# Association between IGF-1 and Nutritional Status in Patients with Chronic Kidney Disease

*Gun Woo Kang, In Hee Lee, Ki Sung Ahn

Department of Internal Medicine, Catholic University of Daegu School of Medicine, Daegu, Korea

## Background

- Insulin-like growth factor-1 (IGF-1) is the key mediator of the anabolic actions of growth hormone. In previous studies, IGF-1 has been associated with an increased risk of cardiovascular disease. Limited studies in patients receiving dialysis suggest that serum IGF-1 correlates with markers of nutrition, compared to serum albumin and transferrin, And, the association between serum IGF-1 levels and renal function is not clear.

- The aim of this study was to investigate the nutritional status and renal function according to serum IGF-1 levels in patients with chronic kidney disease (CKD).

## Method

- **Study design**: Retrospective

- **Study period**: Jan. 2010 ~ Nov. 2012

- **Inclusion**
  1. Patients of CKD stage III-V in single center (N=165)
  2. age ≥ 20

- **Exclusion**
  1. renal replacement therapy (dialysis, renal transplantation)

- **Nutritional markers**
  1. albumin, prealbumin, transferrin, cholesterol
  2. body surface area
  3. skin-fold thickness
  4. % fat with dual energy x-ray absorptiometry (DEXA)

- **Estimated Glomerular Filtration Rate (eGFR)**
  via Modification of Diet in Renal Disease (MDRD) equation

- **Statistics**
  using univariate and multivariate logistic regression analysis

## Results

### Table 1. Demographic of total subjects (N=165)

| Variables | Mean±SD or n (n of patients = 165) |
|---|---|
| Age, years | 60.7±13.4 |
| Male : Female (%) | 97 (55.8) : 68 (41.2) |
| Cause of CKD (%) | |
| DM | 104 (63.4) |
| HTN | 18 (11.0) |
| CGN | 28 (17.1) |
| others | 15 (8.5) |
| eGFR, mL/min/1.73m$^2$ | 10.4±7.6 |
| CKD stage (%) | |
| III | 7 (4.2) |
| IV | 24 (14.5) |
| V | 134 (81.6) |
| IGF-1, ng/mL | 174.1±99.0 |

n: number of patients, CKD: chronic kidney disease, DM: diabetes mellitus, HTN: hypertension, CGN: chronic glomerulonephritis, eGFR: estimated glomerular filtration rate, IGF-1: insulin-like growth factor-1

## Conclusions

These results suggest that serum IGF-1 levels are reduced in CKD patients with malnutrition. However, we didn't find a correlation between IGF-1 and eGFR. We should consider that IGF-1 is the important factor of nutritional status in CKD patients

## Results

### Table 2. Bioelectrical impedance analysis and dual energy X-ray absorptiometry of Patients with Chronic Kidney Disease

| Variables | Mean±SD or n (n of patients = 165) |
|---|---|
| Height, cm | 160.1±9.2 |
| Body Weight, kg | 62.1±11.7 |
| BSA, m$^2$ | 1.65±0.18 |
| BMI, kg/m$^2$ | 24.2±3.8 |
| Obesity, % | 115.0±24.7 |
| W-H ratio | 1.32±5.52 |
| Skin-fold thickness, cm | |
| Biceps | 6.7±4.6 |
| Triceps | 10.6±7.4 |
| Scapular | 17.0±10.7 |
| Muscle mass, kg | 44.4±9.5 |
| LBM, kg | 47.4±10.5 |
| BMR, Calories/day | 1280.6±216.8 |
| %fat, % | 22.0±9.5 |

n: number of patients, BSA: body surface area, BMI: body mass index, W-H ratio: waist hip ratio, LBM: lean body mass, BMR: basal metabolic rate

### Table 3. Clinical and laboratory parameters of patients with chronic kidney disease

| Variables | Mean±SD or n (n of patients = 165) |
|---|---|
| WBC, g/dL | 7,593.3±3,251.3 |
| Hemoglobin, g/dL | 8.4±1.8 |
| Protein/Albumin, mg/dL | 6.0±0.8/3.4±0.5 |
| BUN/Creatinine, mg/dL | 78.1±46.7/7.9±7.0 |
| Calcium/Phosphate, mg/dL | 7.7±1.0/5.7±2.2 |
| Cystatin-C, mg/L | 4.2±2.1 |
| CRP, mg/dL | 23.5±44.1 |
| Intact PTH, pg/dL | 308.7±277.9 |
| 25(OH)D, ng/mL | 11.2±7.2 |
| 1,25(OH)$_2$D, pg/mL | 10.1±7.0 |
| Total cholesterol/TG, mg/dL | 152.7±58.9/135.6±70.9 |
| LDL/HDL, mg/dL | 103.6±86.1/39.5±21.3 |
| ApoA/ApoB, mg/dL | 110.8±25.4/81.0±28.8 |
| Free fatty acid, uEq/L | 475.1±255.2 |
| Ferritin, ng/mL | 271.8±253.9 |
| Prealbumin, mg/dL | 27.8±10.7 |
| Transferrin, mg/dL | 174.8±42.3 |

n: number of patients, CRP: C-reactive protein, PTH: parathyroid hormone, LDL: low density lipoprotein, HDL: high density lipoprotein, ApoA: apolipoprotein A1, ApoB: apolipoprotein B

### Table 4. Pearson's Correlation Coefficient

| | Age | eGFR | Alb | ApoA | Prealb | BSA | Tricep | %fat | IGF-1 |
|---|---|---|---|---|---|---|---|---|---|
| Age | 1 | | | | | | | | |
| eGFR | 0.119 | 1 | | | | | | | |
| Alb | 0.073 | -0.082 | 1 | | | | | | |
| ApoA | -0.067 | 0.204* | -0.079 | 1 | | | | | |
| Prealb | -0.273** | -0.091 | 0.463** | 0.093 | 1 | | | | |
| BSA | -0.185* | 0.044 | -0.003 | -0.104 | 0.101 | 1 | | | |
| Tricep | -0.045 | -0.013 | -0.055 | 0.021 | 0.104 | 0.111 | 1 | | |
| %fat | 0.165 | -0.085 | 0.158 | -0.140 | 0.149 | -0.028 | 0.512** | 1 | |
| IGF-1 | -0.231** | -0.210** | 0.229** | -0.162* | 0.399** | 0.202** | 0.175* | 0.333** | 1 |

**: $p < 0.01$, *: $p < 0.05$
Alb: albumin, Prealb: prealbumin

### Table 5. Multivariate analysis of risk factors for IGF-1

| | 95% CI | P value |
|---|---|---|
| Age | -1.928-1.011 | 0.537 |
| eGFR | -4.022-0.324 | 0.094 |
| Albumin | -42.753-27.637 | 0.671 |
| ApoA | -1.074-0.465 | 0.435 |
| Prealbumin | 0.635-4.264 | 0.009* |
| BSA | -44.380-138.823 | 0.309 |
| Tricep | -2.242-2.290 | 0.983 |
| %fat | 0.502-4.615 | 0.015* |