

DINH DƯỠNG TRÊN BỆNH THẬN MẠN Ở CÁC GIAI ĐOẠN



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Bệnh viện Nguyễn Tri Phương

NỘI DUNG

- ▶ SUY DINH DƯỠNG/ BỆNH THẬN MẠN
- ▶ KHUYẾN CÁO DINH DƯỠNG/ BỆNH THẬN MẠN

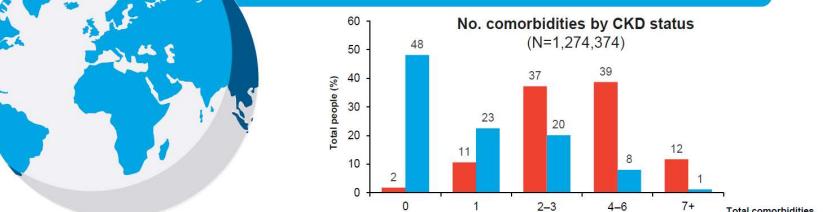
NỘI DUNG

- ▶ SUY DINH DƯỠNG/ BỆNH THẬN MẠN
- ▶ KHUYẾN CÁO DINH DƯỠNG/ BỆNH THẬN MẠN

Bệnh thận mạn rất phổ biến với gánh nặng y tế cao trên toàn cầu



Ảnh hưởng >840 triệu người trên toàn thế giới¹



1. Jager KJ, et al. *Kidney Int* 2019;96: 1048–1050.
2. MacCrae C, et al. *Br J General Practice* 2021;71:e243–e249.

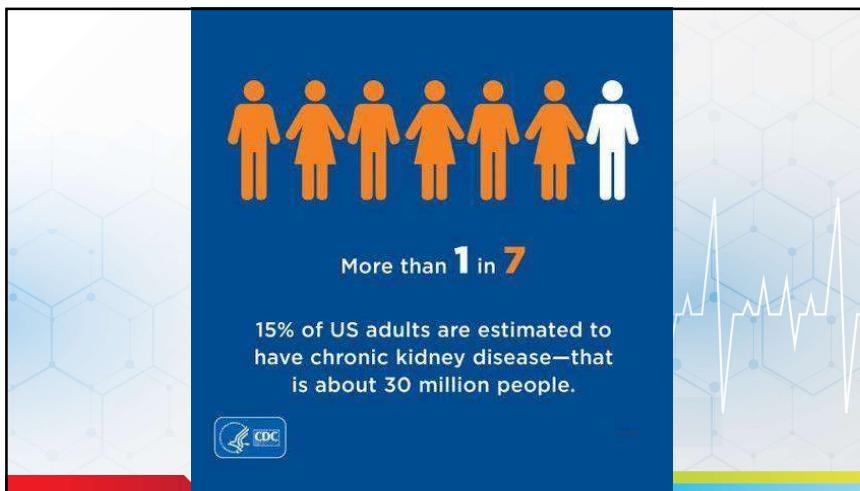
Tỉ lệ bệnh đồng mắc cao hơn ở nhóm có CKD & không có CKD²

