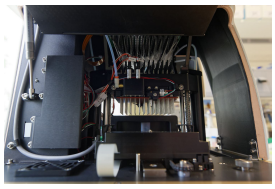
Seahorse XFe96 analyzer

https://search.researchequipment.wur.nl/SearchDetail.aspx?deviceid=af743041-cbe7-4578-b12e-d6283a423fb2



Brand

Seahorse Bioscience

Type

XFe96

Contact

Vincent de Boer (vincent.deboer@wur.nl)

Annelies Bunschoten (annelies.bunschoten@wur.nl)

Organisation

Animal Sciences Group

Department

Human and Animal Physiology

Description

The Seahorse XFe96 analyzer has the capability of analyzing cellular metabolism of a wide range of sample types (from cultured cells to model organisms), making it a highly versatile research tool.
Cellular metabolism, the intricate network of pathways providing energy and building blocks, nowadays is the intense focus of both basic and applied research attention. Disturbance of the metabolic network is an underlying mechanism of many diseases in humans, animals and plants. Understanding metabolic imbalances can lead to specific dietary interventions, targeted to prevent disease or to design novel therapies for human and animal diseases. We combine Seahorse analyses with high-throughput imaging of 96-well plates using the Cytation 1, which enables rapid acquisition of microscopic images of cells or model organisms in well plates.

Technical Details

The XFe96 analyzer from Seahorse Bioscience measures multiple parameters (O2 and H+) simultaneously using optical biosensors in cell culture microplate assays in real time It is capable of automatically injecting 4 different compounds into the wells, allowing for fast and reproducible measurement of extracellular fluxes before and after injection. Oxygen is consumed during cellular metabolism and extracellular medium is acidified due to excretion of lactic acid produced during glycolysis. O2 and pH flux analysis, combined with injection of compounds targeting metabolism, provides a detailed profile of cellular metabolic phenotype. In the instrument disposable cartridges, embedded with 96 doublets of fluorescent biosensors, are coupled to a fiber-optic waveguide. The waveguide delivers light at different excitation wavelengths and transmits the emitted fluorescent signal through optical filters to highly sensitive photodetectors.
Our Seahorse is housed inside an hypoxic chamber (Custom made by Coy Lab) so that real-time analysis of metabolic function can be performed at a wide range of oxygen concentrations (including hypoxia). This allows for analyzing in vitro cellular and organismal metabolic functions at relevant in vivo oxygen levels.
We equipped our Seahorse with the Agilent XF normalization system providing an even higher level of accuracy and standardization of the cellular assays we perform with the Seahorse. It consists of the Cytation 1 (Biotek, Agilent) and integrated software for automatic imaging and normalization of plates and data.

Applications

- Targeting cellular metabolic pathways with dietary components in cultured cells
- Screening the effect of food components on mitochondrial function and toxicity
- The Seahorse can be exploited to perform as an alternative for metabolic analyses in small animals
- Analyzing metabolism of isolated blood cells or tissue cells after interventions
- Analyzing cellular metabolism of genetically altered C. elegans strains
- Following metabolism during embryonic development (eg zebrafish)
- Analyzing fermentation in yeast cells for food processing technologies
- Assessment of plant cell metabolism

Publications

Proteomic and biochemical studies of lysine malonylation suggest its malonic aciduria-associated regulatory role in mitochondrial function and fatty acid oxidation, Colak, G.; Pougovkina, O.; Dai, L.; Tan, M.; Brinke, H. te; Huang, H.; Wanders, R.J.; Locasale, J.W.; Lombard, D.B.; Boer, V.C.J. de; Zhao, Y. , Molecular and Cellular Proteomics , http://www.wur.nl/en/Publication-details.htm?publicationId=publication-way-343935313035

SIRT1/PGC1a-dependent increase in oxidative phosphorylation supports chemotherapy resistance of colon cancer, Vellinga, T.T.; Borovski, T.; Boer, V.C.J. de; Kranenburg, O., Clinical Cancer Research , http://www.wur.nl/en/Publication-details.htm?publicationId=publication-way-343935313033

A computational study of the Warburg effect identifies metabolic targets inhibiting cancer migration, Keren Yizhak, Sylvia E Le Dévédec, Vasiliki Maria Rogkoti, Franziska Baenke, Vincent C de Boer, Christian Frezza, Almut Schulze, Bob van de Water and Eytan Ruppin, Molecular Systems Biology, http://onlinelibrary.wiley.com/doi/10.15252/msb.20134993/full

Inhibiting epigenetic enzymes to improve atherogenic macrophage functions, Van den Bossche J, Neele AE, Hoeksema MA, de Heij F, Boshuizen MC, van der Velden S, de Boer VCJ, Reedquist KA, de Winther MP, Biochemical and Biophysical Research Communications 455 (2014), http://www.sciencedirect.com/science/article/pii/S0006291X14020397

Fish Macrophages Show Distinct Metabolic Signatures Upon Polarization, Wentzel, AS; Janssen, JJE; de Boer, VCJ; van Veen, WG; Forlenza, M; Wiegertjes, GF, Front Immunol. 2020 Feb 25;11:152. doi: 10.3389/fimmu.2020.00152. eCollection 2020, https://research.wur.nl/en/publications/fish-macrophages-show-distinct-metabolic-signatures-upon-polariza

Mitochondrial ATP Depletion Disrupts Caco-2 Monolayer Integrity and Internalizes Claudin 7, JanssenDuijghuijsen LM, Grefte S, de Boer VCJ, Zeper L, van Dartel DAM, van der Stelt I, Bekkenkamp-Grovenstein M, van Norren K, Wichers HJ, Keijer J., Front Physiol. 2017 Oct 11;8:794. doi: 10.3389/fphys.2017.00794. eCollection 2017. PMID: 29075202 Free PMC article, https://www.wur.nl/en/Publication-details.htm?publicationId=publication-way-353238353638