中文題目：低蛋白飲食合併酮酸氨基酸對於慢性腎病變患者血管內皮功能與血清中親蛋白尿毒素之研究

英文題目：Effect of low protein diet supplemented with ketoanalogues on endothelial function and protein-bound uremic toxins in patients with CKD

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Background: Studies have been demonstrated that a low protein diet supplemented with ketoanalogues (KAs) could significantly retard renal function progression. However, its effect on endothelial function and serum levels of protein-bound uremic toxins is not clear. The aim of study is to explore if low protein diet (LPD) and KAs supplement will affect the kidney function, vascular function and serum uremic toxins levels in a CKD-based cohort.

Methods: In this study, we enrolled 22 stable CKD patients with stage3 to 4 under LPD (0.6-0.8g/day). Patients were divided into 2 groups –control (LPD only) and study group (LPD + KAs 6 tab/day). Serum biochemistry, total/free indoxyl sulfate (TIS/FIS), total/free p-cresyl sulfate (TPCS/FPCS) and endothelial function- flow mediated dilation (FMD) were measured before and after 6 months KAs supplement.

Results: Before study, there was no significant difference on kidney function, FMD and uremic toxins levels between control and study group. Under the paired t-test, there is a significant decrease with TIS, FIS (all $p<0.05$) and a significant increase with FMD, eGFR, bicarbonate (all $p<0.05$) in study group than control group. In multivariate regression analysis, significant difference were sustained in FMD, TPCS, FPCS, TIS and FIS (all $p<0.001$) when age was adjusted; significant difference were maintained in FMD, FPCS, TIS (all $p<0.001$) and TPCS ($p=0.012$) when age, SBP, sodium and albumin were adjusted; increase in FMD ($p<0.001$) and decrease in FPCS ($p=0.012$) and TIS ($p<0.001$) remained a persistent finding when adjusted for age, SBP, sodium, albumin and DBP.

Conclusion: These results indicated that LPD supplemented with KAs not only can significantly preserve kidney function but also have a benefit on endothelial function as well as protein-bound uremic toxins in CKD patients. We speculate that this additional effect of KAs may result from the improvement of kidney function.

Keywords: Chronic kidney disease, ketoanalogues, p-cresyl sulfate, indoxyl sulfate, flow mediated dilation