

# Oroboros **O2k-Workshop**



Mitochondrial Physiology Network 28.05(01):1-8 (2023)

Version 01: 2023-01-25 ©2023 Oroboros

Updates: [https://wiki.orooboros.at/index.php/MiPNet28.05\\_IOC158\\_Innsbruck\\_AT](https://wiki.orooboros.at/index.php/MiPNet28.05_IOC158_Innsbruck_AT)

## **O2k-Coaching Days 158<sup>th</sup> O2k-Workshop on high-resolution respirometry**

**2023 Feb 27 – Mar 01  
Innsbruck, Tyrol, Austria**



**O2k-Coaching Days** is a training course which provides a fundamental introduction to **high-resolution respirometry (HRR)** with the Oroboros O2k. It will give an overview of the **O2k**, including real-time analysis with **DatLab 8** and applications of the **Titration-Injection microPump TIP2k**. Hands-on sessions, using one O2k per participant, range from instrumental setup and service of the polarographic oxygen sensor (**OroboPOS**), instrumental quality control system, to respirometry experiments with substrate-uncoupler-inhibitor (SUIT) protocols using HEK 293T cells as the biological sample. Many optimized SUIT protocols are available as DL-Protocols and will be shown at the Coaching Days, as well as the [SUITbrowser](#), which helps you find the best SUIT protocol for your specific research questions. The [Blue Book](#) and [Mitochondrial Physiology](#) provide a basic introduction to mitochondrial

bioenergetics, complementing the training course, and therefore we recommend reading them beforehand. The 158<sup>th</sup> workshop is a unique opportunity to learn about the new developments in HRR.



## Lecturers and tutors

<a href="#">Cardoso Luiza</a>	Mitochondrial Wizard, Oroboros Instruments
<a href="#">Cecatto Cristiane</a>	Mitochondrial Phoenix, Oroboros Instruments
<a href="#">Gnaiger Erich</a>	CEO, Innovation Alchemist, Oroboros Instruments
<a href="#">Gürth Patrizia</a>	Laboratory Technician, Oroboros Instruments
<a href="#">Timón-Gómez Alba</a>	Mitochondrial Mage, Oroboros Instruments

## O2k-Workshop: OUR COMMON AIMS

- **Mitochondrial physiology:**  
Study mitochondrial function in the **context** of cell physiology and pathology
- **Instrumental performance – the O2k:**
  - 🕒 Learn **high**-resolution respirometry
  - 🕒 Gain **hands-on** experience
  - 🕒 Extend to O2k-**Multi**Sensor applications
- **Excellence in research:**
  - 🕒 Instrumental **quality** control
  - 🕒 Experimental design for **innovation**
  - 🕒 Data analysis meeting superior **standards**



