

## [Test Your Knowledge: Magnesium - The Forgotten Star of Dialysis Patients' Health](#)

I once watched a [profoundly meditative video on YouTube](#). It was one of those philosophical discourses that forces one to look at the big picture, and perhaps take life a little less seriously. A fascinating point it raised was how we are all over 13 billion years old, or almost as old as the universe. And while that might not make much sense given our relatively minuscule chronologic age, the fact that we are all forged from essentially the same material that was produced at the dawn of the universe leaves me wonder struck! This very fact applies to magnesium. The humble magnesium found in our bodies was in fact produced by the grand process of [nuclear fusion of carbon on massive stars](#). Later, as a star [exploded into a giant super nova](#), magnesium began its interstellar journey, eventually destined to play a major role in our physiology. Yes, [life as we know it would not have been possible without supernovae](#).

OK. Let's get down to more mundane earthly matters. Magnesium (which takes its name from [Magnesia, a region in Greece](#)) is an essential mineral [involved in multiple physiologic pathways](#) ranging from nucleic acid synthesis to energy production to cell signaling. Its deficiency has major implications for health (the average American's intake of magnesium tends to be under [the usual recommended intake](#)), and disorders of magnesium homeostasis are common in the dialysis population due to dialysis' ability to remove/add magnesium from/to the patient.

But when was the last time one paid attention to the magnesium concentration in the dialysate? Should one be giving it a bit more thought when you write that dialysis prescription? In a normal person, magnesium levels are affected by intake, gastric absorption, bone health, and renal excretion. Intuitively, we might think that the average dialysis patient will have a high magnesium level because of diminished renal excretion. However, as per the [timely review by Alhosaini and Leehey](#), that might not always be the case. This important article in the *AJKD* underlines the scant attention paid to magnesium in dialysis patients.

Let's go through a few questions based on the article to see how well we know about the role of magnesium in the dialysis patient.

1. Which commonly used medication in dialysis patients is **not** associated with hypomagnesemia?

- A. Proton pump inhibitors
- B. Digoxin
- C. Sevelamer
- D. Cinacalcet

2. Which of the following affects magnesium diffusion during dialysis?
  - A. Concentration gradient across the dialysis membrane
  - B. Gibbs-Donnan effect
  - C. Hypoalbuminemia
  - D. All of the above
  
3. Use of low magnesium dialysate leading to a decrease in serum magnesium concentration is associated with which hemodynamic effect?
  - A. Hypertension
  - B. Hypotension
  - C. No changes in blood pressure
  
4. What is the most likely reason for the above effect in question 3?
  - A. Increased peripheral resistance
  - B. Impaired myocardial contractility
  - C. Reduced peripheral resistance
  - D. Maintained peripheral resistance and myocardial contractility
  
5. High serum magnesium concentrations might have an inhibitory effect on vascular calcification.
  - A. True
  - B. False
  
6. Hypermagnesemic dialysis patients could be predisposed to:
  - A. Adynamic bone disease
  - B. Osteitis fibrosa
  - C. High magnesium concentrations do not impact bone health

*Post Prepared by Veeraiash Chauhan, MD, AJKD Blog Contributor*

Solutions to AJKD Blog's [Test Your Knowledge: Magnesium - The Forgotten Star of Dialysis Patients' Health](#)

Based on [Alhosaini and Leehey AJKD review](#)

1. **C.** [Proton pump inhibitors](#), [digoxin](#), and [cinacalcet](#) are all associated with hypomagnesemia. These medications should be considered as potential contributing factors when hypomagnesemia is noted in dialysis patients.
2. **D.** [All these factors](#) affect magnesium diffusion during dialysis.
3. **B.** The [use of low magnesium dialysate](#) and [subsequent decrease in serum magnesium concentration](#) has been associated with hypotension in patients during dialysis.
4. **B.** Impaired myocardial contractility is considered the reason behind intradialytic hypotension noted in hypomagnesemic patients. Patients [in this study](#) had the same peripheral resistance and heart rate across different dialysate magnesium concentrations, ranging from 0.5-1.5 mEq/L.
5. **A.** Magnesium is known to inhibit vascular calcification by [reducing the transformation of calcium phosphate crystals into a stable apatite form](#), and by [reducing the transformation of vascular smooth muscle cells into osteoblasts](#).
6. **A.** Hypermagnesemia has been associated with [lower PTH levels, and therefore raises concern of adynamic bone disease](#) in hypermagnesemic dialysis patients.