

UPDATE ON MINERAL METABOLISM IN CKD: Disease Progression, Cardiovascular Complications, and Clinical Outcomes

ATTESTATION/EVALUATION

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Degree(s)/Specialty: MD/DO PharmD, RPh NP PA
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Number of years in practice: ≤ 5 6–10 11–15 16–20
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MET LEARNING OBJECTIVES:

4 = strongly agree 3 = agree 2 = disagree 1 = strongly disagree

Upon completion of this activity, I will be able to:

Explain the roles of Vitamin D and PTH in regulating serum calcium levels

4 3 2 1

Explain the link between biochemical changes in sHPT associated with CKD and increased morbidity and mortality

4 3 2 1

Discuss the different therapies for the disorders of PTH and mineral metabolism in patients with CKD, review the data on clinical outcomes, and apply these therapies to clinical practice

4 3 2 1

ENDURING MATERIAL:

4 = strongly agree 3 = agree 2 = disagree 1 = strongly disagree

The information discussed was:

- Presented in a clear and understandable manner

4 3 2 1

- Provided clinically relevant information

4 3 2 1

- Able to provide me with an increased understanding/awareness of the subject material

4 3 2 1

CONTENT:

Please rate the overall content presented in this activity:

Too basic Appropriate Too complex

BIAS:

Was this activity fair, balanced, objective, and free from commercial bias?

Yes No

CME POSTTEST

1. **Plasma calcium levels are regulated by hormone action in which organs?**
 - a) Bone
 - b) Liver
 - c) Intestine
 - d) Kidney
 - e) a, c, and d
 - f) all of the above

2. **The calcium sensing receptor is a G-protein coupled receptor that:**
 - a) Stimulates cAMP production
 - b) Stimulates PTH secretion
 - c) Inhibits PTH secretion
 - d) Translocates to the nucleus after hormone binding
 - e) Decreases cellular calcium through phospholipase C signaling

3. **Elevated PTH increases calcitriol primarily through which mechanism?**
 - a) Stimulation of kidney 1α -hydroxylase
 - b) Enhancement of intestinal absorption from diet
 - c) Inhibition of P450 metabolizing enzymes in liver
 - d) Increasing skin vitamin D photoconversion by > 25%

4. **The vitamin D receptor (VDR) has what property?**
 - a) Enhances PTH transcription up to 6-fold
 - b) Inhibits PTH transcription
 - c) Is found almost exclusively in the kidney
 - d) Is critical for blocking parathyroid hyperplasia
 - e) Is critical for FGF-23 signaling

5. **Plasma phosphorus is increased by which of the following mechanism:**
 - a) Dietary intake
 - b) Vitamin D-enhanced intestinal uptake
 - c) Bone resorption
 - d) Elevated PTH
 - e) a, b, and c
 - f) All mechanisms

6. Which of the following is observed first when kidney function deteriorates?

- a) Plasma PTH elevation
- b) Plasma vitamin D decrease
- c) Plasma calcium decrease
- d) Plasma phosphorus increase
- e) PTH and calcitriol changes are evident before Ca and P changes

7. Which is the best characterization of vascular calcification?

- a) Prevented by treatment with active vitamin D analogues
- b) A regulated process that is exacerbated by CKD
- c) A cardiovascular risk factor, but treatable with Ca-based phosphate binders
- d) Dependent solely on Ca x P
- e) Mediated by dysregulation of apatite convertase

8. Which is an advantage of sevelamer over calcium-based phosphate binders?

- a) Lower mortality
- b) Lower cost
- c) Higher tolerability
- d) Greater reduction of serum phosphorus

9. In a recent clinical trial, patients treated with cinacalcet had mean PTH levels that were:

- a) Transiently reduced
- b) Strongly dependent on the frequency of dialysis
- c) Reduced by 15% ($P < 0.005$)
- d) Reduced by approximately 50%
- e) Reduced by approximately 80%

10. Which has been shown in clinical trials of active vitamin D analogues?

- a) Calcitriol and paricalcitol have equal effects on serum PTH
- b) Doxercalciferol and paricalcitol are associated with better survival of HD patients than calcitriol
- c) Teng's randomized prospective trial showed that intravenous vitamin D use is associated with decreased mortality in ESRD patients
- d) Repletion with ergocalciferol is associated with the same survival benefit as calcitriol treatment in ESRD