Nutrition Care for Kidney Disease

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PRESENTER
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Disclosures

None.

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Learning Objectives

1. Describe the pathophysiology of the kidneys and the effects medical nutrition therapy have on improving the quality of life for those who suffer from CKD.
2. Identify the common types of dialysis.
3. Explain the nutrient needs of people with kidney disease from stages 1 to 5.
4. Discuss the importance of and implement nutrition assessments in your daily practice as it relates to CKD.

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Guidelines: *KDIGO and KDOQI*

- Kidney Disease Improving Global Outcomes 2017 update (KDIGO)
- Kidney Disease Outcomes Quality Initiative 2003 (KDOQI)

Kidney, D., Improving, G. O. K. C. M., & Work, G. (2017). KDIGO 2017 Clinical Practice Guideline Update for the Diagnosis, Evaluation, Prevention, and Treatment of Chronic Kidney Disease-Mineral and Bone Disorder (CKD-MBD). *Kidney international supplements*, *7*(1), 1.

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Our Agenda for Today

- Overview: Physiology of the Kidneys
- Types of Dialysis
- Nutrition Assessment in CKD for patients
- Nutrition Management of Diabetes in CKD
- Mineral and Bone Disorders in CKD
- Anemia
- Putting it Into Practice

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Physiology of the Kidneys

- Blood enters to provided oxygen and **excrete waste**
- **Major** functions:
  - Excretory
  - Acid-base balance
  - Endocrine
  - Fluid and electrolyte balance

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Impairment of the Kidneys Can Lead To…

- Edema
- Uremia
- Metabolic acidosis
- Hypertension
- Anemia
- Bone disease
- Altering the response to drugs

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Types of Dialysis

- **In-center** hemodialysis
- **Home** therapy
  - Peritoneal dialysis – may do this **alone**
  - Hemodialysis – requires a competent **partner**

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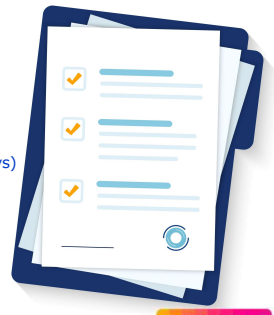
Nutrition Assessment in CKD

- **Weight** of patient
  - Estimated dry weight
  - Bio-impedence
- **Albumin** (21 days) vs. **pre-albumin** (3 days)
- Protein **needs**: 1.2 to 1.4 gm per kg
- Energy **requirement:**
  - BEE
  - 30-35 Kcal per kg
  - Adjusted weight



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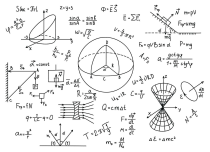
Adjusted Weight

- **Controversial**, but current practice (KDOQI)
- Used if <95% or >115%
- (EDW-Std BW) x 0.32 (female) + Std BW
- (EDW-Std BW) x 0.38 (male) + Std BW



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Example of a 100 kg Female

- Adjusted weight = 77.6 kg
- 30 Kcal per kg = 2,328 Kcal
- 1.4 gm protein per kg = 109 gm protein

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Assessing Dietary Intake

- Food **records**
- Food **recall**
- Food **frequency**
- Truth vs. what the patients **think** you want to hear
- **Micronutrients** – renal vitamins

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Lab Values

- **Blood Urea Nitrogen** (BUN) (reference range = 10-20 mg/dl)
- **Creatinine** – a chemical waste product of creatine (reference range = 0.7-1.3 mg/dl)
- Creatine is a chemical the body makes to **supply energy**, mainly to muscles
- Both will **not exceed** normal ranges until 60% of kidney function is lost

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Measuring Kidney Function

- GFR vs. eGFR
- GFR: estimates how much blood passes through the glomeruli each minute
  - Glomeruli are **the tiny filters** in the kidneys that filter waste from the blood
  - An excellent measure of the **filtering capacity** of the kidneys
  - **Not** clinically feasible and cannot be measured directly
- eGFR – commonly used to help classify stages of CKD

$$eGFR = 186 \times [\text{Serum Creatinine}]^{-1.154} \times \text{Age}^{-0.203} \times [1.212 \text{ if black}] \times [0.742 \text{ if female}]$$

- Both GFR and eGFR are often used interchangeably in literature

Ku, E., Kia, D., Shlipak, M., Anderson, A. H., Chen, J., Go, A. S., ... & Sondheimer J. H. (2016). Change in measured GFR versus eGFR and CKD outcomes. *Journal of the American Society of Nephrology*, *27*(7), 2196-2204.

