

Roland Hellinger, PhD

University Assistant/Post-Doc

[Medical University of Vienna](#), [Center for Pharmacology and Physiology](#), Vienna Austria;

Phone: +43 (1) 40160 31393 | +43 6802015704

Email: roland.hellinger@meduniwien.ac.at

ORCID [0000-0002-8955-8793](#) | Research ID [D-3050-2018](#)



PERSONAL DATA

Birthdate 06/09/1986 | Birthplace Zwettl, Lower Austria | Nationality Österreich/Austria

RESEARCH INTEREST

Bioactive Natural Product Discovery – Molecular & Chemical Pharmacology of G-protein coupled receptor modulators – Drug Target Identification & Mechanism of Action Studies – Metabolomics and Peptidomics – Pharmacology of Human Protease Inhibitors

Description of my main research fields

Immune system modulatory peptides. Cyclic cysteine-rich peptides (e.g. the drug candidate T20K) have immune system modulatory activity. In my previous research activities, I have investigated the expression of these peptides in plants, their amino acid sequence and native structure. Their bioactivity was studied on human and mouse immune cells and a therapeutic application as immune system modulators was shown using the EAE model for multiple sclerosis. The mode of action was investigated, for example a putative molecular drug target (14-3-3 protein isoforms) was identified in a chemical proteomics study. The adapter proteins of the 14-3-3 family are ubiquitous in cells, but as I identified the Foxo3a protein, including cell-nucleus shuttling and transcriptional activity, was modulated in the presence of T20K. Nowadays, my research activities concentrate on the further characterization of the identified 14-3-3/Foxo3a interaction and the possible effects of T20K's modulation of intracellular protein shuttling as well as the resulting effects of the Foxo3a dependent protein expression (e.g. p27^{KIP}, FoxP3, CD26, etc.) in human immune cells. Furthermore, the drug candidate T20K will be investigated, for example to receive more insight in the structure-function relationship and to study effects of the peptide on the NK-, B-cells level in the EAE model.

Cyclic cysteine-rich peptides as human protease inhibitors. Previously, I reported the discovery and initial characterization of the first cyclic cysteine-rich peptide inhibitor (psysol-2) of the human prolyl endopeptidase. Nature-derived peptide-based protease inhibitors (peptide-PI) are a large group inhibitors with significant benefits over small molecule inhibitors – these are: their increased selectivity to specifically target a protease/-family and their expected lower toxicity. In my previous research activities, I could confirm psysol-2's mode of action as non-competitive inhibition mode, which is a unique feature compared to many competitive small molecule inhibitors of prolyl endopeptidase (unpublished results). The protease is a possible drug target for a disease-modifying therapy in synucleinopathies, such as Parkinson's Disease. For example, small molecule protease modulators were shown to modify the protein- α -synuclein interaction, to reduce α -synuclein aggregation and precipitations in the brain. My research interest also comprise the discovery of novel peptide inhibitors for other (related) proteases (e.g. human neurolysin, DPP-IV, FAP α , neprilysin, etc) as well as their characterization. Furthermore, I run several collaborations in (neuro)peptidome analysis, for example with Dr. J. Kovarik (MUW, Angiotensin II metabolism), Dr. Peter Macheroux (University Graz, DPP-III) or Dr. Jozef Vanden Broeck (KU Leuven, Neuropeptidomics).

ACADEMIC QUALIFICATION

2012-2016. Doctor of Philosophy (Ph.D.): N094 doctoral program “Molecular Signal Transduction” at the Medical University of Vienna, Center for Pharmacology and Physiology. “*Bioactive Circular Cysteine-rich Peptides: Discovery, Characterization and Application in Target Identification for Drug Discovery*” (Assoc.-Prof. Priv.-Doz. Dr. Christian W. Gruber (BAppSc, PhD)), Graduation date 23.06.2016.

2010-2012. Master of Science (M.Sc.): Chemistry

University of Vienna, “*Enantioselective Separation of Fluorescence Tagged Amino Acids using Chiral*

Anion Exchangers” (Univ. Prof. em. Dr. Wolfgang Lindner)

2007-2010. Bachelor of Science in Applied Natural Science (B.Sc.).

