

**Thomas Edlinger**  
Public Relations and Event Management

Medical University of Graz  
Neue Stiftingtalstraße 6  
8010 Graz  
thomas.edlinger@medunigraz.at

**Press release**  
**For immediate publication**

### **Early warning signs in the blood: new findings on cardiovascular risks and other diseases in children and young adults**

Graz, 25 September 2024: Cardiovascular disease is the most frequent cause of death in Austria. Prevention is essential to its avoidance, and biomarkers play an important role in the early detection of risk. One of these biomarkers, trimethylamine N-oxide (TMAO), has been investigated by Andreas Meinitzer and Gunter Almer's research group at the Clinical Institute of Medical and Chemical Laboratory Diagnostics in collaboration with Finnish researchers in Turku. The current findings of this international cooperation have recently been published in the renowned *Clinical Chemistry* journal.

#### **TMAO: How a substance in food influences health**

Trimethylamine N-oxide is a substance produced by our bodies after we have eaten certain foods such as red meat, fish, eggs and cheese. Initially produced by bacteria in the gut, it then travels to the liver, where it is processed. "Elevated TMAO values in the blood are associated with cardiovascular disease, type 2 diabetes, hypertension and kidney failure. The precursor to TMAO is created by bacteria in the gut microbiome and then transformed into an active substance in the liver," explains Gunter Almer of the Med Uni Graz Clinical Institute of Medicinal and Chemical Laboratory Diagnostics. Interestingly there are also indications that TMAO might have positive effects, for example that it inhibits the development of cancer cells and stabilizes glucose balance.

#### **A look at TMAO: Long-term observations show sex-specific differences in young people**

The current study analyzed the concentration of trimethylamine N-oxide (TMAO) in the blood serum of a total of 1,062 children and young people from age eleven to early adulthood. This unique longitudinal study followed their TMAO values over 15 years by taking measurements at regular intervals (at age 11, 13, 15, 17, 19 and 26). The progression of these microbiome metabolites as well as a large number of other health parameters was documented with precision.

The findings revealed a continual rise in TMAO concentration starting at age eleven in both female and male participants. "Particularly noticeable was that young men already had significantly higher TMAO values than their female peers at the start of the study. Despite different dietary interventions, the TMAO levels in the blood did not change, which indicates that other factors may influence TMAO concentration," summarizes Gunter Almer.

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Medizinische Universität Graz, Neue Stiftingtalstraße 6, 8010 Graz, [www.medunigraz.at](http://www.medunigraz.at)

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The relationship observed in female participants was especially interesting: There was proof that fiber consumption directly influenced TMAO levels. This indicates potential sex-specific differences in the metabolism of TMAO. "This discovery suggests that future research should investigate TMAO metabolism more closely and take into account sex-specific differences in the processing of these metabolites," conclude the two experts.

**To the publication:**

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**Further information and contact:**

Gunter Almer

Clinical Institute of Medical and Chemical Laboratory Diagnostics

Medical University of Graz

T: +43 316 385 13145

E: [gunter.almer@medunigraz.at](mailto:gunter.almer@medunigraz.at)

**Profile: Gunter Almer**

Gunter Almer is a biologist and senior scientist at the Clinical Institute of Medical and Chemical Laboratory Diagnostics (KIMCL). He has many years of experience as a researcher in a wide variety of projects: the setup of the STYJOB study of overweight children; research on atherosclerosis in cell cultures and on diverse lab models in FFG, FWF and EU projects at KIMCL; collaboration with research partners throughout Europe and at the former Academy of Sciences, where he created nanoparticles to detect atherosclerosis. He is currently examining the impact of diverse high calorie diets and moderate long-term endurance sports in the lab as well as the connections between the microbiome and different biomarkers.

**Profile: Andreas Meinitzer**

Andreas Meinitzer is a chemist with many years of research experience at the Medical University of Graz. He has written numerous publications on clinical analytics and epidemiology and has contacts throughout Europe.