



Mitochondrial Physiology

MiP2010

7th MiPconference

Mitochondrial Physiology

FEBS Workshop: The Many Functions of the Organism in our Cells

MiP2010, Obergurgl, Tyrol, Austria
27. Sep – 1. Oct 2010



Programme

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Tu 28	Session 1: Mitochondria – the organism in communication with the cell.....	B2
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Scientific Committee: **Mitochondrial Physiology Society**
 Chair/ Co-chair: **Erich Gnaiger** (Innsbruck, Austria), **Guy Brown**, (Cambridge, UK)
Vilma Borutaite (Davis, US), **Rodrigue Rossignol** (Bordeaux, France),
Steven Hand (Baton Rouge, US)
Local Organizers: **Erich Gnaiger** (Innsbruck, Austria)
Kathrin Renner (Regensburg, Germany)
MiP Art **Odra Noel** (London, UK)

- page numbers refer to the book of abstracts

Monday, 27. Sept.

- 19:30 Arrivals – Registration – Poster mounting
Dinner
- Opening: MiP2010: Seven Years Mitochondrial Physiology Society – MiPs**
- 0-01. 21:15 **Kathrin Renner-Sattler (Regensburg DE), Erich Gnaiger (Innsbruck AT)** FEBS Workshop: Mitochondrial Physiology - **welcome to MiP2010:** Bioblasts – the aliens with permanent residence in our cells. - *p.13 / p.25*

Tuesday, 28. Sept. Morning

Session 1: Mitochondria – the organism in communication with the cell

- Chairs:** **Vilma Borutaite (Kaunas LT)**
Rodrigue Rossignol (Bordeaux FR)
- 09:00-12:00 Oral presentations 10+5 min
- 08.45-09:00 **FEBS Workshop - MiP2010:** Organization - overview
- 1-01. 09:00-09:15 **Keith Garlid (Portland USA)** Signalosomes - a general signalling mechanism to and from mitochondria. - *p.29*
- 1-02. 09:15-09:30 **Charles Hoppel (Cleveland USA)** Activation of distinct mitochondrial cAMP-PKA compartments induces different effects on mitochondrial function. - *p.30*
- 1-03. 09:30-09:45 **Caitlin Pesout (Portland USA)** The mechanism of signalling by the adenosine receptor in heart. - *p.31*
- 1-04. 09:45-10:00 **Anna Kajma (Warsaw PL)** Mitochondrial potassium ion channels regulated by polyunsaturated fatty acid. - *p.32*
- 10:00-10:45 Break
- 1-05. 10:45-11:00 **Anne Marie Allen (Glasgow SC)** Acute mitochondrial dysfunction inhibits macrophage cholesterol efflux to apolipoprotein AI. - *p.33*
- 1-06. 11:00-11:15 **Andrey Kozlov (Vienna AT)** Mitochondria in systemic immune response: a victim or an offender? - *p.34*
- 1-07. 11:15-11:30 **Boris Chernyak (Moscow RU)** Study on the mitochondrial production of reactive oxygen species with novel mitochondria-targeted antioxidants. - *p.34*
- 1-08. 11:30-11:45 **Peter Dungal (Vienna AT)** Effects of nitroglycerin on mitochondrial respiration and ROS production are nitric oxide-independent. - *p.35*
- 1-09. 11:45-12:00 **Arianna Montanari (Rome IT)** Mitochondrial tRNA pathogenetic human substitutions: analysis of the yeast equivalent mutants and study of suppressive effect of interactor molecules. - *p.36*
- 12:00-15:30 Lunch
- Walks and talks**

Tuesday, 28. Sept. Afternoon

Session 2: Control of mitochondrial biogenesis, the mitochondrial population, and OXHOS capacity in tissues

