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Released: 01/10/2025
Valid until: 01/10/2026
Time needed to complete: 54m

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The Phosphate Battleground: The Role of the Kidneys and the Gut

Announcer:
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Episode 2

Dr. Sprague:
Hello, this is CME on ReachMD. And I'm Dr. Stuart Sprague. Here with me today is Dr. Steven Fishbane. Steven, what are the pathophysiological mechanisms underlying phosphate homeostasis?

Dr. Fishbane :
Phosphorus is an essential mineral. It plays a key role in cellular metabolism and under normal circumstances we are acquiring phosphorus through many of the foods that we eat.

And normally, I think one of the interesting things is that the absorption of phosphorus in the intestines is not through cells or transcellular type process, but the normal absorption is actually between cells paracellular pathway, and that's the more phosphorus that you eat. And the higher the concentrations of phosphorus and the intestines, the more that's being absorbed into the body. And once in the body, phosphorus is very carefully regulated by hormones that we're well aware of, like FGF 23, vitamin D and parathyroid hormone.

The pathophysiology in chronic kidney disease. As GFR starts to decline, there is positive phosphate balance. There's a very early retention of phosphorus within the body, and I don't think that we see it because serum phosphorus concentrations really don't rise until the later stages of kidney disease. In the earlier stages, we've got protective mechanisms that maintain serum phosphorus within the normal range, but as we get towards stage four and stage five chronic kidney disease, it's quite common to see elevated serum phosphorus.

I like to check phosphorus concentrations every year or so on stage three, maybe every three to six months in stage four or five. But as serum phosphorus starts to rise and especially as we get towards end stage kidney disease and excretion of phosphorus becomes so difficult, it just becomes a ubiquitous problem.

Stuart, is that your view as well?

Dr. Sprague:
Yes, it is. And I think to me it's very important.

And I also like to look at some of the compensatory mechanisms such as the parathyroid hormone, which goes up rather early in chronic kidney disease as is FGF 23, which generally nobody really measures or looks at, but those are some of the compensatory mechanisms to help increase urinary phosphate excretion as phosphate absorption goes up. So by the time phosphorus is increased, when we see it in the blood, we already have significant hyperparathyroidism and that's something that we have to address.

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The other issue, I think, as you talked very nicely, this phosphorus is in the diet and in actually some of the medications we take too at phosphorus supplements is that it really makes a difference as opposed to organic or inorganic phosphate because we tend to absorb a lot more of the inorganic phosphate that's used as additives, et cetera, to our foods or in our medications, which then further accelerates the accumulation of phosphorus and the compensatory mechanisms.

So I think that's something that we need to hopefully counsel some of our patients about when we talk about diet as well. I don't know how you approach that.

Dr. Fishbane:
Yeah, no, I sure agree with that. I think that's a really important part of thinking about diet, which can be quite important for patients.

Dr. Sprague:
Well, this has been a brief but important discussion. Our time is up. I like to thank you all for listening. Thank you.

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