Austrian Biotech University of Applied Sciences, “*Simultane Bestimmung von 231 Pflanzenschutzmitteln in Lebensmitteln Hochleistungsflüssigchromatographie - Tandem Massenspektrometrie*“ (Dr. Céline Lesueur and Prof. Dr. Justyna Rechthaler)

ACADEMIC CAREER

Current position 03/2018–to date: University Assistant/Post-Doc

Center for Pharmacology and Physiology of the Medical University of Vienna. Institute of Pharmacology, assoc. with the [MS Core Facility](#) and the lab for Drug Discovery and Peptidomics

07/2016–03/2018: Post-Doctoral Scientist

Center for Analytical Chemistry at Department for Agrobiotechnology, University of Natural Resources and Life Sciences (BOKU), Vienna. BiMM–Bioactive Microbial Metabolites project

RECRUITED RESEARCH PROJECTS

FWF Zukunftskolleg (Young independent research groups)

I am coordinator of a research group of five postdoctoral principal investigators. The Project, PeptAIDes – ‘Peptides Therapeutics for Autoimmune and Inflammatory Diseases’ – has been awarded a total research funding of € 2.321.572,34. The project period is from end of 2020 till 2024.

OeAD International Fellowship

Awarded to Olivier Eteme N`Dogo for the period 2019/20, Sum €10,450,-

The fellowship has been recruited under my auspice and the fellow will be hosted in the laboratory of Dr. Christian Gruber.

POST-GRADUATE EDUCATION

2016. Thermo Scientific Training Certificates for Metabolomics and Proteomics Individual Operator Training for an Orbitrap-HF mass spectrometers

2014. Quality Control and Quality Assurance in the Chemical Laboratory, Montanuniversität Leoben. **Passed with distinction.**

2013. Bruker Daltonics Training Certificates for the ESI-(Q)-TOF mass spectrometers Individual Operator Training.

2013. University Course, Pharmaceutical Bioinformatics, University of Uppsala, 7.5 ECTS credits

2012. EuPA course, Basic Mass Spectrometry for Proteomics, Biomedical Center University of Lund, Sweden.

SCIENTIFIC RECOGNITION (SELECTED)

- Oral presentation at the 35th European Peptide Symposium, Dublin, Ireland 2018
- Oral presentation at the 6th Austrian Peptide Symposium, Vienna 2016
- Oral and poster presentation at the 3rd International Conference on Circular Proteins, Moreton Island, Australia 2015
- Oral and poster presentation at the 11th Australian Peptide Conference, Kingscliff, Australia 2015
- Poster presentation at the International Conference “Natural Products and Drug Discovery – Future Perspectives”, Vienna, 2014, **Awarded with the 2nd Poster Price**
- Poster presentation at the 4th Austrian Peptide Symposium, Salzburg 2014. **Awarded with the Best Poster Presentation**
- Oral contribution at the annual Austrian Pharmacologist Meeting, Innsbruck 2014
- Oral contribution at the 33rd European Peptide Symposium, Sofia, Bulgaria 2014
- Oral contribution at the 3rd Austrian Peptide Symposium, Graz 2013
- Poster presentation at the 19th Australian Peptide Congress, Penang 2013
- Oral contribution at the annual Austrian Pharmacologist Meeting, Vienna 2013

- Oral contribution at the 9th Young Scientist Association PhD Symposia, Vienna 2013
- Poster presentation at the 14th Tetrahedron Symposium, Vienna 2013

ACHIEVEMENTS AND HONOURS

- **Junganalytikerpreis 2016** awarded by the Austrian Society for Analytical Chemistry (ASAC)
- Best Poster Presentation at the 4th Austrian Peptide Symposium, Salzburg 2014.
- Best Poster Presentation at the International Natural Products and Drug Discovery – Future Perspective Symposium, Vienna, 2014.
- **Förderpreis für Chemie 2013** for the Diploma Thesis “*Enantioselective Separation of Fluorescence Tagged Amino Acids using Chiral Anion Exchangers*” donated by the Austrian Chemical Society.
- Merit scholarship 2008 provided by the Austrian Biotech University of Applied Sciences, Tulln.
- TOP student bursary 2008 funded by Land Niederösterreich

TEACHING ACTIVITY

- N202, Human Medicine, Pharmacological *Seminars* Block 4, SS2019-to date “802.001 Functional Systems and Biological Regulation”; up to 1.7 ECTS
- N202, Human Medicine, Pharmacological *Seminars & Practical* Course Block 9, WS 2019-to date “803. 005 Diseases, Manifestation, Perception and General Pharmaceutical Intervention & Therapy; up to 2.56 ECTS
- N202, Human Medicine, Pharmacological *Seminars* Block 10 SS2020-to date “804.001 Endokrinologie und Stoffwechsel”; up to 0.8 ECTS

PROFESSIONAL MEMBERSHIPS

Member of the Society of Austrian Chemists (GÖCH)
 Member of the European Peptide Society (EPS) and of the Austrian Peptide Society
 Member of the Austrian Society of Analytical Chemistry (ASAC)
 Member of the Austrian Pharmacologist Society (APhar)

