

# Oroboros NextGen-O2k all-in-one demo workshop



Mitochondrial Physiology Network 27.02(02):1-4 (2022)

Version 02: 2022-06-20 NextGen-O2k DatLab ©2022 Oroboros

Updates: [https://wiki.orooboros.at/index.php/MiPNet27.02\\_IOC153\\_Innsbruck\\_AT](https://wiki.orooboros.at/index.php/MiPNet27.02_IOC153_Innsbruck_AT)

## 153<sup>rd</sup> O2k-Workshop on High-Resolution Respirometry: NextGen-O2k all-in-one demo



2022 Jul 01 – 02

Innsbruck, Tyrol, Austria

The **153<sup>rd</sup> O2k-Workshop on high-resolution respirometry (HRR)** is the **1<sup>st</sup> NextGen-O2k all-in-one demo**. We will provide an overview of the **NextGen-O2k**, with demo experiments of different applications and real-time analysis using **DatLab 8 (new)**.

O2k-Demo experiments demonstrate the unique advantages and limitations of simultaneous monitoring of oxygen concentration and flux (mitochondrial respiration) and either mitochondrial coenzyme Q redox state (Q-Module), NAD(P) redox state (NADH-Module), calcium uptake capacity, or ATP production (Fluo-Module with the fluorescent dyes Calcium Green or Magnesium Green). With the PB-Module, a demo experiment will show the advantages and limitations of monitoring oxygen concentration and flux related to photosynthesis. Different biological samples will be used, cryopreserved HEK 293T cells permeabilized with digitonin, isolated mitochondria from trout liver, and the green algae *Chlamydomonas reinhardtii*.



The **Blue Book** (5<sup>th</sup> edition) and the **Mitochondrial Physiology** provide a basic introduction to mitochondrial physiology, complemented by the links which can be found in the program.

### Lecturers and tutors

|                                    |  |
|------------------------------------|--|
| <a href="#">Cardoso, Luiza</a>     | Mitochondrial Wizard, Oroboros Instruments (AT)      |
| <a href="#">Cecatto, Cristiane</a> | Mitochondrial Phoenix, Oroboros Instruments (AT)     |
| <a href="#">Gnaiger Erich</a>      | Innovation Alchemist, CEO, Oroboros Instruments (AT) |
| <a href="#">Schmitt, Sabine</a>    | Mitochondrial Detective, Oroboros Instruments (AT)   |

## Program

### 1 Friday, Jul 01

\*printed in workshop materials

| Demo   | Weblink  |
|--|--|
| 13:00-13:15 Introduction:<br>The NextGen-O2k, all-in-one                                       | <a href="#">NextGen-O2k</a><br><a href="#">MiPNet26.13 NextGen-O2k manual</a>            |
| 13:15-14:30 Coenzyme Q redox state, Q-Module demo experiment with permeabilized HEK 293T cells | <a href="#">MiPNet24.12 NextGen-O2k: Q-Module</a><br><a href="#">Komlodi BEC 2021*</a>   |
| 14:30-15:00 <i>Coffee-break and discussion</i>   |  |
| 15:00-16:00 NADH-Module demo experiment with fish liver isolated mitochondria                  | <a href="#">MiPNet26.12 NextGen-O2k: NADH-Module</a>                                     |
| 16:00-17:00 PB-Module demo experiment with green algae <i>Chlamydomonas reinhardtii</i>        | <a href="#">MiPNet26.11 NextGen-O2k: PB-Module</a><br><a href="#">Went MitoFit 2021*</a> |

### 2 Saturday, Jul 02

| Demo   | Weblink   |
|--|---|
| 09:00-10:30 Mitochondrial calcium uptake capacity measurement with Calcium Green (CaG) demo experiment with permeabilized HEK 293T cells | <a href="#">MitoPedia: Calcium Green</a><br><a href="#">Cecatto Bioblast 2022</a> |
| 10:30-11:00 <i>Coffee-break and discussion</i>   |   |
| 11:00-12:30 Mitochondrial ATP production measurement with Magnesium Green (MgG) demo experiment with permeabilized HEK 293T cells        | <a href="#">MiPNet26.10 MgG</a><br><a href="#">Cardoso BEC 2021*</a>              |
| 12:30-13:00 <i>Final discussion</i>  |   |

