Malnutrition in advanced CKD

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Malnutrition

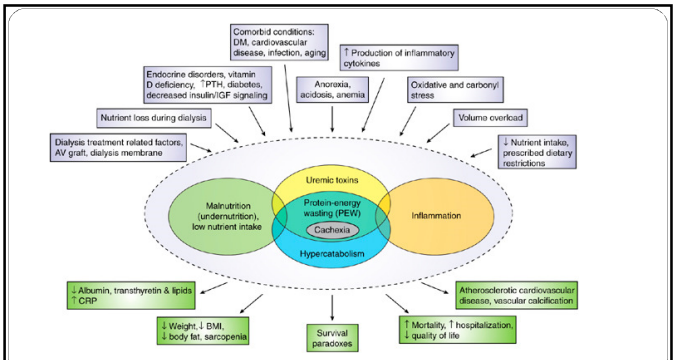
Lack of proper nutrition, caused by not having enough to eat, not eating enough of the right things or being unable to use the food that one does eat

Protein Energy Wasting (PEW) in CKD

Multiple nutritional and catabolic alterations that occur in chronic kidney disease and is associated with morbidity and mortality

Estimated to be present in 18-75% of people with CKD, worsening as disease progresses

Multifactorial aetiology characterised by prevalence of:
- anorexia, inflammation, oxidative stress, insulin resistance, anaemia



NSW Renal Supportive Care - Malnutrition

Age Range	Count	Average SGA	SGA range	Average Charlson Score
<50	**50% malnourished**			4
50-59	4	A7	(1 patient)	4
60-69	11	B3	C2-B5	6
70-79	54	B5	C1-A7	9
80-89	122	B5	C2-A7	8
>90	37	B4	C1-A7	9
Total	229	B5	C1-A7	8

Protein Energy Wasting (PEW) in CKD

Body function impairment is classified into 3 stages

1. Impairment (disease-related symptoms – poor appetite, nausea)
2. Limitation in activities (dyspnea, fatigue)
3. Poor participation (experiencing reduced QoL, increased morbidity and mortality)

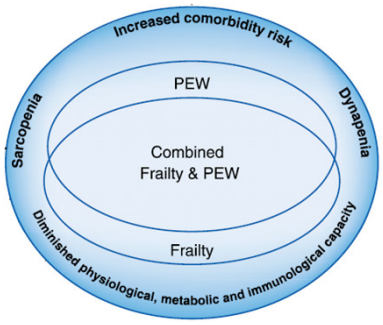
PEW associated with significant morbidity, reduced QoL and one of the primary predictors of mortality

Management of malnutrition

Patients should be managed in an integrative way, taking into account the multiple facets of their clinical picture, aiming to improve muscle mass, structure, metabolism and function

Interventions should consider all determinants (of muscle wasting) not just the nutritional ones.

- combine nutrition, exercise, anti-inflammatories, anabolic hormones



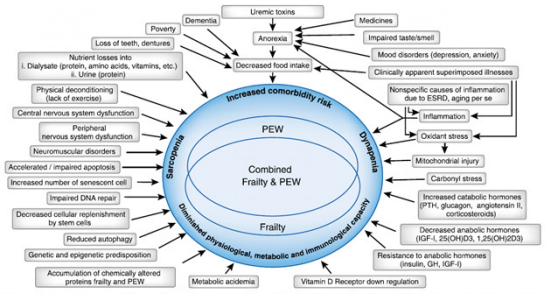


Figure 1. Potential causes of frailty and protein-energy wasting in elderly patients with end stage kidney disease. 1,25$(OH)_2D_3$, 1,25-dihydroxycholecalciferol; ESKD, end stage kidney disease; PTH, parathyroid hormone; VDR, vitamin D receptor.