## Program

### 1 Monday, Feb 27

	O2k Basic – quality control	Weblink	Room
08:30-09:00	<i>Welcome - Get-together: Introduction of participants and their research interests</i>		MiPArT
09:00-09:20	<b>OroboPOS service and O2k instrumental setup</b> - overview with videoclips	<a href="#">O2k-FluoRespirometer</a> <a href="#">O2k-Videosupport</a>	Oroboros O2k- Laboratory
09:20-10:40	<b>Hands-on</b> (2 groups) OroboPOS service and O2k instrumental setup	<a href="#">POS Service</a> <a href="#">O2k-Start</a>	Oroboros O2k- Laboratory
10:40-11:00	<b>DatLab 8 overview</b>	<a href="#">Getting started with DatLab</a>	MiPArT
11:00-11:30	<b>Instrumental quality control 1:</b> oxygen calibration	<a href="#">Gnaiger 2008 POS</a> <a href="#">SOP: O2-calibration</a>	MiPArT
11:30-12:30	<b>Hands-on:</b> Instrumental quality control 1: oxygen calibration DL-Protocol: O2k-cleaning BeforeUse DL-Protocol: O2 calibration air	<a href="#">SOP: O2k-cleaning and ISS</a> <a href="#">SOP: O2-calibration</a>	Oroboros O2k- Laboratory
12:30-13:30	<i>Lunch break</i>		
13:30-14:00	<b>Hands-on:</b> Instrumental quality control 1: oxygen calibration (continuation). DatLab analysis DL-Protocol: O2 calibration air	<a href="#">Oxygen calibration</a> <a href="#">SOP: POS calibration</a>	Oroboros O2k- Laboratory
14:00-14:30	<b>Instrumental quality control 2:</b> Instrumental O2 background – overview with videoclips	<a href="#">SOP: O2 background</a> <a href="#">TIP2k manual</a>	Oroboros O2k- Laboratory
14:30-15:30	<b>Hands-on: Instrumental quality control 2:</b> Instrumental O2 background DL-Protocol: Instrumental O2 background TiP2k		Oroboros O2k- Laboratory
15:30-16:00	<i>Coffee / Tea</i>		MiPArT
16:00-17:45	<b>Hands-on:</b> Instrumental quality control 2 (continuation). DatLab analysis. DL-Protocol: Instrumental O2 background TiP2k		Oroboros O2k- Laboratory

## 2 Tuesday, Feb 28

	O2k Basic – SUIT protocols	Weblink	Room
08:30-09:10	<b>Hands-on:</b> Instrumental quality control 1: oxygen calibration DL-Protocol: O2k-cleaning BeforeUse DL-Protocol: O2 calibration air	<a href="#">SOP: O2k-cleaning and ISS</a> <a href="#">SOP: O2-calibration</a>	Oroboros O2k- Laboratory
09:10-10:10	<b>Introduction to substrate-uncoupler-inhibitor titration (SUIT) protocols</b> – fundamental principles. SUIT reference protocol: RP1&RP2	<a href="#">MitoPedia: SUIT</a>	Oroboros O2k- Laboratory
10:10-10:25	<b>SUITbrowser:</b> how to find the best SUIT protocol for your research questions.	<a href="#">Oroboros SUITbrowser</a>	Oroboros O2k- Laboratory
10:25-10:30	<b>Hands-on:</b> Instrumental quality control 1: oxygen calibration DL-Protocol: O2 calibration air	<a href="#">SOP: O2-calibration</a>	Oroboros O2k- Laboratory
10:30-10:45	<i>Coffee / Tea</i>		MiPArT
10:45-12:45	<b>Hands-on:</b> O2k-experiment: Respiration of permeabilized cells: measurement of oxygen consumption with the reference protocol RP1 (SUIT-001) and RP2 (SUIT-002). DL-Protocol: SUIT-001 O2 ce-pce D003.DLP DL-Protocol: SUIT-002 O2 ce-pce D007.DLP	<a href="#">SUIT reference protocols</a> <a href="#">SUIT-001 O2 ce-pce D003</a> <a href="#">SUIT-002 O2 ce-pce D007</a>	Oroboros O2k- Laboratory
12:45-13:00	<b>Hands-on:</b> O2k-cleaning after use DL-Protocol: O2k-cleaning AfterUse	<a href="#">SOP: O2k-cleaning and ISS</a>	Oroboros O2k- Laboratory
13:00-14:00	<i>Lunch break</i>		
14:00-14:30	<b>Hands-on:</b> O2k-cleaning after use (continuation) DL-Protocol: O2k-cleaning AfterUse		Oroboros O2k- Laboratory
14:30-15:30	<b>DatLab analysis:</b> Introduction and new features <b>Hands-on: Individual DatLab analysis</b> – O <sub>2</sub> flux	<a href="#">Oxygen flux analysis</a>	Oroboros O2k- Laboratory
15:30-16:00	<i>Coffee / Tea</i>		MiPArT
16:00-17:30	<b>DatLab analysis summary</b>		MiPArT