- Chairs:** **Charles Hoppel (Cleveland US – representing UMDF),**
Michael Schocke (Innsbruck, AT)
- 15:30-18:45 Oral presentations 10+5 min
- 2-01. 15:30-15:45 **Erich Gnaiger (Innsbruck AT)** Measuring the upper limit of mitochondrial performance - how and why? - *p.43*
- 2-02. 15:45-16:00 **Robert Boushel (Copenhagen DK)** Reduced mitochondrial respiration during combined inhibition of nitric oxide and prostaglandins in human skeletal muscle. - *p.45*
- 2-03. 16:00-16:15 **Graham Kemp (Liverpool UK)** Human muscle 'mitochondrial capacity' inferred from 31P MRS recovery kinetics differs from published invasive maximal-exercise measurements. - *p.45*
- 2-04. 16:15-16:30 **Rodrigue Rossignol (Bordeaux FR)** CREB-dependent retrograde induction of mitochondrial biogenesis in mitochondrial diseases. - *p.46*

- 2-05. 16:30-16:45 **Dominik Pesta (Innsbruck AT)** Investigation of muscle metabolism of the M. quadriceps via ³¹P MRS and high-resolution respirometry in connection with 10 weeks of strength and endurance training in normoxia and hypoxia. - *p.47*
- 2-06. 16:45-17:00 **Dominique-Marie Votion (Liège BE)** Mitochondrial respiratory capacity in skeletal muscle from top-level equine athletes. - *p.48*
- 17:00-17:45 Break
- 2-07. 17:45-18:00 **Per Berthelson (Stockholm SE)** The effect of exercise on mitochondrial substrate utilization and oxidative stress in glycogen depleted skeletal muscle. - *p.49*
- 2-08. 18:00-18:15 **Flemming Dela (Copenhagen DK)** Mitochondrial respiration in subcutaneous and visceral adipose tissue from patients with morbid obesity. - *p.50*
- 2-09. 18:15-18:30 **Anisha Gupte (Houston USA)** Age- and diet-related mitochondrial dysfunction in a novel mouse model of metabolic syndrome is rescued by treatment with a PPAR γ agonist. - *p.51*
- 2-10. 18:30-18:45 **Lauren Wright (Sydney AUS)** Increasing mitochondrial substrate oxidation and antioxidant defences improves lipid-induced insulin-resistance in rat skeletal muscle. - *p.52*
- 19:00-20:45 Dinner

Tuesday, 28. Sept. Evening

Poster Session 1 and 2

- Posterguides 1: **Clara de Palma (Milan IT)**
Toney Hickey (Auckland NZ)
- Posterguides 2: **Kathrin Renner-Sattler (Regensburg DE),**
Mariusz Wieckowski (Warsaw PL)
- 20:45-22:00 Presenters of posters for Sessions 1 and 2 should be available at their posters during this time; to be continued as an open poster session.
- 1-10. Poster **Dariia Gudkova (Kiev UA)** A novel possible function of mitochondria in the regulation of cellular mRNA metabolism in mammalian cells. - *p.37*
- 1-11. Poster **Julietta Rivera-Zavala (Querétaro MEX)** Regulation of hepatic mitochondrial β -oxidation during expression of the food entrained oscillator. - *p.38*
- 1-12. Poster **Marleen Forkink (Nijmegen NL)** Mitochondrial ROS as local and global cell regulators. - *p.39*
- 1-13. Poster **Anders Garlid (Portland USA)** Reactive oxygen species (ROS) and signalling: which ROS, and how does it move about the cell? - *p.39*
- 1-14. Poster **Andrzej Woyda-Ploszczyca (Poznan PL)** Purine nucleotide-sensitivity of Acanthamoeba castellanii mitochondrial uncoupling protein; role of ubiquinol. - *p.40*
- 1-15. Poster **Jamile Paier-Pourani (Vienna AT)** The impact of mitochondrial ROS on cellular dysfunction induced by inflammatory mediators. - *p.41*
- 1-16. Poster **Peter Dungal (Vienna AT)** Effects of nitrite on hepatocytes subjected to hypoxia/reoxygenation.
- 2-11. Poster **Charles Hoppel (Cleveland USA)** Control of mitochondrial oxidative phosphorylation by the phosphorylation system in human skeletal muscle: Variation during development and implication for patients with mitochondrial disease. - *p.52*
- 2-12. Poster **Bronislav Gavenauskas (Kiev UA)** Intermittent hypoxic training limits rat skeletal muscle mitochondrial dysfunction induced by exhaustive exercise. - *p.54*
- 2-13. Poster **Agnieszka Sliwa (Kracow PL)** Influence of free fatty acids on mitochondrial function of the human preadipocytes. - *p.54*
- 2-14. Poster **Joanna Górska (Kracow PL)** Free fatty acids as potential modulators of mitochondrial function in three selected models of the stressed cells. - *p.55*
- 2-15. Poster **Snizhana Chorna (Kiev UA)** Long-term exercise training improves myocardial tolerance to ischaemia-reperfusion and decreases the sensitivity of calcium-induced mitochondrial permeability transition pore opening. - *p.56*

