Graier F. Wolfgang*

Key Researcher

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*Elected Member of the Academia Europaea

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SCIENTIFIC & ACADEMIC CAREER

since 2018	*Head*, Gottfried Schatz Research Center for Cell Signaling, Metabolism & Aging
since 2015	*Head*, NIKON – Center of Excellence Graz, NCoE-Graz
since 2009	*Chair*, Institute of Molecular Biology and Biochemistry, Center of Molecular Medicine, Medical University Graz (since October 1st 2009)
since 2009	*Full Professor of Molecular Biology*, Medical University of Graz, Austria
1995 - 2009	*Associate Professor*, Department of Medical Biochemistry & Medical Molecular Biology at the University of Graz, Austria
1993 - 1994	*PostDoc* Training in Physiology and Membrane biophysics at the Dalton Cardiovascular Research Center, Vascular Cell Biophysics Laboratory (Prof. Dr. Mike Sturek), University of Missouri, Columbia, MO, USA
1992 – 1993	*PostDoc*, Department of Pharmacology & Toxicology, University of Graz, Austria
1988 - 1991	Ph.D. thesis in pharmacology at the Department of Pharmacology and Toxicology, University of Graz, Austria
1981 - 1988	Study of Pharmacy & Pharmaceutical Chemistry, University of Graz, Austria

MAIN AREA OF RESEARCH

Wolfgang Graier' research focuses on aging-associated changes in cellular, subcellular and sub-organellar ion regulation, mitochondrial bioenergetics and cellular energy metabolism. His team's current work explores how aging-associated alterations in e.g. tissue perfusion, cellular shape and organ rigidity, environmental factors like shear stress and hormones, and alterations in nutrition supply, cause variations in sub-cellular/inter-organellar/sub-organellar ion homeostasis triggering fast metabolic rewiring. His group revealed that persisting metabolic rewiring leads to metabolic reprogramming yielding organelle/cell dysfunction and, ultimately cell death. They afford such studies by designing and developing novel genetically encoded fluorescence sensors that allow multi-dimensional visualization of metabolic processes in live-time super/high resolution applying customized laser fluorescence microscopes. Moreover, they are experienced in mimicking disease states in human cells. These models fundamentally help to discover potential protein targets for our efforts in designing and developing senolytic-active compounds. In this regard, Graier's group has already described the senolytic activity of two natural compounds (e.g. resveratrol) and is currently elaborating the lead structure of mitochondria-targeted senolytics that have been already proved effective in model of human endothelial cell aging and *Caenorhabditis elegans.* MetAGE, provides the unique chance to expand our research to other model organisms and even humans/human samples while offering cutting-edge technology for analysis. Hence, he will analyze cellular metabolic wiring in the models of the participating groups and seek to find new mechanisms and pathways that are important in aging and aging-associated cellular dysfunction. In MetAGE he will serve as integrative part of our joint efforts in the discovery of the molecular mechanisms of aging-related diseases, and in the discovery of anti-aging active senolytic lead compounds.

ADDITIONAL RESEARCH ACTIVITIES

1992-present	More than 32 years of uninterrupted support by competitive national, European, British and American third-party funded research grants (€ ~14.8 Mio)
Since 2006	Four successful patent applications filed (US2018328908 (A1); PCT/EP2020/052513; WO2016066647 (A1); WO2016066647 (A1)) and another four are in preparation
Since 2016	Co-Founder, CEO and owner of *Next Generation Fluorescence Imaging* Inc. (NGFI) which develops genetically encoded biosensors and affordable microscopic devices to support researchers in performing fluorescence microscopy.

Honors & Awards

More than 20 national and international research awards, also including Teaching Awards. Invited referee of multiple international journals and funds agencies (USA, CH, UK, S, GER, IT, F, BL, CZ, CAN, and the EU). Personally invited nominee of The Japan Prize/Japan, The VinFuture Prize/Vietnam, The Sjöberg Prize of the Royal Swedish Academy of Sciences/Sweden, and the Nobel Prize by the Nobel Committee on behalf of Nobel Assembly at Karolinska Institutet/Sweden.