With CKD

3.8

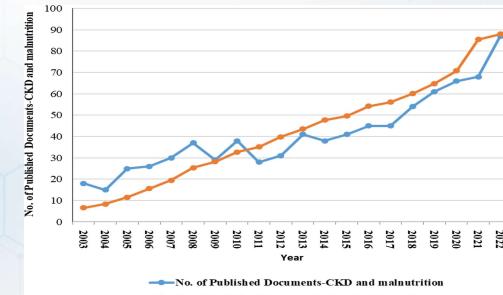
Without CKD

1.2

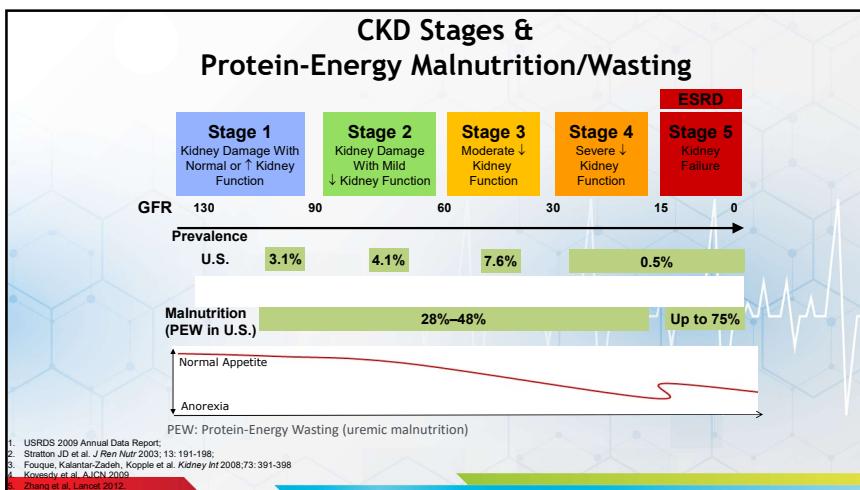


Tình hình suy dinh dưỡng và bệnh thận mạn ngày càng tăng

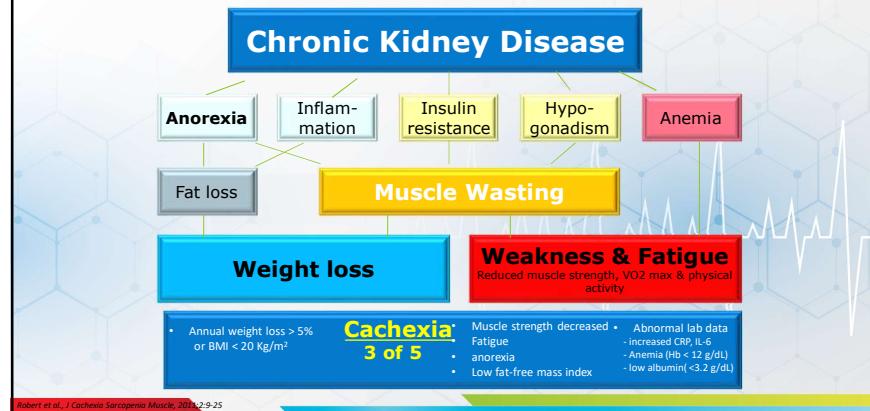
The annual number of publications related to malnutrition and chronic kidney disease from 2003 to 2022

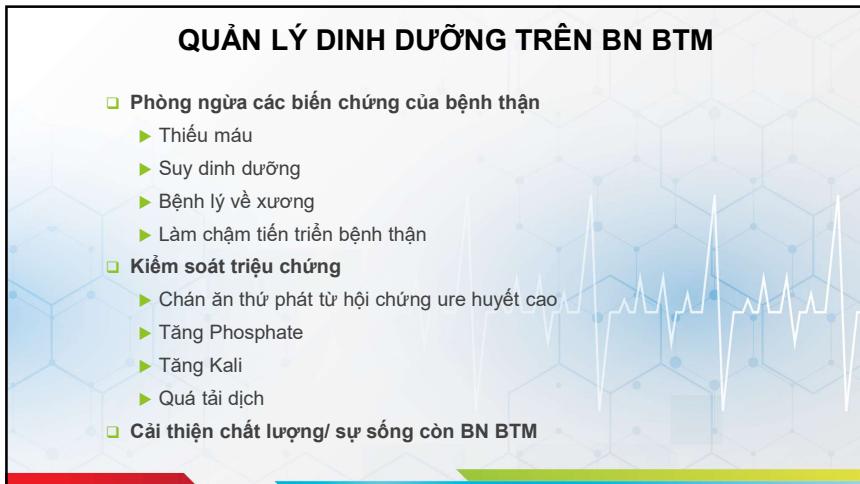
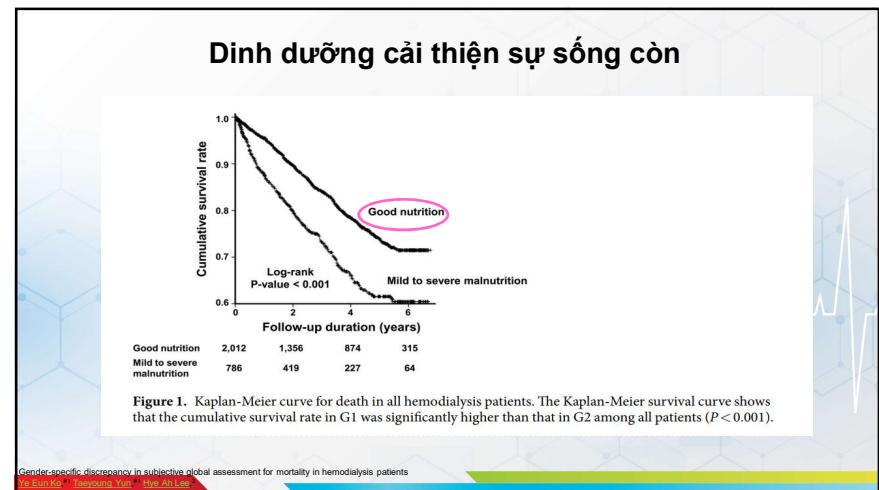
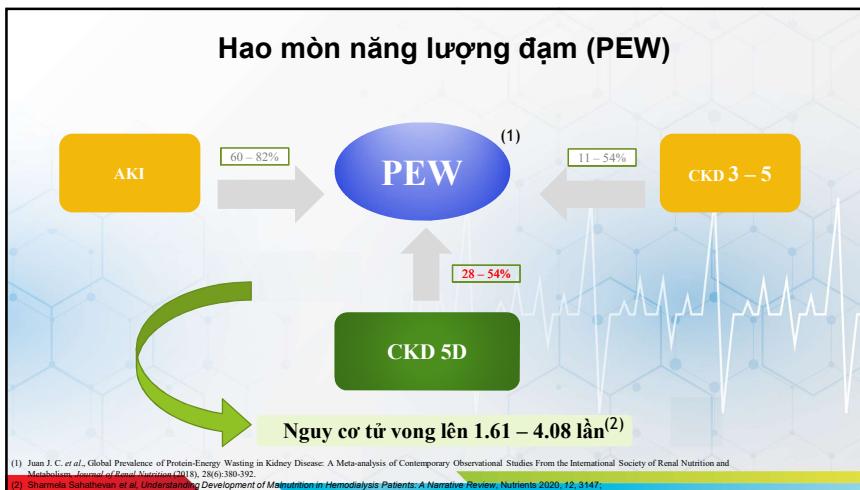