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Stages of CKD

GFR: measured in ml/minute/1.73 m^2 (average body surface area)

Stage:

1 – GFR of <90 ml/min/1.73 m^2 – start treatment to slow progression and reduce CVD risk

2 – GFR of 60-89 – estimate progression

3 – GFR of 30-59 – evaluate and treat complications

4 – GFR of 15-29 – prepare for kidney replacement therapy

5 – GFR of <15 – kidney replacement therapy

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Nutrients Needs

Nutrient	Stage 4	Hemodialysis	Peritoneal Dialysis	Nocturnal HD
Energy Kcal/kg	25-35	30-35	30-35	30-35
Protein g/kg	0.8	1.2-1.3	1.2-1.3	1.2-1.3
Sodium g/d	<2	<2	<2	<2
Potassium g/d	Unrestricted unless hyperkalemia	2.7-3.1	3-4; adjust prn	Adjust prn, usually unrestricted
Fluids ml/d	Usually unrestricted	750-1,500	Maintain balance	Maintain balance
Phosphorous mg/d	800-1,000	800-1,000	800-1,000	800-1,000

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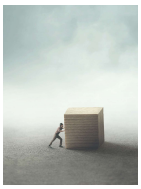
Patients with Diabetes on Dialysis: *Nutrition Care Challenges*

- Classifications and levels of **prevention**
- Effects of dialysis on diabetes **management**
- Effects of diabetes on **dialysis**
- Education: **diabetic** diet or **renal** diet?
  - Need to help patients dispel **misconceptions**



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Diabetes: *Classifications and Preventions*

- **Three** main classifications
- **Levels** of prevention: primary, secondary, and tertiary
- **Tertiary** prevention
  - **Postpone** Progression
  - **Prevent loss** of limbs and eyesight

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Diabetes Management: *Effects of Dialysis*

- **In-center** treatment schedule
- Dialysis and **blood glucose**
- Dialysis and the **metabolic** environment
- **Hypoalbuminemia**

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Effects of Diabetes on Dialysis

- Gastroparesis
- Peridontal disease
- Hyperglycemia and fluid
- Bone and mineral management

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Bone and Mineral Disorders

- Phosphorous, calcium, and vitamin D
- Phosphorous
  - 800 to 1,000 mg daily
  - Absorption: organic phos vs. inorganic phos
- High serum phos ⇨ calcium from bones to serum
- Phosphorus binders
- Role of kidneys with vitamin D

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Problems with High Serum Phosphorous

- Calcium **deposits**
  - Heart
  - Skin
  - Lungs
  - Blood vessels
- Bone **disease**
  - Bone and joint pain
  - Weak brittle bones
- Increased risk of **mortality**

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Initial Symptoms of Hyperphosphatemia

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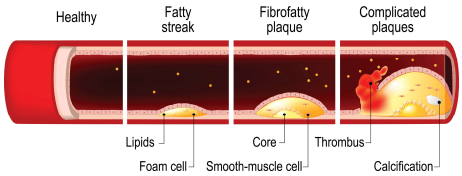
Calcium – Phosphorus Deposits



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Bone Disease

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Calciphylaxis

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Anemia

- Anemia - Greek word meaning **lack of blood**
- Need **RBC** to transport 0_2 and CO_2
- Need **erythropoietin** (EPO) to make RBC in bone marrow
  - **EPO** is a hormone secreted by the kidneys
- Need **hemoglobin** in RBC to transport O_2 and CO_2
- Need **nutrients** to mature RBC to make hemoglobin
  - Iron
  - Vitamin B_{12}
  - Folic Acid

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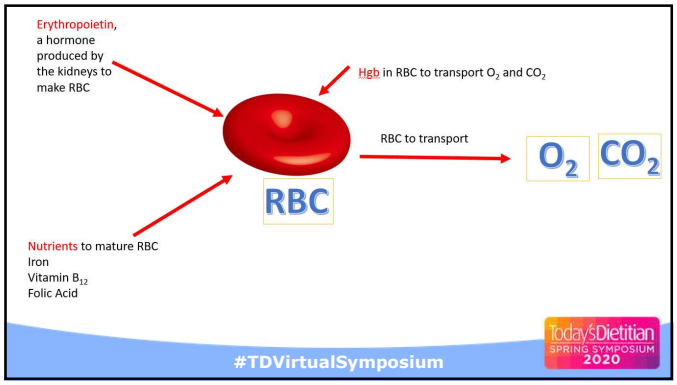

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Causes of Anemia

- Impaired **destruction** – blood loss
- Impaired **production**
  - RBC not being produced **enough**
    - EPO and bone marrow
  - RBC are produced, but not mature – **insufficient nutrients**

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Nutrition for Anemia

- Iron, Vitamin B^{12}, and Folic Acid
- Iron
  - Usually given IV during treatment
  - May use oral iron supplements
  - May educate on increasing iron intake in food
- B^{12} and Folic Acid
  - Renal vitamins (without minerals)
  - Educate on food sources

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CKD and Anemia: *Recap*

- Kidney disease
- Reduced EPO
- Reduced number of RBC
- Reduced oxygen for the body

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Putting It Into Practice

- Understand **what the kidneys do** for our bodies and how nutrients interact with them
- Need to **adjust body weight**, especially when obese
- Need to match each **patient's needs** with their intake
- Understand how diabetes **interacts** with kidney disease
- Need to **educate and manage** bone and mineral disorders

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Questions?

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