- 2-16. Poster **Katherine Lyabakh (Kiev UA)** Mathematical modelling of NO, O₂ transport and mitochondrial oxygen consumption rate in skeletal muscle during exercise. - *p.56*
- 2-17. Poster **Hana Kratochvílová (Prague CZ)** MEM70 is mitochondrial membrane protein involved in ATP synthase biogenesis. - *p.57*
- 2-18. Poster **Hyoung Kyu Kim (Busan KR)** BH4 deficiency involved in cardiac mitochondria metabolic pathway remodelling. - *p.58*
- 2-19. Poster **Marta Wojewoda (Warsaw PL)** Selenium affects mitochondrial biogenesis via modulation of nuclear respiratory factors level and activity. - *p.58*
- 2-20. Poster **Oana Duicu (Timisoara RO)** Direct effects of magnesium orotate on oxidative phosphorylation of mitochondria *in situ*. - *p.59*
- 2-21. Poster **Malou Friedrich (Uppsala SE)** Kidney cortex mitochondria are non-functional in a potassium-based media whereas heart mitochondria improve with increasing potassium concentration. - *p.60*

Wednesday 29. Sept. Morning

Session 3: From injured mitochondria to organismic disease

Chairs:

Keith Garlid (Portland USA)
Flemming Dela (Copenhagen DK)

08:45-11:30

Oral presentations 10+5 min

3-01.

cancelled

3-02. 08:45-09:00

Guy Brown (Cambridge UK) The mitochondrion in flames: mitochondria in inflammatory neurodegeneration. - *p.62*

3-03. 09:00-09:15

Vilma Borutaite (Kaunas LT) Effect of beta amyloid oligomers on neuronal viability and mitochondrial functions. - *p.63*

3-04. 09:15-09:30

Victoria Bunik (Mosow RU) Contribution of the 2-oxoglutarate dehydrogenase complex to the control of mitochondrial and cellular functions. - *p.63*

3-05. 09:30-09:45

Susanne Arnold (Aachen DE) The role of cytochrome c oxidase in neurodegeneration and neuroprotection. - *p.64*

09:45-10:30

Break - poster area

3-06. 10:30-10:45

Elena A Belyaeva (Petersburg RU) Reactive oxygen species, mitochondrial electron transport system and permeability transition pore as the key players in heavy metal-induced neurotoxicity. - *p.65*

3-07. 10:45-11:00

Rebecca Noack (Düsseldorf DE) GDAP1, a protein mutated in hereditary polyneuropathy Charcot-Marie-Tooth disease 4A, protects from oxidative stress and is involved in mitochondrial shape and function. - *p.66*

3-08. 11:00-11:15

Tomas Mracek (Prague CZ) Increased oxidative stress in fibroblasts from patients with ATP synthase deficiency. - *p.67*

3-09. 11:15-11:30

Carrie Sims (Philadelphia USA) Resuscitation of hemorrhagic shock with vasopressin restores Complex I function in multiple organs. - *p.67*

11:30

MiPboard – Lunch meeting

12:00

Lunch – short walk and talk

Wednesday 29. Sept. Afternoon

Session 4: Cancer cell metabolism, the Warburg effect versus Crabtree effect, and apoptosis

Chairs:

Votion Dominique-Marie (Liège BE)
Steven Hand (Baton Rouge US)

