refer to the [associated GRS program page](#) for more information.

## Conference Program

Sunday	
2:00 pm - 9:00 pm	Arrival and Check-in
6:00 pm - 7:00 pm	Dinner
7:30 pm - 7:40 pm	Introductory Comments by GRC Site Staff / Welcome from the GRC Chair
7:40 pm - 9:30 pm	<b>Keynote Session: Pioneers in Redox Regulation and Signaling</b> Discussion Leaders: <b>Leslie Poole</b> (Wake Forest School of Medicine, United States)
7:40 pm - 8:20 pm	<b>Helmut Sies</b> (Heinrich Heine University Dusseldorf, Germany) "H <sub>2</sub> O <sub>2</sub> and Thiol-Based Redox Signaling"
8:20 pm - 8:35 pm	Discussion
8:35 pm - 9:15 pm	<b>Rafael Radi</b> (Universidad de la Republica, Uruguay) "Peroxynitrite, Peroxiredoxins and Carbon Dioxide: Thiol Oxidation and Overoxidation"
9:15 pm - 9:30 pm	Discussion
Monday	
7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	<b>Enabling Technologies for Redox Biology</b> Discussion Leader: <b>Vsevolod Belousov</b> (Federal Center of Brain Research and Neurotechnologies, Russia)

9:00 am - 9:20 am	<b>Cristina Furdai</b> (Wake Forest University School of Medicine, United States) "[18F]Fluoro-DCP: A First Generation PET Radiotracer for Monitoring Protein Sulfenylation <i>in vivo</i> "
9:20 am - 9:30 am	Discussion
9:30 am - 9:50 am	<b>Markus Waldeck-Weiermair</b> (BRIGHAM AND WOMEN'S HOSPITAL, United States) "Selective Sensory Ataxia Caused by Chemogenetic Oxidative Stress"
9:50 am - 10:00 am	Discussion
10:00 am - 10:20 am	<b>Derek Pratt</b> (University of Ottawa, Canada) "The Inhibition of Lipid Peroxidation and Associated Cell Death by Persulfides"
10:20 am - 10:30 am	Discussion
10:30 am - 11:00 am	Coffee Break
11:00 am - 11:20 am	<b>Che Pillay</b> (University of Kwazulu-Natal, South Africa) "Quantifying Signaling from Dynamic Redox Profile Data"
11:20 am - 11:30 am	Discussion
11:30 am - 11:50 am	<b>Gregory Payne</b> (University of Maryland, College Park, United States) "Targeting Redox Inputs by Mediated Electrochemistry: From Characterizing Oxidative Stress to Electrogenetics"
11:50 am - 12:00 pm	Discussion
12:00 pm - 12:20 pm	<b>Lars Leichert</b> (Ruhr University Bochum, Germany) "A Probe for Protein N-Chloramines Reveals a New Role for Thiol-Based Antioxidant Systems"
12:20 pm - 12:30 pm	Discussion
12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:30 pm	Free Time

3:00 pm - 4:00 pm	<p><b>The GRC Power Hour™</b></p> <p><i>The GRC Power Hour™ is designed to address diversity and inclusion in the scientific workplace by providing a safe environment for informal and meaningful conversations amongst colleagues of all career stages. The program supports the professional growth of all members of our communities, including ethnicity, race and/or gender identity by providing an open forum for discussion and mentoring.</i></p> <p>Organizer: <b>Bindu Paul</b> (Johns Hopkins School of Medicine, United States)</p>
4:30 pm - 6:00 pm	<b>Poster Session</b>
6:00 pm - 8:00 pm	<p><b>Grand Challenges and New Paradigms in Thiol-Based Redox Signaling</b></p> <p>Discussion Leader: <b>Kate Carroll</b> (UF Scripps Biomedical Research, United States)</p>
6:00 pm - 6:20 pm	<p><b>Ruma Banerjee</b> (University of Michigan, United States)</p> <p>"A Metabolic Paradigm for H<sub>2</sub>S Signaling"</p>
6:20 pm - 6:30 pm	Discussion
6:30 pm - 6:50 pm	<p><b>Pietro Ghezzi</b> (Università di Urbino, Italy)</p> <p>"Thiol Regulation of Innate Immunity"</p>
6:50 pm - 7:00 pm	Discussion
7:00 pm - 7:20 pm	<p><b>Vadim Gladyshev</b> (Brigham and Women's Hospital / Harvard Medical School, United States)</p> <p>"Systems Approaches to Thiol- and Selenol-Based Redox Control"</p>
7:20 pm - 7:30 pm	Discussion
7:30 pm - 7:50 pm	<p><b>Benoit D'Autréaux</b> (Paris-Saclay University, France)</p> <p>"Fe-S Cluster Assembly: The Intersection of Inorganic and Organic Sulfur Chemistry"</p>
7:50 pm - 8:00 pm	Discussion
8:00 pm - 9:00 pm	Dinner

## Tuesday

7:30 am - 8:30 am Breakfast

8:30 am - 9:00 am Group Photo

9:00 am - 12:30 pm **Molecular Mechanisms of Thiol-Based Redox Regulation**

Discussion Leader: **Elizabeth Veal** (Newcastle University, United Kingdom)