## 3 Wednesday, Mar 01

O2k Basic – proficiency test		Weblink	Room
08:30-10:00	<b>MitoFit proficiency test</b> <b>Hands-on:</b> Instrumental quality control 1: oxygen calibration DL-Protocol: O2k-cleaning BeforeUse DL-Protocol: O2 calibration air	<a href="#">SOP: O2k-cleaning and ISS</a> <a href="#">SOP: O2-calibration</a>	Oroboros O2k- Laboratory
10:00-10:30	<i>Coffee / Tea</i>		MiPArT
10:30-12:15	<b>MitoFit proficiency test</b> <b>Hands-on:</b> O2k-experiment: Respiration of permeabilized cells: measurement of oxygen consumption with the reference protocol RP1 (SUIT-001) and RP2 (SUIT-002). DL-Protocol: SUIT-001 O2 ce-pce D003.DLP DL-Protocol: SUIT-002 O2 ce-pce D007.DLP	<a href="#">SUIT reference protocol</a> <a href="#">SUIT-001 O2 ce-pce D003</a> <a href="#">SUIT-002 O2 ce-pce D007</a>	Oroboros O2k- Laboratory
12:15-12:45	<b>Hands-on:</b> O2k-cleaning after use DL-Protocol: O2k-cleaning AfterUse	<a href="#">SOP: O2k-cleaning and ISS</a>	Oroboros O2k- Laboratory
12:45-13:45	<i>Lunch break</i>		
13:45-14:00	<b>Hands-on:</b> O2k-cleaning after use (continuation) DL-Protocol: O2k-cleaning AfterUse	<a href="#">SOP: O2k-cleaning and ISS</a>	Oroboros O2k- Laboratory
14:00-14:45	<b>Hands-on: DatLab analysis</b> – O <sub>2</sub> flux	<a href="#">Oxygen flux analysis</a>	Oroboros O2k- Laboratory
14:45-15:15	<i>Coffee / Tea</i>		MiPArT
15:15-15:30	<b>O2k-Applications - overview</b>	<a href="#">O2k Applications</a>	MiPArT
15:30-16:00	<b>The Bioblast wiki:</b> MitoPedia, the Oroboros Ecosystem, O2k Publications and O2k-Network	<a href="http://www.bioblast.at">www.bioblast.at</a> <a href="#">MitoPedia</a> <a href="#">O2k-Publications</a> <a href="#">O2k-Network</a>	MiPArT
16:00-17:00	<b>Proficiency test: DatLab analysis summary</b>		MiPArT
17:00	<b>Farewell activity</b>		MiPArT

## List of participants

Participant	Institution

\*Asterisks indicate the number of O2k instruments in the participant's lab.

## Venue and Accommodation

### Oroboros O2k-Laboratory

Schoepfstrasse 18, 6020 Innsbruck

> [How to get there](#)

### Hotel suggestion:

Basic Hotel Innsbruck

> <https://www.basic-hotel.at/en/>



## 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.orooboros.at/index.php/O2k-Manual>

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

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

## Acknowledgements

Program prepared for printing by Cardoso LHD, Beno M, Oroboros Instruments.

## 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>

The Next World-Summits on Mitochondrial Physiology and Bioenergetics



Become a MiPmember now and join our MiPevents

» [www.mitophysiology.org](http://www.mitophysiology.org)



22<sup>nd</sup> European Bioenergetics Conference

2024 August 26-31  
Congress Innsbruck, Austria  
[www.ebec2024.org](http://www.ebec2024.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 NextGen-O2k PhotoBiology-Module, widening our focus from medicine to environment and climate.

### Contact

Erich Gnaiger, PhD  
 Oroboros Instruments GmbH  
 Schoepfstrasse 18  
 A-6020 Innsbruck, Austria  
 T +43 512 566796 F +43 512 566796 20  
[instruments@oroboros.at](mailto:instruments@oroboros.at) | [www.oroboros.at](http://www.oroboros.at)  
**Mitochondria and cell research**



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