13:45-17:00

Oral presentations 10+5 min

4-01. 13:45-14:00

Peter Vaupel (Mainz DE) Evidence against a mitochondrial dysfunction in cancer cells as a hallmark of malignant growth. - *p.79*

4-02. 14:00-14:15

Hans van Beek (Amsterdam NL) Computational model predictions of metabolic fluxes connecting cytosol and mitochondrial matrix under 'Warburg effect' conditions. - *p.80*

4-03. 14:15-14:30

Tatjana El-Bacha (Rio de Janeiro BR) Metabolic reprogramming of lung cancer cell induced by sodium butyrate: studies on mitochondrial physiology and bioenergetics. - *p.81*

- 4-04. 14:30-14:45 **Caroline Jose (Bordeaux FR)** Bioenergetics of tumours: sequential oncogenes activation modulate energy metabolism during carcinogenesis. - *p.81*
- 14:45-15:00 **Min Wu (Boston USA)** The Warburg effect, glucose addiction and reprogramming of mitochondrial function in metabolic transformation of human cancer cells. – *Seahorse Bioscience (sponsor presentation 1)*.
- 15:00-15:45 Break – poster area
- 4-05. 15:45-16:00 **Katarína Smolková (Prague CZ)** ATP-citrate lyase silencing and glutamine metabolism of cancer cells. - *p.82*
- 4-06. 16:00-16:15 **Heather M Wilkins (Denver USA)** Bcl-2 interacts with the mitochondrial 2-oxoglutarate carrier and regulates the mitochondrial glutathione pool. - *p.82*
- 4-07. 16:15-16:30 **William C Stanley (Baltimore USA)** Dietary supplementation with docosahexaenoic acid, but not eicosapentaenoic acid, alters cardiac mitochondrial phospholipid fatty acid composition and delays Ca²⁺-induced permeability transition in normal and hypertrophied myocardium. - *p.83*
- 4-08. 16:30-16:45 **Luciene Maria Zanchetta (Sligo IR)** Sunlight damage to human skin mitochondria. - *p.84*
- 4-09. 16:45-17:00 **Franca Esposito (Naples IT)** TRAP1 and the calcium binding protein sorcin interact in mitochondria and protect cells against apoptosis induced by antiproliferative agents. - *p.85*

Wednesday, 29. Sept. Evening – before dinner

Poster Session 3 and 6

- Posterguides 3: **Tatiana El-Bacha (Rio de Janeiro BR)**
Andrey Kozlov (Vienna AT)
- Posterguides 6: **Natascha Sommer (Giessen DE)**
Michael Breitenbach (Salzburg AT)
- 17:00-19:00 Presenters of posters for Sessions 3 and 6 should be available at their posters; open poster session continued in the evening 21:00.
- 3-10. Poster **Alžběta Vondráčková (Prague CZ)** High-resolution melting mutation scanning of 15 nuclear-encoded genes in 60 patients with cytochrome c oxidase deficiency. - *p.68*
- 3-11. Poster **Barbara Zapala (Krakow PL)** Humanin a neuroprotective factor involved in metabolic (mitochondria-related) and antiapoptotic mechanisms in neuronal and endothelial cell lines. - *p.69*
- 3-12. Poster **Polina Tsygankova (Moscow RU)** Developing the algorithm for molecular diagnostics of infantile mitochondrial encephalomyopathies. - *p.70*
- 3-13. Poster **Svetlana Fa (Novi Sad SRB)** Toxic effects of HBCDD upon Leydig cell steroidogenesis – possible role of mitochondria? - *p.71*
- 3-14. Poster **Hyoungh Kyu Kim (Busan KR)** Glutathione peroxidase 1 protects mitochondria against hypoxia-reoxygenation damage in mouse hearts. - *p.72*
- 3-15. Poster **Yulia S Itkis (Moscow RU)** Rare mitochondrial mutations in cases of Leigh disease. - *p.73*
- 3-16. Poster **Nina Krako (Rome IT)** Targeting mitochondrial amyloid β through intrabodies: new approach to study pathogenesis of Alzheimer's disease. - *p.74*
- 3-17. Poster **Deepika Verma (Hongkong CN)** Sub-cellular organization of cysteine synthase complex, cysteine and sulfur regeneration in plant mitochondria. - *p.74*
- 3-18. Poster **Laszlo Wenchich (Prague CZ)** Influence of freezing on the activity of the respiratory chain complexes in the muscle tissue. - *p.75*
- 3-19. Poster **Laszlo Wenchich (Prague CZ)** Knock-down of cytochrome c oxidase structural subunits in HEK293 cells. - *p.75*
- 3-20. Poster **Victoria Bunik (Moscow RU)** The OGDHC-exerted control of mitochondrial respiration is increased under energy demand. - *p.76*
- Poster **Magdalena Lebiezinska (Warsaw PL)** Oxidative stress-dependent p66Shc phosphorylation in skin fibroblasts of children with mitochondrial disorders.