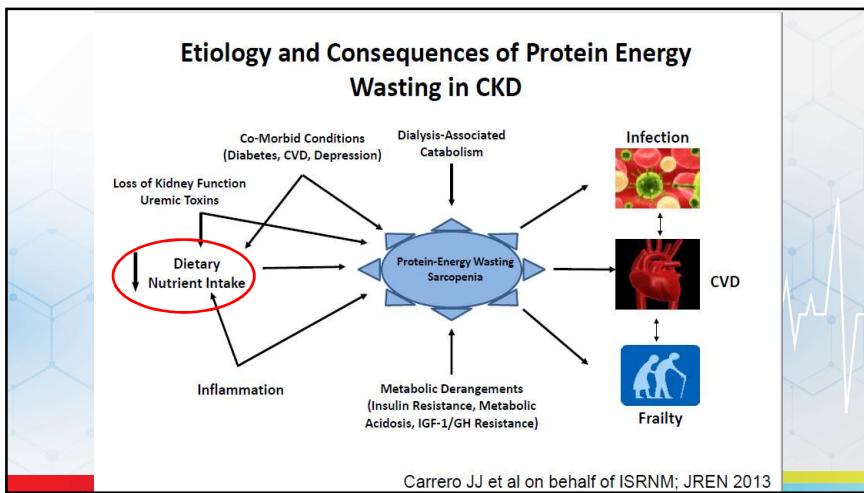
Shakhsir, M.H., Varoh, D., Hassan, M. et al. Mapping the global research landscape on malnutrition for patients with chronic kidney disease: a visualization analysis. *J Health Popul Nutr* 42, 101 (2023). <https://doi.org/10.1186/s41043-023-00445-8>



The Mechanism of PEW (Protein Energy Wasting)

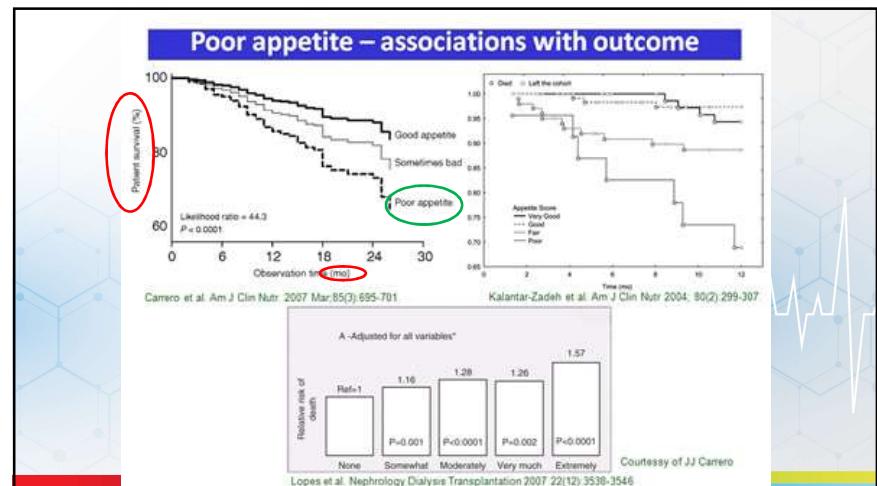
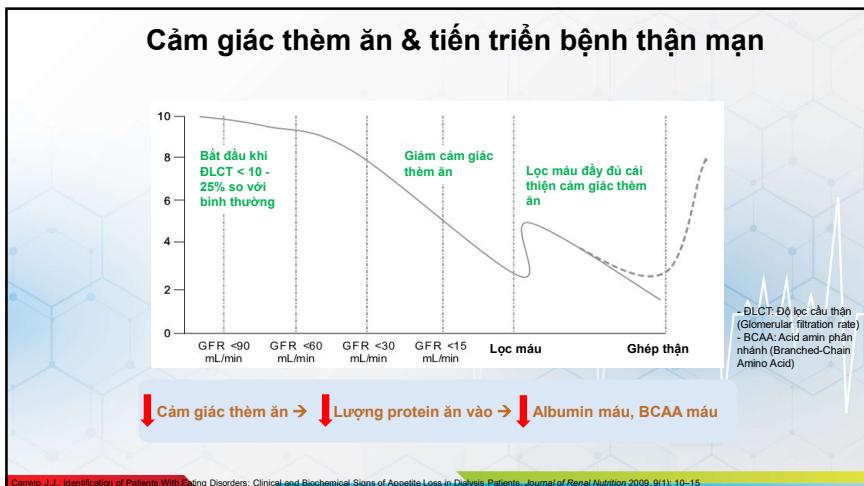






CUNG CẤP PROTEIN – NĂNG LƯỢNG KHÔNG ĐỦ

- Chế độ ăn kiêng cũ
- Chán ăn:** do suy thận, khẩu vị bất thường, tăng nhấp đường + khó chịu ở bụng trong Thẩm Phân Phúc Mạc
- Nhập viện thường xuyên
- Nhiều thuốc điều trị
- Bất thường tổng xuất của dạ dày



URE HUYẾT

Loss of Kidney Residual Function
Uremic Toxins

RỐI LOẠN CHUYỀN HOÁ VÀ NỘI TIẾT

Toan chuyển hóa:

- Tăng phân huỷ protein
- Tăng oxide hoá acid amins
- Giảm tổng hợp cơ
- Giảm chức năng hay kháng Insulin, GH, hóc môn tuyến giáp

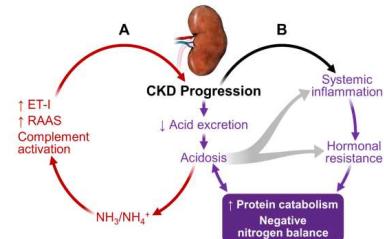


Figure 1. Interconnection of CKD progression with metabolic acidosis, inflammation, hormonal resistance and protein catabolism. (A) Kidney dysfunction limits proton (H^+) excretion, resulting in a systemic metabolic acidosis. The acidosis causes activation of complement systems, renin angiotensin aldosterone systems and endothelin-1. These acidosis-mediated effects cause CKD progression, forming a vicious cycle; (B) Acidosis promotes inflammation and tissue resistance to multiple anabolic hormones and simultaneously enhances activity of catabolic corticosteroids. Protein catabolism generates acidic products, contributing to acidosis in the setting of CKD and ESRD. Collectively, these abnormalities give rise to a state of protein catabolism, causing sustained negative nitrogen balance, leading to muscle wasting.

