EXPLORING THE ROLE OF NUTRITION IN ACCELERATED IMMUNE AGEING AFTER KIDNEY TRANSPLANTATION

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Background and rationale

- Although kidney transplantation improves survival and quality of life in end-stage kidney disease (ESKD), kidney transplant recipients (KTRs) still face a 2–4-fold higher mortality risk than the general population. Growing evidence links this excess risk to accelerated ageing — marked by cardiovascular disease, metabolic dysfunction, and immunosenescence (premature aging of the immune system).
- Additionally, KTRs often begin their transplant journey with a clear nutritional disadvantage, given the high burden of malnutrition associated with end-stage kidney disease (ESKD) and prolonged dialysis exposure. Unfortunately, dietary recommendations in transplantation are lacking, and advice often extrapolated from data in non-transplant populations.
- Diet and nutritional status are known to influence immune ageing in experimental and human studies in non-transplant populations, but their role in kidney transplantation remains unexplored.

Objectives and scope

The primary objective is to investigate possible associations between serum and urinary micro/bioactive nutrients and immune aging in kidney transplantation. Secondary outcomes include associations with dietary intake (dietary quality and patterns, food processing grade, protein source), recovery from transplantation (e.g. frailty, delayed graft function, time-to-infection) and body composition. Additionally, the gut/salivary microbiome and metabolomics data will be collected as exploratory outcomes.

Planned activities & deliverables

This prospective longitudinal single-center cohort will include approximately 75 adult de novo KTRs. Participants will be assessed at baseline, 3 and 6 months after kidney transplantation. Different markers of immune aging (phenotyping by flowcytometry, cytokine analysis, TREC) will be assessed and combined with a tiered nutritional assessment, including dietary intake evaluation, plasma/urine micro- and bioactive nutrients, ultrasound-guided body-composition analysis, frailty assessment and patient-reported outcomes. Additional fecal and salivary samples will be collected for potential microbiome and metabolome profiling.
Timeline and deliverables: Month (-3): EC approval; 0-18 months: Participant recruitment and inclusion, 6-month follow-up; 18-24 months: Data analysis (primary and secondary endpoints) and publication of the results. Additional exploratory outcomes are planned for subsequent studies beyond this time period. The results of this study are expected to contribute to future peer-reviewed publications and dissemination at international scientific meetings.

Resources & enablers

- This is a doctoral research project within the Ghent University doctoral program for Health Sciences. This study will be conducted at the Nephrology research unit, consisting of experienced clinical nephrologists and fundamental scientists. Additionally, collaborations with dietitians with long-standing experience in clinical nutrition research and dietetic practices were forged. The doctoral student will perform data-collection/analysis.
- Financial coverage of personal wages is available. The MNI grant will mainly support above-described analytical activities (€32,000), biobanking of human samples (€5,000; allowing for future collaborations and additional studies), statistical support services (€1,000), and publication costs (€2,000).

Results, expected outcomes & impact:

- **Implementation**

Findings will be implemented within the existing Belgian kidney transplant rehabilitation program by updating the dietary recommendations provided by dietitians during routine follow-up in our center, including revisions to the currently distributed patient information booklet. In addition, results will be disseminated through Belgian kidney disease and transplant patient organizations via educational lectures, social media, and other outreach activities.

- **How will this project advance nutritional care in clinical practice**

Current dietary recommendations for KTRs are largely non-specific and extrapolated from non-transplant populations, limiting their clinical relevance and scientific robustness. By generating dedicated data in this population, our study aims to strengthen the evidence base for nutrition in kidney transplantation and support the development of more precise, clinically applicable dietary recommendations tailored to transplant recipients.

- **Is the project transferable to other care settings / geographical regions?**

While the findings are directly relevant to KTRs, they might be extrapolated to other solid organ transplant populations with similar immunological and metabolic profiles; and other patient populations under immunosuppression. Moreover, as KTRs represent a more pronounced/accelerated form of (immune) ageing, the results may provide broader insights into the role of nutrition in immune ageing for the general population.

V **Please tick to confirm the PEN letter of endorsement is attached. Incomplete submissions will not be considered.**

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