- 6-03a. Poster **Serena Pisoni (Milan IT)** NO withdrawal induces mitophagy in skeletal myoblasts: identification of autophagic pathway. - *p.100*
- 6-09. Poster **Basu Somsuvro and Changmai Piya (Budweis CZ)** The Fe/S cluster assembly protein Isd11 is essential for tRNA thiolation in *Trypanosoma brucei*. - *p.106*
- 6-10. Poster **Drahomíra Faktorová (Budweis CZ)** Probing for primary functions of prohibitin in *Trypanosoma brucei*. - *p.106*
- 6-11. Poster **Piquereau Jérôme (Paris FR)** Alteration of the mitochondrial dynamics affects intracellular energy transport and sensitivity to the permeability transition pore opening. - *p.107*
- 6-12. Poster **Piquereau Jérôme (Paris FR)** Postnatal development of mouse heart: formation of energetic microdomains. - *p.108*
- 6-13. Poster **Volker Ullrich (Konstanz DE)** Association of MnSOD with mitochondrial DNA. - *p.109*
- 6-14. Poster **Gasparian Marine (Moscow RU)** Cytoskeleton inhibitors stimulate apoptosis induced by TRAIL or TNF α in HeLa cells overexpressing Bcl-2. - *p.109*
- 6-15. Poster **Lena Pernas (Stanford USA)** Association of host mitochondria with the parasitophorous vacuole during *Toxoplasma* infection is not dependent on rhopty proteins ROP2/8. - *p.110*
- 19:00-20:15 Dinner

Wednesday, 29. Sept. Evening – after dinner

Sponsor Session

Chairs: **Hans van Beek** (Amsterdam NL)
Graham Kemp (Liverpool UK)

- 4-10. 20:30-20:45 **Min Wu (Boston USA)** – *Seahorse Bioscience (sponsor presentation 2)*.
- 4-11. 20:45-21:15 **Anita Wiethüchter & O2k-Team (Innsbruck AT)** Bioblast Wiki - OROBOROS INSTRUMENTS (*sponsor presentation 1&2*) – *p.111*

Thursday 30. Sept. morning

Session 5: Mitochondrial depression, ageing, and repair

Chairs: **Wieslawa Jarmuszkiewicz** (Poznan PL)
Werner Koopman (Nijmegen NL)

- 08:30-12:00 Oral presentations 10+5 min
- 5-01. 08:30-08:45 **Steven C Hand (Baton Rouge USA)** Simultaneous depression of oxidative phosphorylation and glycolysis during invertebrate diapause. – *p.87*
- 5-02. 08:45-09:00 **Svetlana Knovalova (St. Petersburg RU)** Mitochondrial function of lamprey hepatocytes during metabolic depression. – *p.88*
- 5-03. 09:00-09:15 **Natascha Sommer (Giessen DE)** Mitochondrial cytochrome redox state and respiration in acute pulmonary oxygen sensing - measurement in isolated lung and cells. – *p.89*
- 5-04. 09:15-09:30 **Jose Matallo (Ulm DE)** Interactions between sulfide and mitochondrial respiration in cultured murine alveolar macrophage. – *p.89*
- 5-05. 09:30-09:45 **Anthony Hickey (Auckland NZ)** Live fast, die old: How do birds fight age? – *p.91*
- 5-06. 09:45-10:00 **Maria N Yurova (St. Petersburg RU)** Effects of SkQ1 on life span and spontaneous carcinogenesis in mice. – *p.91*
- 10:00-10:45 Break – poster area
- 5-07. 10:45-11:00 **Mariusz R Wieckowski (Warsaw PL)** Aging and mitochondrial dysfunctions - role of p66Shc lifespan-regulator protein. – *p.92*
- 5-08. 11:00-11:15 **Anne Laure Bulteau (Paris FR)** Importance of the mitochondrial Lon protease in aging and Parkinson disease. – *p.93*
- 5-09. 11:15-11:30 **Michael Breitenbach (Salzburg AT)** Asymmetric inheritance of functional and of oxidatively damaged mitochondrial aconitase in yeast aging. – *p.93*