9:00 am - 9:10 am **W. Todd Lowther** (Wake Forest School of Medicine, United States)  
"Molecular Basis for the Specificity of Thiostrepton Targeting Human Peroxiredoxin 3"

9:10 am - 9:15 am Discussion

9:15 am - 9:25 am **Ari Zeida** (Facultad de Medicina, Universidad de la Republica, Uruguay)  
"Role of Thiol Redox Status in SARS-CoV2 Spike Glycoprotein Recognition by the Host Receptor ACE2"

9:25 am - 9:30 am Discussion

9:30 am - 9:50 am **Brian Smith** (Medical College of Wisconsin, United States)  
"Protein Cysteine Sulfenylation By Oxidized Lipid Signaling Promotes Platelet Activation"

9:50 am - 10:00 am Discussion

10:00 am - 10:20 am **James Galligan** (University of Arizona, United States)  
"Glutathione as a Critical Mediator of Post-Translational Modifications"

10:20 am - 10:30 am Discussion

10:30 am - 11:00 am Coffee Break

11:00 am - 11:20 am **Tobias Dick** (German Cancer Research Center (DKFZ), Germany)  
"Mechanisms of Sulfane Sulfur Mediated Cytoprotection"

11:20 am - 11:30 am	Discussion
11:30 am - 11:50 am	<b>Ana Denicola</b> (University of the Republic, Uruguay) "Dynamics of hPrx Oligomerization: Is it Related to Catalysis?"
11:50 am - 12:00 pm	Discussion
12:00 pm - 12:20 pm	<b>Hadley Sikes</b> (Massachusetts Institute of Technology, United States) "Detecting and Targeting Compartment-Specific Vulnerabilities in Redox Metabolism"
12:20 pm - 12:30 pm	Discussion
12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:30 pm	Free Time
4:30 pm - 6:00 pm	<b>Poster Session</b>
6:00 pm - 8:00 pm	<b>Targeting Thiol Redox State and Oxidative Stress in Disease</b> Discussion Leader: <b>Philip Eaton</b> (Queen Mary University of London, United Kingdom)
6:00 pm - 6:20 pm	<b>Michael Pluth</b> (University of Oregon, United States) "New Approaches for H <sub>2</sub> S and Sulfane Sulfur Delivery"
6:20 pm - 6:30 pm	Discussion
6:30 pm - 6:50 pm	<b>Carmen Wong</b> (The University of Hong Kong, Hong Kong SAR China) "Redox Homeostasis in Hepatocellular Carcinoma and its Therapeutic Implications"
6:50 pm - 7:00 pm	Discussion
7:00 pm - 7:20 pm	<b>Bruce Freeman</b> (University of Pittsburgh, United States) "Clinical Development of Cysteine Proteome-Targeted Nitroalkenes"
7:20 pm - 7:30 pm	Discussion

7:30 pm - 7:50 pm	<b>Yvonne Janssen-Heininger</b> (Larner College of Medicine, University of Vermont, United States) "Glutaredoxin-Mediated Control of GSH: A Thiol Connection with System XC- and Relevance to Lung Cancer"
7:50 pm - 8:00 pm	Discussion
8:00 pm - 9:00 pm	Dinner
<b>Wednesday</b>	
7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	<b>Thiol-Based Redox Signaling Pathways</b> Discussion Leader: <b>Albert Van Der Vliet</b> (University of Vermont, United States)
9:00 am - 9:20 am	<b>Fernando Antunes</b> (Faculdade de Ciências da Universidade de Lisboa, Portugal) "Hydrogen Peroxide Signaling in Aging"
9:20 am - 9:30 am	Discussion
9:30 am - 9:50 am	<b>Michel Toledano</b> (French Alternative Energies and Atomic Energy Commission (CEA)/CNRS, France) "Deciphering the Redox Control of Secretion: A Unique Function of Glutathione in the Endoplasmic Reticulum"
9:50 am - 10:00 am	Discussion
10:00 am - 10:20 am	<b>Carolyn Sevier</b> (Cornell University, United States) "Redox Signaling at the Endoplasmic Reticulum"
10:20 am - 10:30 am	Discussion
10:30 am - 11:00 am	Coffee Break
11:00 am - 11:20 am	<b>Amit Reddi</b> (Georgia Institute of Technology, United States) "Sod1 Integrates Oxygen Availability to Redox Regulate NADPH Production and the Thiol Redoxome"