Protein Energy Wasting (PEW) in CKD

4 main criteria to assess

Reduced muscle mass	Low protein / energy intake, anorexia
MAMC DEXA BIA Creatinine appearance (urine)	For at least 2 months: <25kcal / kg/ day or <0.8g protein / kg / day

Sarcopenia

Deficiency of muscle mass and function

Condition arising in elderly people as a result of reduced physical activity and compromised nutrition

Sarcopenia is a feature of PEW and ageing

Assessment

Muscle Mass: DEXA

Strength and physical performance: Hand Grip Strength, Gait Speed

Sarcopenia in CKD

- Sarcopenia is observed earlier in CKD compared to non-CKD
- Adult with CKD should expect 1% loss of muscle mass per year

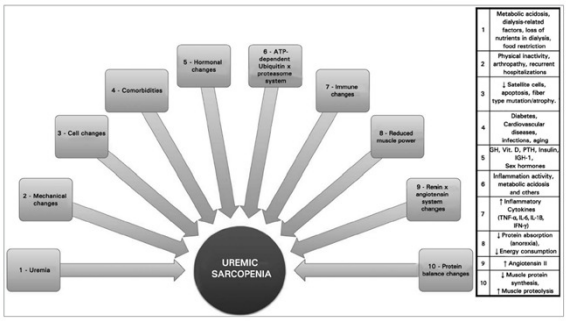
IN ADDITION normal age-related factors in CKD:

Protein losses (through dialysis or proteinuria)

Muscle wasting due to chronic inflammation

Change in muscular compartments (increasing fat deposits) – more common in elderly, with low albumin and high proinflammatory cytokines

Figure 1. Uremic sarcopenia etiology. Drawing representing the etiological mechanisms of uremic sarcopenia.



Sarcopenia in chronic kidney disease on conservative therapy: prevalence and association with mortality

Raissa A. Pereira[1], Antonio C. Cordeiro[2], Carla M. Avesani[3], Juan J. Carrero[4,5], Bengt Lindholm[4], Fernanda C. Amparo[2], Celso Amodeo[2], Lilian Cuppari[1] and Maria A. Kamimura[1]

- CKD stage 3-5; n=300 (excluded >80yrs); Brazil
- HGS, BMI, MAMC, triceps skinfold, SGA, BIA
- Diagnosis of sarcopenia based on presence of reduced muscle function (HGS) and muscle mass (MAMC, SGA, BIA)

Results

- Lower BMI, GFR, alb. Hb lower in those with sarcopenia.
- Sarcopenia diagnosed in 5.9-9.8% of patients (dependent on methodology used)
- Sarcopenia associated with mortality (40 month follow up)

RESEARCH ARTICLE

Relationship between Stage of Chronic Kidney Disease and Sarcopenia in Korean Aged 40 Years and Older Using the Korea National Health and Nutrition Examination Surveys (KNHANES IV-2, 3, and V-1, 2), 2008–2011

Sung Jin Moon[1], Tae Ho Kim[2], Soo Young Yoon[1], Jae Ho Chung[1]*, Hee-Jin Hwang[2]*

- Korea; cross-sectional; assessed sarcopenia based on DEXA

Results

- Higher BMI, weight, WC and fat mass higher in sarcopenia
- Lower calorie, protein and fat intakes and lower PA in sarcopenia
- Sarcopenia increased with disease progression

- CKD normal KF: 4.3%; CKD stage 1-2: 6.3%; **CKD stage 3-5: 15.3%**

Frailty

Multi-system impairment
When multiple body systems lose their built-in reserves

Presents as composite of:
- poor physical function
- exhaustion
- low physical activity
- weight loss

Associated with higher risk of falls, cognitive impairment, hospitalisations and death

Assessment
should include medical and functional assessments.

Sarcopenia and frailty

Linked but distinct correlates of musculoskeletal aging.

Frailty	Sarcopenia
Anaemia Reduced cognition Reduced functional capacity Arthritis Poor balance Reduced cardiac function obesity	Muscle loss

Increasing sarcopenia and frailty is associated with worsening QoL in both CKD and non-CKD

Dialysis Morbidity and Mortality study

- Cross-sectional prevalence of frailty in HD and PD; N=2400
- Frailty assessed by:
  - slowness / weakness
  - poor endurance / exhaustion
  - physical inactivity
  - unintentional weight loss

Overall	<40 years	40-50 yrs	50-60yrs	>60yrs
67.7%	44%	61%	66%	74-78%

Compared to non-renal populations:

Cardiovascular Health Study (n=5000)	Women's Health Initiative (n=40,000)
6.9%	16.3%

Time to death or first hospitalization

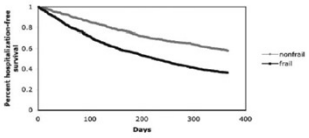


Figure 2. Time to hospitalization or death. Kaplan-Meier plot of the association between frailty and hospitalization-free survival. Gray line, nonfrail patients; black line, frail patients.