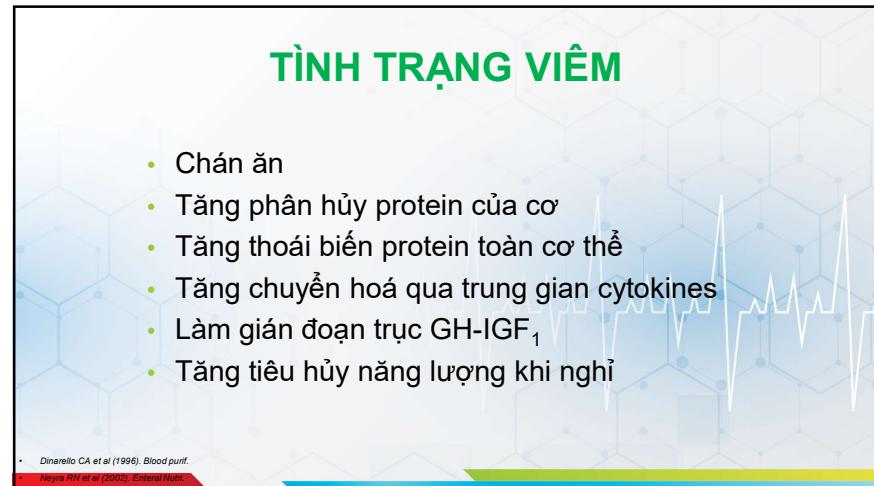
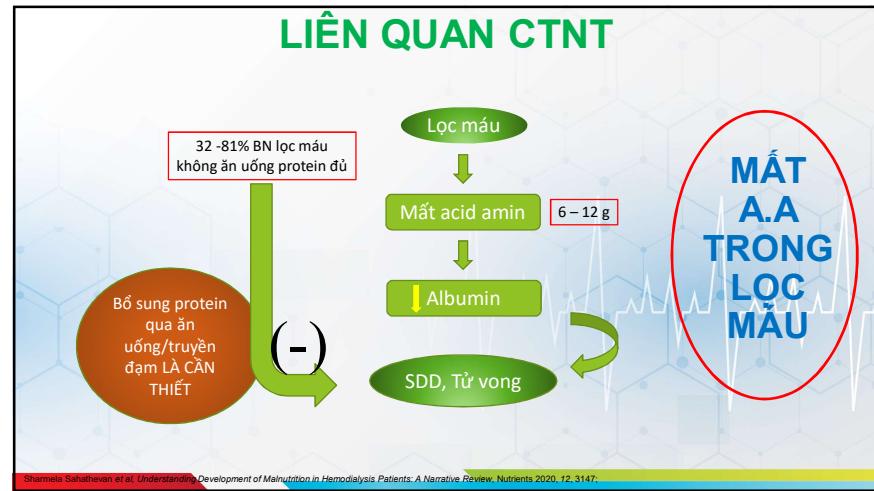
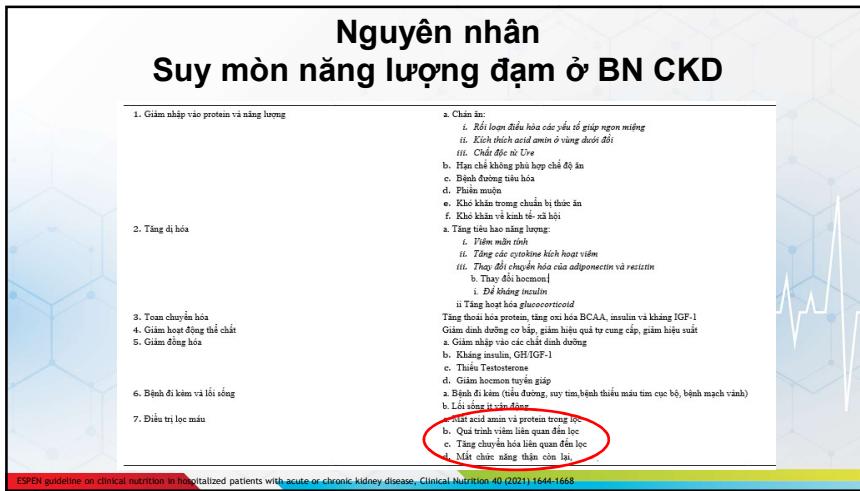
Protein Nutrition and Malnutrition in CKD and ESRD
Yan Zha 1 and Qi Qian 2,* 2017

