National Institute of Diabetes and Digestive and Kidney Diseases

NKDEP National Kidney Disease Education Program

The Case of Carlos Mendes: Complications of CKD

Objectives

1. Student will associate the functions of the kidneys, diet and medications as they relate to the complications of CKD.
2. Student will identify appropriate interventions for hypoglycemia in CKD.

Background

Mr. Mendes is a 77-year-old Hispanic man with type 2 diabetes since 1999. He is here to learn how to treat hypoglycemia in CKD. For the past two months, he needed to drink 10 oz. of orange juice almost every night to treat low glucose levels. He started drinking regular cola with his meals in place of his usual diet cola to keep his blood glucose up during the day as well. His wife does not add salt to cooking.

MNT Referral Data

Medications: Enalapril 10 milligrams (mg) daily, lovastatin 40 gm daily, baby aspirin daily, renal vitamin, ergocalciferol 50,000 IU weekly, NEW: furosemide 80 mg daily

DISCONTINUED: Glipizide XL 10 mg.

Recall

1 cup refried beans (lard) 3 corn tortillas 16 oz. brewed coffee /1 oz. canned milk Snack: apple	2 fast food beef tacos 20 oz. regular cola	1 cup fideos (pasta), fried in 1 tbsp. oil 3 oz. fried beef with onions in 1 tbsp. oil ½ cup refried beans (lard) 1 large flour tortilla (12") 12 oz. regular cola

Review of Pertinent Measures

Measure	3/9/12	12/13/11	9/27/11
Weight (lb.)	197	203	200
Blood Pressure	139/82	146/96	140/90

Measure	Reference Range	3/9/12	12/13/11	9/27/11
UACR	< 30	484	671	683
Glucose	70-100	76	298 H	197 H
BUN	7-20	43 H	28 H	22 H
Creatinine	0.8-1.3	3.1 H	2.6 H	2.5 H
eGFR	> 60	20	24	25
Sodium	135-145	143	139	141

Review of Pertinent Measures *(continued)*

Measure	Reference Range	3/9/12	12/13/11	9/27/11
Potassium	3.5-5.0	5.3 H	4.4	4.5
Chloride	101-111	112	106	107
CO2	21-32	20.2 L	27.2	24.5
Calcium	8.5-10.2	8.4 L	8.2 L	8.2 L
Phosphorus	2.7-4.6	4.3	3.4	3.5
Albumin	3.4-5.0	2.5 L	2.7 L	2.8 L
Cholesterol	< 200	184	---	203 H
LDL	< 100	104 H	---	127 H
HDL	> 35	38	---	39
Triglycerides	< 150	---	---	136
25(OH) D	20 or more	23	17	4
iPTH	65 or less	45	54	69
Hemoglobin A1C	---	6.6	11.4	10.9
Hemoglobin	12 - 17	12.4	---	13.6

Questions and Answers

1. Use the Blank Complications Grid (http://nkdep.nih.gov/resources/mendes-complications-grid-blank-508.pdf) to explain the role of kidney function, and discuss diet and medications for the following:
    a. eGFR is decreasing.
    b. UACR is elevated but decreasing.
    c. Blood urea nitrogen is increasing.
    d. Serum potassium is elevated.
    e. Serum bicarbonate is low.
    f. Serum calcium is low. Use formula: Corrected calcium = serum calcium + [0.8 (4.0 – serum albumin)]
    g. Serum phosphorus is within range.
    h. Serum albumin is low.
    i. LDL cholesterol is elevated.
    j. 25(OH) vitamin D was low and is increasing.
    k. Parathyroid hormone (PTH) level is within range.
    l. A1C decreased from 13.4 to 6.6, more frequent hypoglycemia.
    m. Hemoglobin level is lower than normal for a man.

> **Answer**: See the Complications Grid Answer Key (http://nkdep.nih.gov/resources/mendes-complications-grid-answer-key-508.pdf).

2. Which of the following strategies is the best way to treat hypoglycemia in someone who has CKD and hyperkalemia?

> **Answer**: b. Drink ½ cup of a low potassium beverage such as cranberry juice cocktail.
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> *For additional information, see slide 35 from* ***Chronic Kidney Disease 101: Nutrition Intervention*** *(http://nkdep.nih.gov/resources/ckd-101-nutrition-508.ppt).*

Educational Material

National Kidney Disease Education Program. CKD Diet Counseling (Medical Nutrition Therapy) Referral Form. Rationale for data inclusion. March 2012. http://nkdep.nih.gov/resources/kidney-diet-referral-form-mnt-508.pdf

National Kidney Disease Education Program. *Your kidney test results.* Revised September 2011. NIH Publication No. 11–7407. National Kidney Disease Education Program website. http://nkdep.nih.gov/resources/kidney-test-results-508.pdf

Additional Reading

National Institutes of Health National Diabetes Education Program. *Diabetes Medications Supplement Working Together to Manage Diabetes.* Revised 3/07. NDEP– 54–S. http://ndep.nih.gov/media/Drug_tables_supplement.pdf

de Zeeuw D, Raz I. Albuminuria: A great risk marker, but an underestimated target in diabetes. *Diabetes Care*. 2008;31(2):S190-S193. http://care.diabetesjournals.org/content/31/Supplement_2/S190.full.pdf+html

Kunz R, Friedrich C, Wolbers M, Mann JFE. Meta-analysis: effect of monotherapy and combination therapy with inhibitors of the renin-angiotensin system on proteinuria in renal disease. *Annals of Internal Medicine.* 2008; 148(1):30-48. http://annals.org/content/148/1/30.full.pdf+html

Weir MR, Rolfe M. Potassium homeostasis and renin-angiotensin-aldosterone system inhibitors. *Clinical Journal of the American Society of Nephrology*. 2010;5(3):531-548. http://cjasn.asnjournals.org/content/5/3/531.full.pdf+html

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For more information, visit *www.nkdep.nih.gov/nutrition* or call 1-866-4 KIDNEY (1-866-454-3639).

The National Kidney Disease Education Program (NKDEP) works to improve the understanding, detection, and management of kidney disease. NKDEP is a program of the National Institutes of Health (NIH). NKDEP is a program of the National Institutes of Health.

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