**PRESS RELEASE**

**Revolution of Water Quality Analysis: Bringing DNA/RNA Diagnostics into the 21st Century.**

**Current surveys show great potential & need for molecular genetic methods in the detection and characterization of faecal pollution sources in water. Karl Landsteiner University of Health Sciences significantly involved.**

**Krems (Austria), 19. March 2024: A global evaluation of more than 1,100 publications from the last 30 years demonstrates the successful use of DNA/RNA analysis to conduct scientific studies on hygienic water quality and safety based on faecal microbiological indicators and intestinal pathogens. Accordingly, the international team of the comprehensive meta-study defines this important field as the new scientific discipline of "Genetic Faecal Pollution Diagnostics (GFPD)". This includes methods such as DNA/RNA-PCR analysis and sequencing. The importance of this new discipline is also underlined by an ongoing worldwide survey on the use of GFPD in the daily practice of water management by authorities, organizations, and institutes. The results of these two studies will play a central role at several international conferences in the coming months and will help to put the enormous potential of modern molecular genetic methods even more at the service of water analysis and hygiene.**

Microbiological faecal contamination of water has been analysed in the same way for over 100 years: Bacterial cultures are prepared. This standardized method, which is used worldwide, can detect microorganisms in the intestinal flora after 1-2 days, providing evidence of faecal contamination. The use of molecular genetic methods in water hygiene now allows a significant expansion of the scientific possibilities for hazard and risk analysis of faecal microbiological contamination of water and water resources. An international team led by Prof. Andreas Farnleitner from the Karl Landsteiner University of Health Sciences (KL Krems) and the TU Wien is now advocating the increased use of these possibilities for the hygienic assessment of faecal microbiological contamination. He has underlined this commitment with a study that has attracted worldwide attention and other activities.

**Everything in Flow**

"The influence of modern molecular biological technologies is of course also noticeable in water analysis," says Prof. Farnleitner, who heads the ICC Water & Health\* at KL Krems and TU Wien. "However, the extent to which this is already the case in the field of scientific detection and characterization of faecal microbiological contamination was previously unknown. Together with a global team, we have therefore analysed more than 1,100 studies from the last 30 years and surveyed just that."

The study, published in *FEMS Microbiology Reviews*, shows that GFPD is already widely and diversely used in scientific investigations. "In fact", says Prof. Farnleitner, "it can be said that GFPD has already revolutionized the identification and source tracking of faecal pollution in water resources and is also setting new standards in risk analysis (i.e., determining the probability of infection and disease from water use)." Although the study shows that GFPD was first used in the 1990s, its use has really taken off since the 2000s and is growing at a rapid pace.

Prof. Farnleitner explains the potential of the GFPD: "For the first time, it is possible to distinguish between animal and human faecal pollution – a methodological quantum leap for targeted safety management of water resources." In fact, GFPD methods have already been used to characterize and identify the source of faecal contamination in 649 of the 1,123 studies reviewed. This is an impressive demonstration of acceptance and widespread use. The research team sees an extremely high application potential – also supported by the technology of biobanking (i.e. long-term storage of DNA/RNA samples at -80°C) – in the possibility of "event-related" supplementation of cultivation-based standard examinations.

**Global Application**

Prof. Farnleitner and his team at ICC Water & Health\* are now going one step further in their survey of the global use of GFPD in the field of water hygiene: together with the IWA (International Water Association) Health-Related Water Microbiology Specialist Group and the Global Water Pathogens Project, they have launched a worldwide survey. In addition to scientific studies and publications, the survey will examine the current use of genetic methods ("PCR and DNA/RNA sequencing") for microbiological water quality testing in everyday water management practice. It is aimed at institutes, (regulatory) authorities and other organisations involved in water hygiene. Prof Farnleitner comments: "There is still a lot of space for improvement when it comes to the use of GFPD in legally required water testing. There is also a lack of simple principles, such as a sufficient definition of suitability for use and global standards."

The survey, which concludes its data collection phase this month, will be accompanied by a series of national and international conferences and workshops. A workshop chaired by Prof. Farnleitner at the IWA World Water Conference in Toronto, Canada, in August 2024 (entitled Use of genetic methods for microbial water quality testing: a global, water industry-wide survey) will be highly visible internationally. At the IWA Water Micro in the Netherlands (2025), the survey will be officially concluded with another workshop and the results will be published for the international community.

Images available on request

**Original publication**: Have genetic targets for faecal pollution diagnostics and source tracking revolutionized water quality analysis yet? K. Demeter, R. Linke, E. Ballesté, G. Reischer, R. E. Mayer, J. Vierheilig, C. Kolm, M. E. Stevenson, J. Derx, Alexander K.T. Kirschner, R. Sommer, O.C. Shanks, A. R. Blanch, J. B. Rose, W. Ahmed, A. H. Farnleitner. FEMS Microbiology Reviews , 2023, 47 , 1–36.

<https://kris.kl.ac.at/en/publications/have-genetic-targets-for-faecal-pollution-diagnostics-and-source->

**Karl Landsteiner University of Health Sciences (03/2024)**

The Karl Landsteiner University of Health Sciences (KL Krems) is an educational and research institution on the Campus Krems and recognised throughout Europe. KL Krems offers modern, demand-oriented education and continuing education in medicine and psychology as well as a PhD programme in Mental Health and Neuroscience. The flexible educational programme is tailored to the needs of students, the requirements of the labour market and the challenges of science. The three university hospitals in Krems, St. Pölten and Tulln and the MedAustron Ion Therapy and Research Centre in Wiener Neustadt guarantee clinical teaching and research of the highest quality. In its research, KL Krems focuses on interdisciplinary fields with high relevance to health policy - including biomechanics, molecular oncology, mental health and neuroscience as well as the topic of water quality and the associated health aspects. KL Krems was founded in 2013 and accredited by the Austrian Agency for Quality Assurance and Accreditation (AQ Austria).

[www.kl.ac.at/en](http://www.kl.ac.at/en)

\*The **ICC Water & Health** is a cooperation between TU Wien, Medical University of Vienna and Karl Landsteiner University of Health Sciences (**www.waterandhealth.at**). The Inter-University Cooperation Center for Water and Health (ICC Water & Health) sees itself as a scientific platform and competent partner in questions of water quality and its impact on human health. The ICC is dedicated to the development of innovative concepts for assessing water quality, new microbiological and molecular biology methods, efficacy testing of physical and chemical treatment methods, and numerical models for estimating the risk of infection and disease in water use. The lessons learned will be used to derive effective and sustainable health management measures. The ICC was founded by the Vienna University of Technology and the Medical University of Vienna in 2010 and has been sustainably established thanks to the competitive research funding of the Federal Ministry of Science, Research and Economy (BMWFW). In 2017, ICC Water & Health was expanded to include the Karl Landsteiner University of Health Sciences (KL). KL is now an official part of the research platform.

[www.waterandhealth.at](http://www.waterandhealth.at/)

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