PEER REVIEW ACTIVITIES

Journal of Natural Products	Toxins, Nutrients, Biomedicines (MDPI Journal)
Journal of Antimicrobial Research	Communication Biology
Journal of Food Chemistry	Biologica Journal
Scientific Reports	Phytochemistry
ACS Chemical Biology	

INTERNATIONAL COOPERATIONS

Univ.-Prof. Dr. Ulf Göransson, University of Uppsala, Department for Medicinal Chemistry, Pharmacognosy/Peptide Chemical Biology

Univ.-Prof. Dr. Christian F.W. Becker, University of Vienna, Faculty for Chemistry, Institute for Chemical Biology

Dr. Richard Clark, Senior Research Fellow, University of Queensland, School of Biomedical Sciences

Univ.-Prof. Dr. Ernest Giralt, University of Barcelona, Institute of Research in Biomedicine

Dr. Daniel Kümmel from the Institute of Biochemistry of the WWU Münster

Univ.-Prof. Dr. Peter Macheroux from the TU Graz, Institut für Biochemie.

Dr. Jozef Vanden Broeck, KU Leuven, Animal Physiology and Neurobiology.

Dr.med.univ. Johannes Kovarik, PhD, Medizinische Universität Wien, Universitätsklinik für Innere Medizin III, Klinische Abteilung für Nephrologie und Dialyse.

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In total (2013-2020) I have published/contributed to 16 peer-reviewed research articles (2 review, 14 original research articles) with an average **citation per paper of 20 (h-index 9)** and **the total number citations is 306** (source: [GoogleScholar](https://scholar.google.com/citations?user=...), 09/07/2020).

Note: Authorships underlined; first authorship is marked in boldface; equal contributions are indicated with an asterisk; impact factors (IF) taken from Web of Science (year before publication date or to date), and no. of citations taken from GoogleScholar 09/07/2020, respectively.

PUBLICATION LIST

- [16] Kaltenecker, CC., Domenig, O., Kopecky, C., Antlanger, M., Poglitsch, M., Berlakovich, G., Kain, R., Stegbauer, J., Rahman, M., Hellinger, R., Gruber, C., Grobe, N., Fajkovic, H., Eskandary, FA., Böhmig, GA., Säemann, MD., Kovarik, JJ. Critical Role of Neprilysin in Kidney Angiotensin Metabolism. 2020 Circ. Res. doi: 10.1161/CIRCRESAHA.119.316151. Online ahead of print. [IP 15.8].
- [15] Svoboda, T., Parich, A., Güldener, U., Schöfbeck, D., Twaruschek, K., Václavíková, M., Hellinger, R., Wiesenberger, G., Schuhmacher, R., Adam, G., Biochemical characterization of the Fusarium graminearum candidate ACC-deaminases and virulence testing of knockout mutant strains. 2019. Front. Plant Sci., 10:1072, doi: 10.3389/fpls.2019.01072 [IP 4.1, Q1 in Plant Sciences]
- [14] **Hellinger, R.** and Gruber, CW., *Peptide-based protease inhibitors from plants*. Drug Discov Today. 2019. 24(9), 1877-1889. doi: 10.1016/j.drudis.2019.05.026. [IP 6.88; Q1 Pharmacology and Pharmacy, 2 citations]
- [13] Stadler, D., Lambertini, F., Bueschl, C., Wiessenberger, G., Hametner, C., Schwartz-Zimmermann, H., Hellinger, R., Sulyok, M., Lemmens, M., Schuhmacher, R., Suman, M., Berthiller, F., Krska, R., *Untargeted LC-MS based 13C labelling provides a full mass balance of deoxynivalenol and its degradation products formed during baking of crackers, biscuits and bread*, 2018, Food Chem., 279:303-311, <https://doi.org/10.1016/j.foodchem.2018.11.150>, [IF 4.9; Top 5% Food Science & Technology, 7 citations]
- [12] Keov, P., Liutkevičiūtė, Z., Hellinger, R., Clark, RJ., Gruber, CW. *Discovery of peptide probes to modulate oxytocin-type receptors of insects*, Scientific Reports. 2018, 8, 10020. doi:10.1038/s41598-018-28380-3. [IF 4.2; Q1 Top 10 % multidisciplinary journal, 3 citation]
- [11] Labuda, R., Bernreiter, A., Schüller, C., Kubátová, A., Hellinger, R., Strauss, J. *Metapochonia lutea, a new species isolated from the Danube river in Austria*, Nova Hedwigia. 2018, 106 (3-4), 3-4. doi: https://doi.org/10.1127/nova_hedwigia/2018/0487. [IF 0.9; Q3 Agricultural and Biological Sciences]
- [10] **Hellinger, R.**, Thell, K., Vasileva, M., Liutkevičiūtė, Z., Muhammad, T., Gunasekera, S., Kümmel, D., Becker, CF., Göransson, U., Becker, CFW., Gruber, CW. *Chemical Proteomics for Target Discovery of Head-to-Tail Cyclized Mini-Proteins*, Front. Chem. 2017, 5:73. doi: 10.3389/fchem.2017.00073. [IF 3.9; Q2 Chemistry (multidisciplinary), 4 citations]
- [9] Zutz, C., Chiang, YM., Faehnrich, B., Bacher, M., Hellinger, R., Kluger, B., Wagner, M., Strauss, J., Rychli, K. *Butyrate influences intracellular levels of adenine and adenine derivatives in the fungus Penicillium restrictum*, Microbiological research, 2017, 197:1-8. doi: 10.1016/j.micres.2016.12.013. [IF 3.0; Q2 Microbiology]
- [8] Thell, K., Hellinger, R., Sahin, E., Michenthaler, P., Gold-Binder, M., Haider, T., Kuttke, M., Liutkevičiūtė, Z., Göransson, U., Gründemann, C., Schabbauer, G., Gruber, CW. *Oral activity of a nature-derived cyclic peptide for the treatment of multiple sclerosis*, PNAS, 2016. 113(15): 3960-3965. doi: 10.1073/pnas.1519960113. [IF 9.4, Top 10% Multidisciplinary Sciences, 54 citations]
- [7] **Hellinger, R.**,* Attah, AF,* Sonibare, MA., Moody, JO., Arrowsmith, S., Wray, S., Gruber, CW. *Ethnobotanical survey of Rinorea dentata (Violaceae) used in South-Western Nigerian ethnomedicine and detection of cyclotides*, J Ethnopharmacol., 2016, 179 (1): 83-91. doi: 10.1016/j.jep.2015.12.038. [IF 3.4; No. 4/Top 15%, Integrative & Complementary Medicine, 12 citations]