Association of modified frailty score with survival

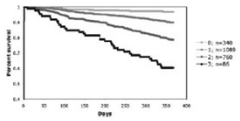


Figure 3. Association of modified frailty score with survival. Kaplan-Meier plot of the association between the modified frailty score and survival.

2.2x more likely to die within 1 year

CLINICAL RESEARCH STUDY

THE AMERICAN JOURNAL of MEDICINE

Frailty and Chronic Kidney Disease: The Third National Health and Nutrition Evaluation Survey

Emilee R. Wilhelm-Leen, BA,[a] Yoshio N. Hall, MD,[b] Manjula K. Tamura, MD, MPH,[b] Glenn M. Chertow, MD, MPH[b]
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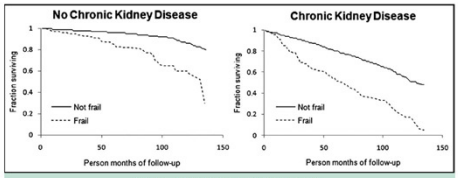


Figure 3 Frailty, chronic kidney disease, and survival.

N=33,200
Fried's frailty score: low BMI, slow walking, weakness, exhaustion, low physical activity

People with CKD 2x more likely to be frail

5% gen pop
vs
20% eGFR <40ml/min

Prevalence

Sarcopenia

Non-CKD: 10% 60-70yrs and 30% in 80yrs
CKD: 45-63% in elderly HD patients
**increases with disease progression*

Frailty

Non-CKD: 4-16%
Dialysis: 44-80%
**increases with disease progression*

Current nutritional guidelines

Sarcopenia

Protein
- 1.2-1.5g protein /kg IBW / day

**With 10-15g EAA per meal required for optimal muscle synthesis*
**This requires 30g protein per meal*

Conservative CKD

Protein
- 0.6-0.8g protein/kg IBW /day

**to reduce uraemic production, slow kidney disease progression and maintain body nitrogen balance*
- 35kcal / kg IBW / day

70kg person on conservative pathway
Renal: 40-56g protein daily
Sarcopenia: 110-130g

Low Protein Diets:

- Slowing progression
- Symptom management (and therefore QoL)
  - Reduced appetite
  - Taste changes
  - Nausea
  - Vomiting

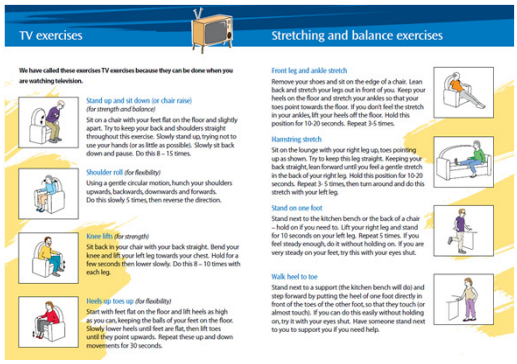
Relaxing protein restrictions can result in high potassium / salt / phosphate intake which in turn can result in symptoms and acute events

Current nutritional management

Symptom management
- Strategies depend on symptoms
- to improve nutritional intake

Nutritional intake
- ?? upper end of protein recommendations
- dependent on treatment / severity / age etc may relax restrictions (keeping in mind other dietary aspects – e.g. potassium)

Physical activity
- general guidelines for elderly *Choose Health Be Active*



Ideas for the future

- Interventions to target inflammation
  - Fish oil
  - High fibre
  - Turmeric
  - Evening Primrose Oil (?efficacy above uraemic pruritus)
- Increasing physical activity to improve function
- ?? Optimal protein for muscle function and reducing uraemic symptoms

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