Oral Nutritional Support to Improve Gut Microbiota and Health Outcomes in Older Adults with Early Stage Chronic Kidney Disease

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The Society of Clinical Enteral and Parenteral Nutrition

Description of the initiative

• Background / context

- Chronic kidney disease (CKD) stages 2–3 are common yet often undetected in older adults. These early stages are a critical period where nutritional interventions can prevent malnutrition, slow disease progression, and reduce systemic inflammation. Malnutrition and inflammation are both highly prevalent and modifiable in older CKD populations.

• Rationale for the initiative

- Early-stage CKD presents a unique opportunity for preventive nutritional care before frailty and polypharmacy dominate. Gut microbiota modulation through targeted oral nutritional support has the potential to improve systemic health and delay physical decline. Despite this, microbiota-targeted nutrition is rarely implemented in geriatric CKD care.

• Objectives and scope

- This project aims to evaluate the effect of oral nutritional supplementation (ONS) on gut microbiota composition, inflammatory markers, nutritional status, and body composition in nursing home residents aged 65–75 with CKD stages 2–3. A control group without ONS will also be followed. The study will quantify species like *Bifidobacterium*, *Faecalibacterium prausnitzii*, and *Akkermansia muciniphila*, and measure stool inflammation markers such as calprotectin and bile acids.

Planned activities & deliverables

• Outline the steps to be taken

Ethics approval and recruitment of 40 nursing home residents (20 with CKD stage 2–3, 20 controls)
Baseline assessments: CGA, MMSE, BIA, blood tests, stool sampling
Oral nutritional supplement (ONS) intervention for 3 months
Stool sampling and dietary monitoring at months 0, 1, and 3
Sequencing and microbiota analysis using 16S rRNA (V3–V4)
Statistical analysis and result interpretation

• What are the concrete deliverables of the project?

Gut microbiota profiles and inflammatory marker data
Clinical and functional health outcome data
Interim and final technical reports
One or more peer-reviewed scientific publications
A model protocol for nutritional intervention in early-stage CKD

• What achievements are possible in the next 12 and 24 months?

Month 12: Intervention completed, preliminary microbiota and clinical findings, interim report submitted
Month 24: Final analysis completed, publication of results, national dissemination of recommendations

Resources & enablers

• Describe personnel, financial needs

- The project will be coordinated by a multidisciplinary academic team consisting of a principal investigator, dietitian, geriatrician, and microbiome research consultants. Daily follow-up and data collection will be carried out by a trained nursing home nurse under supervision. Laboratory and sequencing procedures will be conducted with the support of accredited university research labs.

• Specify how the grant will be spent

DNA Isolation and Sequencing (40 samples, incl. library prep): €35,000
ONS Products for 20 participants for 3 months: €4,500
Cold chain logistics, materials, and printing: €500
Total budget: €40,000

• What factors will make it successful?

Standardized environment and diet in the nursing home setting
Exclusion of confounding variables such as polypharmacy or active infection
Daily monitoring of intake and tolerance by trained personnel
Previous pilot experience of the research team with similar populations
Clear biological outcome measures (microbiota taxa, calprotectin, body composition)

Results/outcomes & expected impact

• How will the findings be implemented?

- The project will provide actionable data linking oral nutritional support to changes in microbiota composition, systemic inflammation, and body composition. These findings will inform nutritional strategies in early-stage CKD management and will be shared with clinicians, dietitians, and public health policymakers.

• How will this project advance patient care / contribute to optimal nutritional care?

- By introducing early intervention before frailty sets in, this study supports a shift from reactive to preventive nutritional care. ONS-based modulation of microbiota can help maintain physical reserve and reduce healthcare burden in elderly CKD patients.

• What makes the project innovative?

- This is one of the first controlled studies combining microbiome sequencing, functional geriatric assessments, and structured ONS intervention in a nursing home setting. It integrates clinical nutrition with molecular-level microbiota response.

• Will the project be likely to influence national nutrition policy?

- Yes. The study's data-driven results may help shape CKD nutritional guidelines and geriatric nutrition protocols, especially in long-term care facilities. Collaboration with national PEN society will support policy dissemination.

• Is the project transferable to other settings / countries?

- Yes. The standardized design, reproducible methodology, and cost-effective intervention make it adaptable to other institutions and countries seeking to improve nutrition care in aging populations.

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

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