- 5-10. 11:30-11:45 **Julia MacDonald (Auckland NZ)** Transmural differences in respiratory capacity across the rat left ventricle in health, aging and streptozotocin-induced diabetes mellitus: evidence that mitochondrial dysfunction begins in the subepicardium. – *p.94*
- 5-11. 11:45-12:00 **Alexander Goldberg (Montreal CA)** A novel anti-aging compound extends longevity by altering the composition of mitochondrial membrane lipids, thereby influencing mitochondrial structure and function. – *p.94*

12:15 MiPexcursion

Thursday 30. Sept. Afternoon

Session 6: Cellular and mitochondrial structure, OXPHOS and supercomplex assembly

Chairs: **Susanne Arnold** (Aachen DE),
Peter Vaupel (Mainz DE)

15:00-17:45 Oral presentations 10+5 min

- 6-01. 15:00-15:15 **Werner Koopman (Nijmegen NL)** Metabolic, structural and functional adaptation to chronic mitochondrial dysfunction. – *p.97*
- 6-02. 15:15-15:30 **Petr Ježek (Prague CZ)** Attempts to visualize mitochondrial network at highest resolution. – *p.97*
- 6-03. 15:30-15:45 **Clara de Palma (Milan IT)** Mitochondrial morphology, mitophagy and nitric oxide: three factors linked during muscle differentiation. – *p.99*
- 6-04. 15:45-16:00 **Michal Cagalinec (Tartu EST)** Mitochondrial fusion and fission are cyclic and highly organized events in cortical neurons. – *p.101*
- 16:00-16:45 Break – poster area
- 6-05. 16:45-17:00 **Daniel Linseman (Denver USA)** Oxidative stress triggers mitochondrial fragmentation and associated N-terminal cleavage of the mitochondrial fusion GTPase OPA1 in neurons via a caspase-independent mechanism. – *p.102*
- 6-06. 17:00-17:15 **Kai Hell (Munich DE)** Topogenesis of the proteins of mitochondria. – *p.103*
- 6-07. 17:15-17:30 **Kornelius Zeth (Tuebingen DE)** Structure and evolution of mitochondrial outer membrane proteins of β -barrel topology. – *p.104*
- 6-08. 17:30-17:45 **Flavia Fontanesi (Miami USA)** A new player in the translational regulation of cytochrome c oxidase biogenesis in the yeast *S. cerevisiae*. – *p.105*

18:15-18:45 MiPsociety: General meeting

19:00 Dinner

Thursday 30. Sept. Evening

Session 7: Mitochondria, complexity, and the power of Bioblots

Chair: **Guy Brown** (Cambridge UK)
Robert Boushel (Copenhagen

DK)

- 7-01. 20:30-20:45 **Nick Lane (London UK)** Mitochondria and the origin of complex life. – *p.113*
- 20:45-21:00 **Odra Noel (London UK)** Life Immitates Art Immitates Life. – *p.114*
- 21:00-21:10 **Erich Gnaiger (Innsbruck AT)** "The Beauty of Mitochondria". – *p.114*
- 21:10 **MiPart Exhibition "The Beauty of Mitochondria"**
– *pp.1-17, 21-24, 78, 113-128*
MiP2010 Party