11:20 am - 11:30 am	Discussion
11:30 am - 11:50 am	<b>Pat Eyers</b> (University of Liverpool, United Kingdom) "Cysteine-Based Signaling Networks: New Kinase Connections"
11:50 am - 12:00 pm	Discussion
12:00 pm - 12:10 pm	<b>Benoit Boivin</b> (SUNY Polytechnic Institute, United States) "Regulation of Protein Tyrosine Phosphatase 1B Reduction in Insulin Resistance"
12:10 pm - 12:15 pm	Discussion
12:15 pm - 12:25 pm	<b>Liron Bar-Peled</b> (MGH Cancer Center and Harvard Medical School, United States) "Identification of Chemotherapy Targets Reveals a Nucleus-to-Mitochondria ROS Sensing pathway"
12:25 pm - 12:30 pm	Discussion
12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:30 pm	Free Time
4:30 pm - 6:00 pm	<b>Poster Session</b>
6:00 pm - 8:00 pm	<b>Thiol-Based Redox Metabolism</b> Discussion Leader: <b>Elena Hidalgo</b> (Pompeu Fabra University, Spain)
6:00 pm - 6:10 pm	Introduction by Discussion Leader
6:10 pm - 6:35 pm	<b>Bruce Morgan</b> (Universität des Saarlandes, Biochemie, Germany) "Novel Genetically Encoded Sensors for Real-Time Monitoring of the Subcellular NADP <sup>+</sup> /NADPH Ratio"
6:35 pm - 6:50 pm	Discussion
6:50 pm - 7:15 pm	<b>Oleh Khalimonchuk</b> (University of Nebraska-Lincoln, United States) "Redox-Mediated Regulation of Mitochondrial Sculpting"
7:15 pm - 7:30 pm	Discussion



7:30 pm - 7:40 pm	<b>Carolina Greco</b> (Humanitas University, Italy) "Rewiring of Hepatic Redox Metabolism in a Model of Heart Failure"
7:40 pm - 7:45 pm	Discussion
7:45 pm - 8:00 pm	General Discussion
8:00 pm - 9:00 pm	Dinner
<b>Thursday</b>	
7:30 am - 8:30 am	Breakfast
8:30 am - 9:00 am	<b>Business Meeting</b> <i>Nominations for the Next Vice Chair(s); Complete the GRC Evaluation Forms; Discuss Future Dates and Venue; Election of the Next Vice Chair(s)</i>
9:00 am - 12:30 pm	<b>Selenoproteins, Reversible Methionine Oxidation and Sulfinic Acid (Sulfane Sulfur, too)</b> Discussion Leader: <b>James West</b> (The College of Wooster, United States)
9:00 am - 9:20 am	<b>Robert Hondal</b> (University of Vermont, United States) "Cheating on Selenium"
9:20 am - 9:30 am	Discussion
9:30 am - 9:50 am	<b>Daniel Bak</b> (Boston College, United States) "Targeting the Selenoproteome through Chemoproteomics"
9:50 am - 10:00 am	Discussion
10:00 am - 10:20 am	<b>Sina Ghaemmaghani</b> (University of Rochester, United States) "Proteome-Wide Surveys of Methionine Oxidation and Reduction"
10:20 am - 10:30 am	Discussion
10:30 am - 11:00 am	Coffee Break
11:00 am - 11:20 am	<b>Emily Flashman</b> (University of Oxford, United Kingdom) "New Insights into Cysteine Dioxygenase Function"

11:20 am - 11:30 am	Discussion
11:30 am - 11:50 am	<b>Takaaki Akaike</b> (Tohoku University Graduate School of Medicine, Japan) "Cyclo-Octasulfur, S <sub>8</sub> , Formed Endogenously in Mammals: its Biosynthesis and Physiological Functions"
11:50 am - 12:00 pm	Discussion
12:00 pm - 12:10 pm	<b>Daiana Capdevila</b> (Leloir Institute, Argentina) "Endogenous and Exogenous Persulfides Attenuate Vibrio Cholerae Hemolysin Expression"
12:10 pm - 12:15 pm	Discussion
12:15 pm - 12:25 pm	<b>Klaudia Galambos</b> (National Institute of Oncology, Hungary) "Reprogramming of Hydrogen Sulfide Metabolism can Support Targeted Therapy Resistance in Melanoma"
12:25 pm - 12:30 pm	Discussion
12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:30 pm	Free Time
4:30 pm - 6:00 pm	<b>Poster Session</b>
6:00 pm - 8:00 pm	<b>Reactive Sulfur Species in Redox Signaling</b> Discussion Leader: <b>Peter Nagy</b> (National Institute of Oncology, Hungary)
6:00 pm - 6:20 pm	<b>Beatriz Alvarez</b> (Universidad de la Republica, Uruguay) "Acidity and Nucleophilicity of Persulfides"
6:20 pm - 6:30 pm	Discussion
6:30 pm - 6:50 pm	<b>Ming Xian</b> (Brown University, USA, United States) "Chemical Tools for Understanding Reactive Sulfur Species"
6:50 pm - 7:00 pm	Discussion

7:00 pm - 7:20 pm	<b>Bindu Paul</b> (Johns Hopkins School of Medicine, United States) "Neuroprotective Role of Hydrogen Sulfide in Alzheimer's disease"
7:20 pm - 7:30 pm	Discussion
7:30 pm - 7:50 pm	<b>David Giedroc</b> (Indiana University, United States) "Thiols and Thiol Persulfides in Bacterial Pathogens: Sensing and Beyond"
7:50 pm - 8:00 pm	Discussion
8:00 pm - 9:00 pm	Dinner
<b>Friday</b>	
7:30 am - 8:30 am	Breakfast
9:00 am	Departure

## Contributors