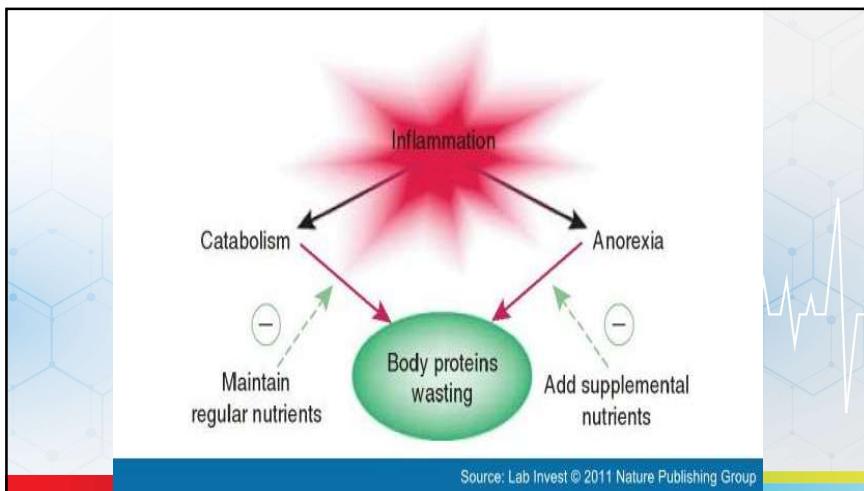
RỐI LOẠN CHUYỀN HOÁ VÀ NỘI TIẾT

Bất thường Insulin, IGF-1, GF :

- Đè kháng GH ở tế bào
- Giảm thụ thể/GH, IGF-1 ở tế bào gan
- Đè kháng insulin

Mitch W E et al (1996). *N Engl J Med.*
Schaefer F et al (2001). *J Clin Endocrinol.*
Stein A et al (1997). *Kidney Int.*





NGUYÊN NHÂN VIÊM

➤ ↑ cytokines: IL-1, IL-6, TNF

➤ ↑ CRP (HD, PD)

- ↓ loại thải cytokines
- Tích tụ chất độc do suy thận
- Màng lọc bất tương hợp
- Nhiễm trùng, nội độc tố
- Chất chỉ điểm viêm + suy dinh dưỡng đồng hiện diện

Stevinkel P et al (1999). Kidney Int. - Kayser GA et al (2001). J Am Soc Nephrol.

NGHIÊN CỨU STEVINKEL ET AL

109 bệnh nhân suy thận mãn giai đoạn tiến triển

- 44% có suy dinh dưỡng từ vừa đến nặng
- 32% có dấu hiệu viêm với CRP ↑ cao
- **72% có dấu hiệu viêm kết hợp với suy dinh dưỡng**

HỆN DIỆN SUY DINH DƯỠNG - VIÊM

Làm tăng tử vong và tai biến – biến chứng nằm viện

- **Suy dinh dưỡng:** yếu tố nguy cơ quan trọng nhất/ hậu quả lâm sàng của ESRD
- **Viêm:** yếu tố nguy cơ độc lập/ hậu quả không mong muốn của ESRD.

Phối hợp 2 yếu tố → ↑ mortality-morbidity theo lũy thừa

Stevinkel P et al (2002). Kidney Int.
Stevinkel P et al (2002). J Am Kidney Dis.

CÁC BỆNH LÝ KẾT HỢP

- ✓ Đái tháo đường
- ✓ Bệnh lý hệ tiêu hoá
- ✓ Bệnh lý hệ tim mạch
- ✓ Viêm nhiễm

Pupim LB and Alp Ikizler (2003): Seminars in Dialysis

NỘI DUNG

- ▶ SUY DINH DƯỠNG/ BỆNH THẬN MẠN
- ▶ KHUYẾN CÁO DINH DƯỠNG/ BỆNH THẬN MẠN

Aims of Nutrition therapy

- ▶ Prevent malnutrition and unintentional weight loss
- ▶ Maintain normal biochemistry levels
- ▶ Minimise symptoms



Factors that influence dietary advice

- ▶ Stage of CKD
- ▶ Treatments e.g. Conservative, Dialysis
- ▶ Other medical conditions e.g. Diabetes
- ▶ Lifestyle (social, psychological aspects)
- ▶ Medications
- ▶ Biochemistry levels (trends)

Hemodialysis and diet

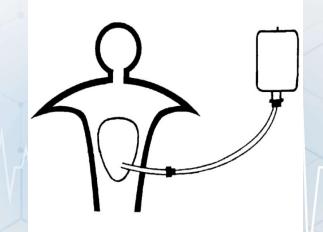
- ▶ Protein (usually 1.0-1.2 grams/kg)
 - ▶ Potassium (less than 2000mgs)
 - ▶ Sodium (less than 2000mgs)
 - ▶ Phosphorus (approx. 1000mgs)
 - ▶ Calories (30-35kcals/kg)
 - ▶ Fluids (1000-1500cc)
- (all the above needs to be individualized)



National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI) guideline

Peritoneal dialysis and diet

- ▶ Protein (need more than HD)
- ▶ Potassium (may not be restricted)
- ▶ Sodium (usually same as HD)
- ▶ Phosphorus (same as HD)
- ▶ Calories (same as HD)
- ▶ Fluids (depends on UO/dry weight)



National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI) guideline

Transplant and diet

- ▶ Protein (approx. 1.2-1.5 grams/kg)
- ▶ Potassium (usually not restricted)
- ▶ Sodium (2400-3000mgs)
- ▶ Phosphorus (may need supplement)
- ▶ Calories (30-35 kcals/kg immediately post transplant and then less unless active)
- ▶ Fluids (need to drink normal amount)

