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Nutritional support for patients with chronic kidney disease

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This is a talk for the nutritional support for patients with chronic kidney disease (CKD). I dissected nutritional support into five subsections: protein intake, sodium intake, potassium intake, phosphorus intake, and water intake.
To dates, there have been several guidelines for nutrition in CKD patients, including KDIGO 2012 guideline. Commonly, guidelines clearly suggested low protein diet for CKD patients. Although some suggested low salt diet, little have highlighted the importance of phosphorus, potassium, and water intake. So, I first will state the importance and background of low protein diet in the first section.
According to KDIGO 2012 guideline, CKD patients need to reduce protein intake to 0.8/kg/day, and need to avoid high protein diet more than 1.3g/kg/day. This is based on the hypothesis by Brenner. Dr. Brenner propose that high protein intake will cause glomerular hyperfiltration by dilation of afferent arteriole and constriction of efferent arteriole. To prove this hypothesis, MDRD study had performed with two sub-sections: study 1 for moderate CKD and study for advanced CKD. Unfortunately, MDRD study had failed to prove the efficacy of low protein diet in the prevention of CKD progression. Too short follow-up period may explain the null-effect. Like RAS inhibitors, low protein diet can reduce hyperfiltration, which may be confounded by rapid progression. Therefore, to identify reno-protective effect of low protein diet, longer study period is needed. Poor compliance may also affect the null-effect. But, more importantly, I think development of malnutrition along with low protein diet may confound the benefit. According to KNOW-CKD cohort, low protein diet seemed to have harmful effect on CKD progression. However, adjusting malnutrition had nullified the statistical significance suggesting the fundamental renal hazard of malnutrition. In this regard, recent study by Garneata et al. inspired the potential role of low protein diet on CKD progression. The difference between MDRD study and Garneata study was of particular emphasis on nutritional support. Therefore, well-organized low protein diet may be reasonable nutritional strategy for CKD patient care.
For CKD patients, sodium intake needs to be reduced to < 90 mmol/day. It has been obvious that reduced sodium intake resulted in reduced blood pressure. In addition, unexpectedly, reduced sodium intake caused reduced proteinuria. Unfortunately, however, low sodium intake had failed to improve renal outcome. Therefore, more studies are needed.
Hyperkalemia has been thought to cause significant mortality and morbidity. The risk of hyperkalemia increased with the progression of CKD. Hyperkalemia may prevent excitation and prolong depolarization of cardio-myocytes. On the other hand, hypokalemia can also excite muscle and shorten depolarization, suggesting U-shaped cardiac hazard of serum potassium. To dates, there have been confusing results on the effect of dietary potassium in CKD patients. Some suggested neutral, another suggested harmful, but the other suggested beneficial effect. Therefore, at this point, we cannot clearly say the optimal intake of potassium.
As for phosphorus, increased phosphate intake increased all-cause death and cardiovascular death even in general population. Nonetheless, phosphate binder had failed to prove benefit in normal phosphorus population. Therefore, reducing dietary phosphate may have benefit in CKD patients.
Finally, low hydration status was associated with increased vasopressin. Increased vasopressin may cause renal hyperfiltration. Increased water intake can decrease vasopressin, more water intake may have beneficial effect in CKD patients.
In conclusion, the evidence for nutritional support in CKD patients has not been strong. However, low protein diet may ameliorate CKD progression, if it does not cause protein energy wasting. Low salt diet reduces blood pressure and proteinuria. Recommendation for optimal potassium intake needs further investigation. Low phosphate diet needs to be educated in CKD patients. Increased

water intake may have beneficial renal and metabolic effects. More studies need to be followed to add strong evidence on this subject.