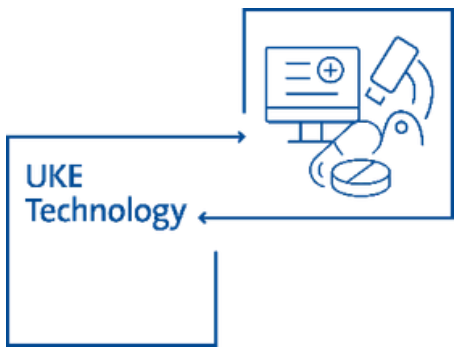

Non-invasive exopher-based detection tool for chronic kidney diseases

Background & Innovation

Tracking exopher-release, content and bound autoantibodies in urine provides a **non-invasive diagnostic tool** with prognostic potential for clinical diagnostics and monitoring kidney diseases!

Kidney diseases, particularly **chronic kidney diseases** (CKD), are of growing clinical and socio-economic importance worldwide. Membranous nephropathy (MN) is a notable autoimmune disorder caused by autoantibodies binding to podocyte antigens like THSD7 A and PLA2R1. Despite its prevalence, the mechanisms behind the resulting glomerular antigen accumulations remain poorly understood. Increasingly, other podocyte diseases are also recognized as autoantibody-mediated.

Our invention highlights a novel pathomechanism in MN: **exopher formation**, a protective process by which podocytes eliminate disease-causing autoantibodies and proteotoxic stress.
Understanding exopher-genesis offers a promising avenue for diagnosing, prognosing, and treating podocyte injuries in autoimmune conditions. This breakthrough paves the way for personalized treatments and early interventions in glomerular diseases.

Technical Description

Podocyte exopher formation can be observed in kidney biopsies and quantified non-invasively in urine samples, as exophers detach from podocytes. In MN, autoantibodies bound to exophers enable highly sensitive diagnosis and monitoring of immunologic activity, surpassing traditional methods.

This approach is particularly advantageous for diseases involving cellular stress, like tauopathies or autoimmune disorders linked to protein aggregation, offering a versatile tool for diagnosing, prognosing, and monitoring conditions associated with proteotoxicity.

Competitive advantage

- Diagnostics: **Highly specific** and **sensitive** in the detection of known autoantibodies to podocyte proteins (i.e. PLA2R1). **Superior to invasive gold standard** methods (serum autoantibody titers, kidney biopsy).
- Disease monitoring/prognosis: **Noninvasive quantification of autoantibodycarrying exophers** indicates immunologic activity and the propensity of podocytes to deal with the autoantibodies.
- **Versatile method** for diagnosing, prognosing, and monitoring of podocyte injury in **glomerular diseases**, allowing for a novel patient stratification.

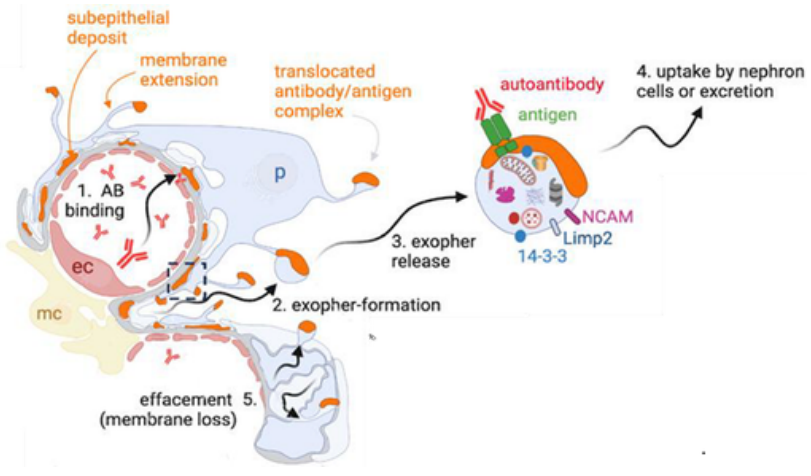

Figure 1:
Podocyte exopher formation and release protect against MN by displacing pathogenic antigen/ autoantibodies from the subepithelial space to the urinary side, enabling their excretion. This process allows precise monitoring of disease activity and reduces the glomerular antigen load.

FOCUS SECTORS
- Diagnostics
- Autoantibody detection
- Urine diagnostics
- Extracellular vesicle diagnostics
- Glomerular diseases

PROJECT KEY WORDS
- Exophers
- Extracellular vesicles
- Membranous nephropathy (MN)
- Non-invasive diagnostics

DEVELOPMENT STATUS
- Successfully tested in patient trials
- Clinically validated

PATENT PROCEDURE STATUS
- EP Patent application filed

POTENTIAL FOR COOPERATION
- R&D Cooperation
- Licensing

Contact Data:
Tutech Innovation GmbH
pva.ip@tutech.de
+49 40 76629-6587

UKE Technology Transfer Office
medigate-transfer@uke.de

Ref: UKE418
Last modified: 2026-04-28

Universitätsklinikum Hamburg-Eppendorf