10 MOST IMPORTANT PUBLICATIONS

1. Gottschalk B, Koshenov Z, Waldeck-Weiermair M, RaduloviS, Oflaz FE, Hirtl M, Bachkoenig OA, Leitinger G, Malli R, **Graier WF** (**2022**). MICU1 controls spatial membrane potential gradients and guides Ca^{2+} fluxes within mitochondrial substructures. **Commun Biol** 5: 76. DOI: 10.1038/s42003-022-03606-3.
2. Koshenov Z, Oflaz FE, Hirtl M, Gottschalk B, Rost R, Malli R, **Graier WF** (**2022**). Citrin mediated metabolic rewiring in response to altered basal subcellular Ca^{2+} homeostasis. **Commun Biol** 5: 76. DOI: 10.1038/s42003-022-03019-2.
3. Gottschalk B, Klec C, Leitinger G, Bernhart E, Rost R, Bischof H, Madreiter-Sokolowski CT, Radulović S, Eroglu E, Sattler W, Waldeck-Weiermair M, Malli R, **Graier WF** (**2019**). MICU1 controls cristae junction and spatially anchors mitochondrial Ca^{2+} uniporter complex. **Nat Commun** 10: 3732. DOI: 10.1038/s41467-019-11692-x.
4. Klec C, Madreiter-Sokolowski CT, Stryeck S, Sachdev V, Duta-Mare M, Gottschalk B, Depaoli MR, Rost R, Hay J, Waldeck-Weiermair M, Kratky D, Madl T, Malli R, **Graier WF** (**2019**). Glycogen Synthase Kinase 3 Beta Controls Presenilin-1-Mediated Endoplasmic Reticulum Ca^{2+} Leak Directed to Mitochondria in Pancreatic Islets and β-Cells. **Cell Physiol Biochem** 52: 57-75. DOI: 10.33594/000000005.
5. Madreiter-Sokolowski CT, Waldeck-Weiermair M, Bourguignon MP, Villeneuve N, Gottschalk B, Klec C, Stryeck S, Radulovic S, Parichatikanond W, Frank S, Madl T, Malli R, **Graier WF** (**2019**). Enhanced inter-compartmental Ca^{2+} flux modulates mitochondrial metabolism and apoptotic threshold during aging. **Redox Biol** 20: 458-466. DOI: 10.1016/j.redox.2018.11.003.
6. Madreiter-Sokolowski CT, Klec C, Parichatikanond W, Stryeck S, Gottschalk B, Pulido S, Rost R, Eroglu E, Hofmann NA Bondarenko AI, Madl T, Waldeck-Weiermair M, Malli R,**Graier WF** (**2016**). PRMT1-mediated methylation of MICU1 determines the UCP2/3 dependency of mitochondrial Ca^{2+} uptake in immortalized cells. **Nat Commun** 7:12897. DOI: 10.1038/ncomms12897.
7. Waldeck-Weiermair M, Malli R, Parichatikanond W, Gottschalk B, Madreiter-Sokolowski CT, Klec C, Rost R,**Graier, WF** (**2015**). Rearrangement of MICU1 multimers for activation of MCU is solely controlled by cytosolic Ca^{2+}. **Sci Rep** 5: 15602. DOI: 10.1038/srep15602.

8. Alam MR, Groschner LN, Parichatikanond W, Kuo L, Bondarenko AI, Ros, R, Waldeck-Weiermair M, Malli R, **Graier WF** (**2012**). Mitochondrial Ca^{2+} uptake 1 (MICU1) and mitochondrial Ca^{2+} uniporter (MCU) contribute to metabolism-secretion coupling in clonal pancreatic β-cells. **J Biol Chem** 287: 34445-34454. DOI: 10.1074/jbc.M112.392084.

9. Waldeck-Weiermair M, Zoratti C, Osibow K, Balenga N, Goessnitzer E, Waldhoer M, Malli R, **Graier WF** (**2008**). Integrin clustering enables anandamide-induced Ca^{2+} signaling in endothelial cells via GPR55 by protection against CB1-receptor-triggered repression. *J Cell Sci* (2008) 121: 1704-1717. DOI: 10.1242/jcs.020958.

10. Trenker M, Malli R, Fertschai I, Levak-Frank S, **Graier WF** (**2007**). Uncoupling proteins 2 and 3 are fundamental for mitochondrial Ca^{2+} uniport. **Nat Cell Biol** 9: 445-452. DOI: 10.1038/ncb1556.