# Johan Auwerx at EPFL : fact sheet

Having arrived at EPFL in 2008, Johan Auwerx directs the Laboratory of Integrated Systems Physiology (LISP). He holds the Nestlé Chair in Energy Metabolism and has authored and co-authored more than 500 scientific papers, highly cited among his peers. His Hirsch index (*h-index*) measures above 110.

## Lab mission

The LISP laboratory is using systems approaches to map the signalling networks that govern mitochondrial function and as such regulate organismal metabolism in health, aging and disease. The scientists apply a state-of-the-art biological toolkit to study a variety of model systems, ranging from the plant *Arabidopsis thaliana* to the nematode *Caenorhabditis elegans* to the mouse and all the way to humans.
Their research has not only allowed the development of new methodologies and scientific approaches – exemplified by their cross-species multi-layered genetics/omics gene mapping strategies – but also helps us better understand how signaling pathways control mitochondrial function and metabolism. Although the research at LISP addresses basic biomedical questions, Professor Auwerx's medical background facilitates the translation into novel preventive and therapeutic strategies for common diseases such as type-2 diabetes, frailty, and obesity, as well as rare inherited mitochondrial diseases. The translational value of the work led at EPFL is demonstrated by the fact that several drugs currently used in the clinic target processes and pathways that Auwerx's team has identified and elucidated.

## Latest high-impact publications

1. M. Watanabe, S.M. Houten, C. Mataki, M.A. Christoffolete, B.W. Kim, H. Sato, N. Messaddeq, J.W. Harney, O. Ezaki, T. Kodama, K. Schoonjans, A.C. Bianco, J. Auwerx. Bile acids induce energy expenditure by promoting intracellular thyroid hormone activation. *Nature*, 2006, 439, 484-9. PMID16400329
2. M. Lagouge, C. Argmann, Z. Gerhart-Hines, H. Meziane, C. Lerin, F. Daussin, N. Messadeq, J. Milne, P. Lambert, P. Elliot, B. Geny, M. Laakso, P. Puigserver, J. Auwerx. Resveratrol improves mitochondrial function and protects against metabolic disease by activating SIRT1 and PGC-1. *Cell* , 2006, 127, 1109-1122. PMID17112576
3. C. Canto, Z. Gerhart-Hines, J.N. Feige, M. Lagouge, L. Noriega, J.C. Millne, P. Puigserver, J. Auwerx. AMPK regulates energy expenditure by modulating NAD+ metabolism and SIRT1 activity. *Nature*, 2009, 458, 1056-1060. PMC3616311
4. R. H. Houtkooper, L. Mouchiroud, D. Ryu, N. Moullan, E. Katsyuba, G. Knott, R.W. Williams, J. Auwerx. Mitonuclear protein inbalance as a conserved longevity mechanism. *Nature*, 2013, 497, 451-457. PMC3663447
5. L. Mouchiroud, R.H. Houtkooper, N. Moullan, E. Katsyuba, D. Ryu, C. Canto, A. Mottis, Y.-S. Jo, M. Viswanathan, K. Schoonjans, L. Guarente, J. Auwerx The NAD+/sirtuin pathway modulates longevity through activation of mitochondrial UPR and FOXO signaling. *Cell*, 2013, 154, 430-441. PMC3753670
6. Y. Wu, E.G. Williams, S. Dubuis, A. Mottis, V. Jovaisaite, S.M. Houten, C.A. Argmann, P. Faridi, W. Wolski, Z. Kutalik, N. Zamboni, J. Auwerx*, R. Aebersold* (*co-corresponding authors). Multilayered genetic and omics dissection of mitochondrial activity in a mouse genetic reference population. *Cell*, 2014, 158, 1415-1430. PMC4179868
7. E.G. Williams, Y. Wu, S. Dubuis, P. Blattmann, C. Argmann, S. Houten, T. Amariuta, W. Wolski, N. Zamboni, R. Aebersold*, J. Auwerx*. (*co-corresponding authors) Systems proteomics and trans-omic integration illuminate new mechanisms in mitochondrial function. *Science*, 2016, 352, aad0189 - DOI: 10.1126/science.aad0189. PMID27284200
8. C. Merkwirth, V. Jovaisaite, J. Durieux, O. Matilainen, S.D. Jordan, P.M. Quiros, K.K. Steffen, E.G. Williams, L. Mouchiroud, S.N. Uhlein, V. Murillo, S.C. Wolff, R.J. Shaw, J.Auwerx*, A. Dillin* (*co-corresponding authors). A Conserved Class of Histone Demethylases Regulate Longevity in Response to Mitochondrial Stress. *Cell*, 2016, 165, 1209-23. PMID27133168

9. H. Zhang, D. Ryu, Y. Wu, K. Gariani, X. Wang, P. Luan, D. D'Amico, E.R. Ropelle, M.P. Lutolf, R. Aebersold, K. Schoonjans, K.J. Menzies*, J. Auwerx*. (*co-corresponding authors) $NAD^+$ repletion improves mitochondrial and stem cell function and enhances lifespan in mice. *Science*, 2016, 352, 1436-43. PMID27127236
10. D. Ryu, L. Mouchiroud, P. Andreux, E. Katsyuba, N. Moullan, A. Nicolet, E. Williams, P. Jha, G. Lo Sasso, D. Huzard, P. Aebischer, C. Sandi, C. Rinsch*, J. Auwerx* (*co-corresponding). Urolithin A induces mitophagy and prolongs lifespan in *C.elegans* and increases muscle function in rodents. *Nature Med.*, 2016, 22, 879-88. PMID27400265

**More information :**

LISP website : http://auwerx-lab.epfl.ch

Emmanuel Barraud, EPFL media officer, +41 21 693 21 90, emmanuel.barraud@epfl.ch

Professor Johan Auwerx, +41 21 693 09 51, johan.auwerx@epfl.ch