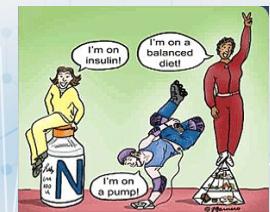


National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI) guideline

Other Considerations

Side effects of transplant medications

- ▶ Osteoporosis
- ▶ Increased blood sugars
- ▶ Changes in bowel function
- ▶ Possible weight gain (several reasons)



Calorie Intake

- ▶ Amount of calories consumed in addition to the protein reduction is critical
- ▶ Enough calories need to be consumed by CKD patients in stages 1-4 to spare protein from being used as a fuel
This prevents loss of lean muscle mass and protein-calorie malnutrition
- ▶ Because of the cardiovascular risk, the extra calories should *not* come from foods that increase risk for cardiovascular disease
- ▶ Current KDOQI recommendations are **35 kcals per kilogram of body weight per day for patients younger than 60 years for all 5 stages.**

1. National Kidney Foundation. Clinical practice guidelines for nutrition in chronic renal failure
2. Beto JA, et al. J Am Diet Assoc. 2004;104:404-409.
3. Kopple JD. Am J Kidney Dis. 2001;37:S66-S70.
4. Kent PS. Nur Clin Pract. 2005;20:213-247.

Protein Intake

- ▶ There is controversy in the literature about protein intake
- ▶ Some scientists suggest that limitation is not necessary
Scientists also point out a lack of compliance with the low-protein diet
- ▶ However, most (but not all) literature suggests that **decreasing protein intake in CKD stages 1-4 can delay progression into stage**

Johnson DW. Dietary protein restriction as a treatment for slowing chronic kidney disease progression: the case against. Nephrology (Carlton). 2006;11:58-62
Beckley MD. Medscape published accessed on 27/01/2010

Protein Intake

WHO recommends: protein intake of **0.8 g/kg/d** for healthy people

Neither lower nor higher protein intake appears beneficial, and each is associated with potential harms

KDOQI recommendations about dietary protein in CKD

- ▶ Stages 1-4 : Protein intake of **0.6-0.75** grams of protein per kilogram of body weight per day (g/kg/d)
- ▶ Stage 5: When patients are receiving dialysis, increased protein intake is suggested (approx. **1.2 g/kg/d**).

National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI) guideline

Note on Type of Protein Intake

- ▶ Type of protein consumed by a patient needs to be considered
- ▶ Because greater than 50% of CKD stage 5 patients ultimately die of cardiovascular events
- ▶ While in stage 5, **proteins of high biologic value are recommended**, which typically means proteins from animals, milk, and eggs.
These are higher-fat and higher-cholesterol foods which could predispose patients already at risk for cardiovascular disease
- ▶ Careful dietary counseling can steer patients in the direction of healthier protein choices of high biologic value

Mandalayam S, Mitch WE. Dietary protein restriction benefits patients with chronic kidney disease. *Nephrology (Carlton)*. 2006;11:53-57

ESPEN

4.5. Protein requirements

4.5.1. What is the potential impact of KRT on protein balance in patients with AKI or AKI on CRD or CRD with KF as compared to that of similar patients, not on KRT? Does KRT increase protein needs?

Statement 6

KRT can exert a negative influence on protein balance by inducing amino acid and peptide/protein losses. As a consequence, protein requirements can be increased in patients undergoing KRT.

Strong consensus (100% agreement)

- ESPEN: Hiệp hội Dinh dưỡng và Chuyển hóa lâm sàng châu Âu (European Society for Clinical Nutrition and Metabolism)
- KRT: Điều trị thay thế thận (Kidney Replacement Therapy)

ESPEN guideline on clinical nutrition in hospitalized patients with acute or chronic kidney disease, *Clinical Nutrition* 40 (2021) 1644-1668

Điều trị thay thế thận (KRT) có thể gây ảnh hưởng tiêu cực đến cân bằng protein bằng cách gây ra sự mất acid amin và peptit/ protein. Do đó, nhu cầu protein có thể tăng lên ở những bệnh nhân KRT.

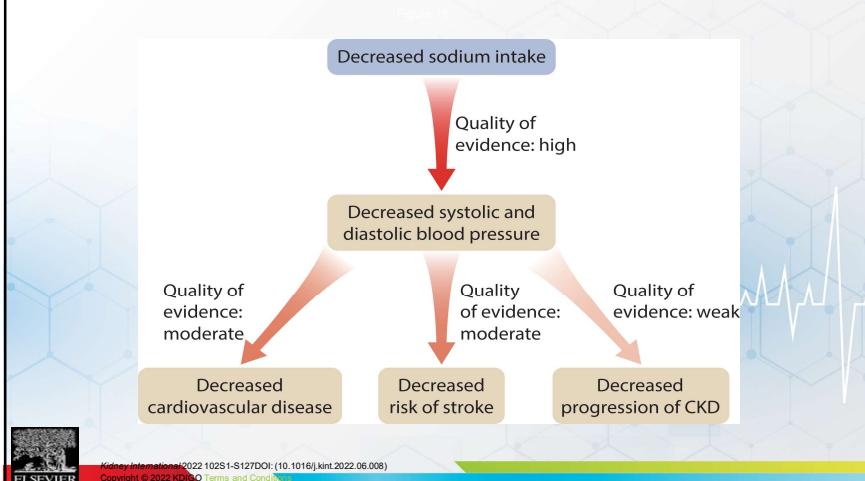
Đồng thuận cao (100% đồng ý).

Other nutritional recommendations for CKD patients

Sodium	2000 mg/d
Calcium	1200 mg/d
Potassium	Intakes should be correlated with laboratory values
Phosphorus	
Fluid intake	Can be unrestricted assuming normal urine output.



