

Ulrich auf dem Keller (1974–2023)



With great sadness, we received the sudden, incomprehensible and saddening announcement of the passing of Professor Dr Ulrich auf dem Keller in Copenhagen this August. Ulrich's untimely death came as a shock to his family, friends and colleagues, and we will all miss him beyond words. We accompanied Ulrich through the different stages of his life and career as a mentee, collaborator, colleague, teacher and mentor—but most importantly as a friend.

Ulrich was a world leader in the fields of wound healing and proteinase biology and a pioneer in mass spectrometry-based proteomics technologies. He has published over 100 highly cited papers on the discovery of matrix metalloproteinase (MMP) substrates and global analysis of proteolysis in healing skin wounds. From 2017, Ulrich was a board member of the European Tissue Repair Society (ETRS), a supporting society of Wound Repair and Regeneration, where he served as an editorial board member. From 2019 to 2022, he elegantly and efficiently manoeuvred the ETRS through the most difficult period of the COVID-19 pandemic as the president of the society. He was also a member of the SKINTEGRITY.CH research consortium, which he supported through multiple collaborations and contributions to scientific events, and served as the president of the International Proteolysis Society from 2017 to 2019. His sudden death prematurely stopped his remarkable career on a steep upward trajectory, and we can only imagine what he would have achieved in the upcoming years. Ulrich auf dem Keller's research work will continue to inspire

scientists to study wound healing, protease biology, and proteomics for generations to come.

Ulrich was raised in Mülheim an der Ruhr, Germany. He spoke Latin and ancient Greek. Following his passion for science, he studied Biochemistry in Tübingen, Germany, and received his Diploma in Biochemistry in 2000. During that period, he spent one year at the Max-Planck-Institute of Biochemistry in Martinsried outside Munich to perform internships in several laboratories, including the laboratory of Sabine Werner. Their first encounter was the beginning of a long-term friendship and collaboration. Ulrich subsequently performed his PhD studies in Sabine's laboratory, which by then had moved to the Swiss Federal Institute of Technology (ETH) Zurich, Switzerland. As a PhD student, he discovered a key function of the cytoprotective transcription factor NRF2 in the prevention of skin carcinogenesis and additionally studied the role of NRF2 in wound healing. Ulrich received his PhD in 2005.

During his PhD, Ulrich developed an enthusiasm for quantitative systems biology when analyzing the NRF2 transcriptome in keratinocytes. To follow this new passion, he decided to join the laboratory of Christopher Overall in Vancouver, Canada, in 2006, where he learned innovative proteomics technologies and combined them with biomedically relevant questions. In the Overall lab, as the recipient of a research fellowship from the German Research Foundation, Ulrich studied the role of proteases in cancer and co-developed iTRAQ-TAILS, a proteomics technology that allows the identification of neo-N-termini of proteins, and he used TAILS to address many important biological questions. After his return to the ETH in Zurich in 2009, Ulrich established an independent research group, now combining his expertise in wound healing research and proteomics, to identify MMP cleavage events during tissue repair in mice and humans.

In 2017, Ulrich was recruited by the Technical University of Denmark (DTU) Bioengineering in Lyngby. Supported by a Young Investigator Award from the Novo Nordisk Foundation, he established his research program on proteolytic networks in skin homeostasis, inflammation and repair with a focus on MMPs. At the DTU, Ulrich quickly became a highly appreciated leader, first with his appointment to Associate and then to Full Professor and head of the Section for Protein Science and Biotherapeutics, Bioengineering, Department of Biotechnology and Biomedicine. The obituary released by his university perfectly summarizes his personal approach to science and leadership: '[...] with his visionary and yet modest approach to leadership he has set an example for us all. In countless situations he has put his colleagues' needs before his own, and through his kindness, always managed to bring out the best in people. Ulrich had an ability to identify exceptional talent

regardless of their career stage, when recruiting highly skilled scientists as PhD students, postdocs and group leaders’.

With his charisma, Ulrich was a source of contagious inspiration and positive energy to his colleagues and mentees. For six continuous years, he was responsible for impressive growth in his section and recruited numerous talented group leaders all sharing the desire to be mentored by him. The career trajectories of his trainees are, first and foremost, proof that his students and postdocs enormously benefitted from Ulrich's skills and his excellent mentorship. Through his friendly, modest, and positive personality, he was liked by everybody, and he became a role model for many young investigators, to whom he demonstrated that scientific success can be combined with family life and hobbies. This included his passion for classical music; Ulrich was an outstanding viola player who played in different orchestras and music groups. In Vancouver, on arrival for his postdoctoral experience, he instantly was made the first viola in the Vancouver Symphony Orchestra. Scandinavians also got to enjoy the tones of his viola. His virtuous performances in the orchestra were matched, if not topped, by his presentations as a gifted speaker at leading conferences in his field. Ulrich was an outstanding presenter who most actively contributed not only to the official discussions but also to networking events and trainee discussion forums.

In addition to his leadership and teaching roles, Ulrich's research group and program within Protease Systems Biology at DTU provided exciting insight into the temporal and spatial regulation of proteases in tissue repair and identified novel regulators of the healing process. His contributions were pivotal in understanding the skin protease network, where he focused on MMPs and kallikreins. He was also leading the international research in understanding the interplay between posttranslational modifications and protease activity in the extracellular space, with hallmark works on glycosylation and phosphorylation. Complementing his interest in basic mechanistic questions, Ulrich became increasingly fascinated by the complex problem of non-healing wounds. He extended his research to translational studies, which he performed in extremely productive and joyful collaborations with Hans Smola and Magnus S. Ågren. Ulrich's generous contributions to collaborations with us and others on a wide variety of different research topics resulted in publications that would not have been possible without his skills, knowledge, and ideas. His most recent work identified innovative and promising biomarkers for normally healing versus non-healing human wounds, paving the way for the development of new treatments to restore the healing of chronic wounds. In his pledge to apply for membership on the ETRS board in

2017, he stated, ‘By becoming a member of the ETRS board, I want to give something back to the society and help in maintaining and further expanding this outstanding network of researchers dedicated to tackle a major unmet medical need with devastating impact on the quality of life of an increasing number of people’. And he did.

We have all been extremely privileged and fortunate to interact with Ulrich both professionally and in our private lives. It is impossible to fill the void he leaves, and we cannot begin to grasp his loss for his family. Most importantly, Ulrich was a devoted husband, father of two children, Florian and Julia, brother and son, and our thoughts go out to his family in this period of grief.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

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