## List of participants

| Participant                             | Institution  |
|---|--|
| <a href="#">Alvarez Diego F</a>         | Sam Houston State University (US)  |
| <a href="#">Arandarcikaite Odeta</a>    | <a href="#">LT Kaunas Borutaite V</a> - Lithuanian University of Health Sciences (LT)                |
| <a href="#">Armas Diaz Yasmany</a>      | Polytechnic University of Marche (IT)  |
| <a href="#">Awadhpersad Ryan</a>        | University of Helsinki (FI)  |
| <a href="#">Boukalova Stepana</a>       | <a href="#">CZ Prague Neuzil J</a> - Czech Academy of Sciences, CZ                                   |
| <a href="#">Giampieri Francesca</a>     | Polytechnic University of Marche (IT)  |
| <a href="#">Gnaiger Carolina</a>        | <a href="#">AT Innsbruck Oroboros</a> - Oroboros Instruments, Innsbruck (AT)                         |
| <a href="#">Hand Steven C</a>           | <a href="#">US LA Baton Rouge Hand SC</a> - Louisiana State University (US)                          |
| <a href="#">Irving Brian A</a>          | <a href="#">US LA Baton Rouge Irving BA</a> - Louisiana State University (US)                        |
| <a href="#">Ivanovic Tijana</a>         | University Clinical Centre of Serbia (RS)  |
| <a href="#">Ioshi Saurabh</a>           | University of Bremen (DE)  |
| <a href="#">Kolonic Attila</a>          | University of Physical Education, Budapest (HU)  |
| <a href="#">Lakshmipathi Vadlakonda</a> | Kakatiya University (IN)   |
| <a href="#">Laner Verena</a>            | <a href="#">AT Innsbruck Oroboros</a> - Oroboros Instruments, Innsbruck (AT)                         |
| <a href="#">Lang Martin</a>             | Institute for Biomedicine, Eurac Research (IT)   |
| <a href="#">Leo Elettra</a>             | <a href="#">DE Bremerhaven Mark FC</a> - Alfred Wegener Institute for Polar and Marine Research (DE) |
| <a href="#">Moreno-Sanchez Rafael</a>   | <a href="#">AT Innsbruck Oroboros</a> - Oroboros Instruments, Innsbruck (AT)                         |
| <a href="#">O'Boyle Nial</a>            | University of Nottingham (UK)  |
| <a href="#">Pallotta Maria Luigia</a>   | University of Molise (IT)  |
| <a href="#">Pavlovic Kasja</a>          | University Clinical Centre of Serbia (RS)  |
| <a href="#">Pedrinolla Anna</a>         | University of Verona (IT)  |
| Rocic Petra                             | Sam Houston State University (US)  |
| <a href="#">Sumbalova Zuzana</a>        | <a href="#">SK Bratislava Sumbalova Z</a> - Comenius University (SK)                                 |
| <a href="#">Torres-Quesada Omar</a>     | University of Innsbruck (AT)   |
| <a href="#">Yuan Taolin</a>             | Karolinska Institutet (SE)   |

## More detail?

Gnaiger E (2020) **Mitochondrial pathways and respiratory control.**

**An introduction to OXPHOS analysis.** 5th ed. Bioenerg

Commun 2020.2. <https://doi.org/10.26124/bec:2020-0002>



Gnaiger E et al – MitoEAGLE Task Group (2020) **Mitochondrial physiology.** Bioenerg

Commun 2020.1. <https://doi.org/10.26124/bec:2020-0001.v1>

**O2k-Manual** – <http://wiki.oroboros.at/index.php/O2k-Manual>

**O2k-Procedures** – <http://wiki.oroboros.at/index.php/O2k-Procedures>

**>4,200 O2k-Publications** – <http://wiki.oroboros.at/index.php/O2k-Publications: Topics>

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## MitoFit Preprints



The Open Access preprint server for mitochondrial physiology and bioenergetics

» <https://www.mitofit.org/index.php/MitoFit Preprints>

## Bioenergetics Communications



The Open Access journal for publishing scientific and technical advances in bioenergetics and mitochondrial physiology as [Living Communications](#)

» <https://www.bioenergetics-communications.org>

## NextGen O2k - Applications

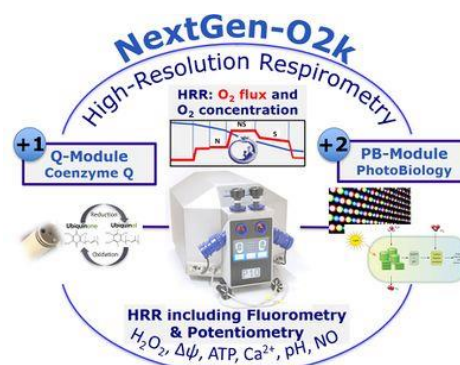
**Find solutions to**

- Cancer
- Obesity
- Diabetes
- Aging
- Cardiovascular
- Neurodegeneration
- Exercise physiology
- Environmental physiology
- PhotoBiology
- Algal biotechnology

**»explore**

- O<sub>2</sub> consumption
- Q-redox state
- NAD(P)H redox state
- Oxygen dependence
- Hypoxia and O<sub>2</sub> kinetics
- H<sub>2</sub>O<sub>2</sub> production
- mt-Membrane potential
- ATP production
- pH, Ca<sup>2+</sup>, NO<sup>-</sup>
- Photosynthesis
- Dark respiration
- Light-enhanced respiration

Oroboros - as a driving force in mitochondrial physiology - extends the analytical and diagnostic power of high-resolution respirometry by integration of NADH- and Q-redox monitoring in the **NextGen-O2k**. We aim at establishing the Oroboros quality control management for dissemination to our worldwide O2k-Network laboratories. This will become an effective contribution to address the acute *reproducibility crisis* of scientific investigation. In the spirit of Open Science and global networking, we will enable data sharing across projects and institutions in an Open Access database on mitochondrial physiology and pathology, to resolve the *inflation crisis* and ultimately the *value-impact crisis* of present academic publication. This will support key developments in mitochondrial medicine. In addition, we expand our business to algal biotechnology and ecology with the photobiology module of the NextGen-O2k, widening our focus from medicine to environment and climate.



## Contact

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**Mitochondria and cell research**

Virtual O2k-Workshops are listed as [MitoGlobal Events](#)