National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI) guideline



Kidney International 2022 102S1-S127DOI: 10.1016/j.kint.2022.06.008

Vitamin và khoáng chất

	Thận nhân tạo (HD)	Lọc màng bụng (PD)
Vitamin C	60 - 100 mg	60 - 100 mg
B6	2 mg	2 mg
Folate	1 - 5 mcg	1 - 5 mcg
B12	3 mcg	3 mcg
Vitamin E	15 IU	15 IU
Kẽm	11 - 15 mg	11 - 15 mg
Sắt	Cá thể hoá	Cá thể hoá
Vitamin D	Cá thể hoá	Cá thể hoá
B1	1,1 - 1,2 mg	1,5 - 2 mg
Khác	RDA	RDA

KDOQI Clinical practice guideline for nutrition in CKD: 2020 update

Vitamin D

- Kidney failure reduces the production and conversion of vitamin D to active calcitriol $1,25(\text{OH}_2)\text{D}_3$.
- CKD patients in stages 2-4 with GFRs of 20-60 mL/min should have serum 25-OH vitamin D checked (not serum $1,25(\text{OH}_2)\text{D}_3$).
- If 25-OH vitamin D is $< 75 \text{ nmol/L}$, the patient should receive standard vitamin D supplements.
- If the patient's **GFR is $< 20 \text{ mL/min}$, or if he or she is in stage 5, standard vitamin D is no longer effective and the active vitamin $1,25(\text{OH}_2)\text{D}_3$ is needed.**

National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI) guideline

Vitamin A

- Patients on dialysis (stage 5) are known to lose certain water-soluble vitamins.
- However, patients in renal failure have **decreased excretion of vitamin A**, and vitamin A toxicity has been reported in some cases.
- Therefore, patients on dialysis should receive a multivitamin supplement that **avoids excessive vitamin A**.

National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI) guideline

Iron and Zinc supplementation

- **Iron supplementation may be necessary** for patients receiving erythropoietin
- There are also data to suggest that dialysis results in increased risk for zinc deficiency; patients taking **zinc supplements** reported improvements in taste alterations and sensitivity

Kopple JD. National Kidney Foundation KDOQI clinical practice guidelines for nutrition in chronic renal failure. Am J Kidney Dis. 2001;37:S66-S70.



ACID FOLIC - KDOQI 2020

Folic Acid Supplementation for Hyperhomocysteinemia

5.1.1 In adults with CKD 3-5D or posttransplantation who have hyperhomocysteinemia associated with kidney disease, we recommend **not to routinely supplement folate with or without B-complex** since there is no evidence demonstrating reduction in adverse cardiovascular outcomes (1A).

Folic Acid Supplementation for Folic Acid Deficiency and Insufficiency

5.1.2 In adults with CKD 1-5D (2B) or posttransplantation (OPINION), we suggest prescribing **folate, vitamin B12, and/or Bcomplex supplement to correct for folate or vitamin B12 deficiency/insufficiency based on clinical signs and symptoms**

AJKD Vol 55 No 9 | Sept 1 | September 2020
(2B)

Diabetics and Kidney Disease

- About a third of diabetic persons will end up with kidney disease.
- This means that in a number of cases, besides **the monitoring of the above dietary factors, blood sugar must also be monitored and controlled.**
- This represents a further unique challenge for nutritional intervention



National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI) guideline

Select Nutritional Parameters for Varying Levels of Kidney Disease*

Nutritional Parameter	Stages 1-4 CKD	Stage 5 Hemodialysis	Stage 5 Peritoneal Dialysis
Calories (kcal/kg/d)	35 < 60 yrs 30-35 ≥ 60 yrs	35 < 60 yrs 30-35 ≥ 60 yrs	35 < 60 yrs 30-35 ≥ 60 yrs, include kcals from dialysate
Protein (g/kg/d)	0.6-0.75	1.2	1.2-1.3
Fat (% total kcal)	For patients at risk for CVD, < 10% saturated fat, 250-300 mg cholesterol/d		
Sodium (mg/d)	2000	2000	2000
Potassium (mg/d)	Match to lab values	2000-3000	3000-4000
Calcium (mg/d)	1200	≤ 2000 from diet and meds	≤ 2000 from diet and meds
Phosphorus (mg/d)	Match to lab values	800-1000	800-1000
Fluid (mL/d)	Unrestricted w/ normal urine output	1000 + urine	Monitor; 1500-2000

Represents initial guidelines; individualization to patient's own metabolic status and coexisting metabolic conditions is essential for optimal care. In stage 5, potassium, phosphorus, and fluid, as well as sodium and calcium, are restricted, depending upon the type of dialysis the patient is undergoing. KDOQI

KDOQI

Guideline 4: Nutritional Supplementation

4.1 Statement on Oral, Enteral, and Intradialytic Parenteral Nutrition Supplementation

Oral Protein-Energy Supplementation
4.1.1 In adults with CKD 3-5D (2D) or posttransplantation (OPINION) at risk of or with protein-energy wasting, we suggest a minimum of a 3-month trial of oral nutritional supplements to improve nutritional status if dietary counseling alone does not achieve sufficient energy and protein intake to meet nutritional requirements.

Enteral Nutrition Supplementation
4.1.2 In adults with CKD 1-5D, with chronically inadequate intake and whose protein and energy requirements cannot be attained by dietary counselling and oral nutritional supplements, it is reasonable to consider a trial of enteral tube feeding (OPINION).