- [6] **Hellinger, R.,*** Koehbach, J.,* Soltis, DE., Carpenter, EJ., Wong, GK., Gruber, CW. *Peptidomics of Circular Cystine-rich Plant Peptides: Analysis of the Diversity of Cyclotides from Viola tricolor by Transcriptome and Proteome Mining*. J Proteome Res. 2015, 14 (11):4851-4862. eoi: 10.1021/acs.jproteome.5b00681. [IF 4.2, Top 20% Biochemical Research Methods, **44 citations**]
- [5] **Hellinger, R.,*** Koehbach, J.,* Puigpinós, A., Clark, RJ., Tarrago, T., Giralt, E. and Gruber, CW. *Inhibition of Human Prolyl Oligopeptidase Activity by the Cyclotide Psysol 2 Isolated from Psychotria solitudinum*. J Nat Prod. 2015, 78 (5):1073-1082. doi: 10.1021/np501061. [IF 3.8; Top 7% Plant Sciences, **Top 16% Pharmacology & Pharmacy, 23 citations**]
- [4] **Hellinger, R.,*** Koehbach, J.,* Halyna, F., Sauer, B., Huber, R., Gruber, CW., Gründemann, C., *Immunosuppressive activity of an aqueous Viola tricolor herbal extract*. J Ethnopharmacol. 2014 151 (1):299-306. [IF 3.4; No. 4, **Top 15%**, Integrative & Complementary Medicine, **51 citations**]
- [3] **Hellinger, R.,*** Thell, K.,* Schabbauer, G., Gruber, CW. *Immunosuppressive peptides and their pharmaceutical application*. Drug Discov Today, 2014. 19 (5):646-653. doi: 10.1016/j.drudis.2013.12.002. [IF 6.0; **Top 5%** Pharmacology & Pharmacy, **51 citations**]
- [2] Koehbach, J., Attah, AF., Berger, A., **Hellinger, R.,** Kutchan, T., Carpenter, E., Rolf, M., Sonibare, MA., Moody, JO., Wong, GK., Dessein, S., Greger, H., Gruber, CW. *Cyclotide discovery in Gentianales revisited – Identification and characterization of cyclic cystine knotted peptides and their phylogenetic distribution in Rubiaceae plants*. Peptide Science: Biopolymers, 2013, 100 (5):438-452. doi: 10.1002/bip.22328. [IF 2.9; Q3 Biochemistry & Molecular Biology, **68 citations**]
- [1] **Hellinger, R.,** Horak, J., Lindner W. *Enantioseparation of 6-aminoquinolyl-N-hydroxysuccinimidyl carbamate tagged amino acids and other zwitterionic compounds on cinchona based chiral stationary phases*. Analytical Bioanalytical Chemistry, 2013. 405 (25):8105-8120. doi: 10.1007/s00216-013-7121-9. [IF 3.4; **Q1 Analytical Chemistry, 13 citations**]