Total Parenteral Nutrition (TPN) and Intradialytic Parenteral Nutrition (IDPN) Protein-Energy Supplementation
4.1.3 In adults with CKD with protein-energy wasting, we suggest a trial of TPN for CKD 1-5 patients (2C) and IDPN for CKD 5D on MHD patients (2C), to improve and maintain nutritional status if nutritional requirements cannot be met with existing oral and enteral intake.

KDOQI Clinical practice guideline for nutrition in CKD: 2020 update.

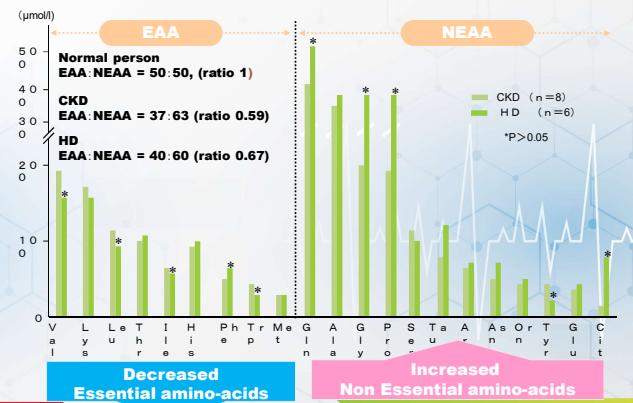
Enteral and parenteral nutritional considerations for CKD patients

- Enteral nutrition should be used in patients who are unable to meet nutrient needs even with appropriate counseling and encouragement or are unable to feed themselves
- Enteral nutrition is always preferred to parenteral nutrition;**
fewer infectious complications, enteral nutrition costs less than parenteral nutrition, and minimal fluid volume is used
- Total parenteral nutrition should only be used if the gut is not working due to disease, injury, etc.**

The rule of thumb is:
If the gut works, use it

National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI) guideline

Aminogram of chronic kidney disease (plasma)



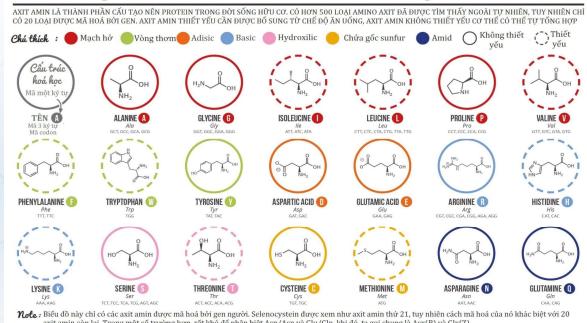
Enteral products

- "Renal" enteral products, are high in caloric density (requiring reduced fluid), and have reduced protein, potassium, sodium, calcium, and phosphorus levels compared with standard products, which can be useful for patients in CKD stages 1-4, depending upon their laboratory values.
- Once patients have progressed to stage 5, a higher-protein product may become necessary to meet the increased protein recommendation. **Depending upon dialysis method**, switching to a standard enteral product may be appropriate at this point

National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI) guideline

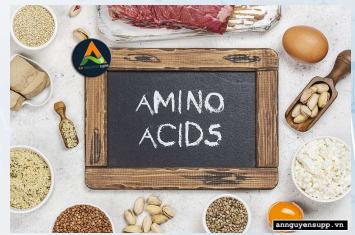
20 loại axit amin cấu thành nên protein được phân thành hai nhóm chính:
Axit amin thiết yếu (9 loại) và axit amin không thiết yếu (11 loại).

20 LOẠI AXIT AMIN THÔNG DỤNG NHẤT



ACID AMIN THIẾT YẾU (EAA)

- ▶ BCAA (valine, leucine và isoleucine)
- ▶ Lysine
- ▶ Threonine
- ▶ Phenylalanine
- ▶ Methionine
- ▶ Histidine.
- ▶ Tryptophan



ACID AMIN KHÔNG THIẾT YẾU (NEAA)

- ▶ Glutamine
- ▶ Aspartate
- ▶ Glutamate.
- ▶ Arginine
- ▶ Alanine
- ▶ Proline
- ▶ Cysteine
- ▶ Asparagine
- ▶ Serine
- ▶ Glycine
- ▶ Tyrosine



KẾT LUẬN

- TỶ LỆ SUY DINH DƯỠNG Ở BỆNH THẬN MẠN CÒN CAO
- NGUY CƠ TỬ VONG VÀ NHẬP VIỆN TĂNG CAO KHI CÓ SUY DINH DƯỠNG
- NHIỀU YẾU TỐ GÂY NÊN SUY DINH DƯỠNG
- DINH DƯỠNG LÀ MỘT PHẦN TRONG VIỆC QUẢN LÝ VÀ ĐIỀU TRỊ BỆNH THẬN MẠN
- CÁC KHUYẾN CÁO VỀ BỔ SUNG DINH DƯỠNG CẦN LƯU Ý THÀNH PHẦN DINH DƯỠNG, ĐƯỜNG CUNG CẤP DINH DƯỠNG THEO CÁC GIAI ĐOẠN BỆNH KHÁC NHAU
- A.A THIẾT YẾU LÀ THÀNH PHẦN QUAN TRỌNG TRONG VIỆC BỔ SUNG DINH DƯỠNG CHO BỆNH THẬN MẠN

CẢM ƠN THẦY CÔ VÀ CÁC
BẠN ĐÃ CHÚ Ý THEO DÕI!

