ASSOCIATION OF SELF-REPORTED AND OBJECTIVE MEASURES OF PHYSICAL ACTIVITY WITH LEG MUSCLE MITOCHONDRIAL OXIDATIVE CAPACITY IN CKD

Se Ri Bae[1] Tae Youn Kim[2] Jorge Gamboa[3] Chenoa Vargas[4] Sophia Liu[5] Kushang Patel[6] Ian de Boer[7] Bryan Kestenbaum[7,8] Baback Roshanravan[4]

[1]University of California, Davis, School of Medicine
[2]University of California, Davis, School of Nursing
[3]Vanderbilt University, Department of Medicine
[4]University of California, Davis, Department of Internal Medicine, Division of Nephrology
[5]University of Washington
[6]University of Washington, Department of Anesthesiology and Pain Medicine
[7]University of Washington, Department of Medicine, Division of Nephrology
[8]University of Washington, Department of Epidemiology

UC DAVIS HEALTH

Division of Nephrology
University of Washington

KIDNEY RESEARCH INSTITUTE

BACKGROUND

- Chronic kidney disease (CKD) is associated with skeletal muscle dysfunction leading to decreased physical functioning.
- Reduced kidney function leads to impaired muscle mitochondrial oxidative capacity underlying poor physical performance.
- The link between muscle mitochondrial oxidative capacity and patient-reported and objective measures of physical activity (PA) remains unclear.

OBJECTIVE

- To determine the association between in-vivo leg muscle mitochondrial capacity and self-reported PA and objective PA.

METHODS

- We performed a cross-sectional study of participants from the Chronic Kidney Mitochondrial Energetics and Dysfunction (CKD-MEND) study.
- Muscle mitochondrial oxidative capacity (ATPmax) in the tibialis anterior muscle was measured using in vivo ^{31}Phosphorus Magnetic Resonance Spectroscopy.
- We assessed patient-reported PA with the Human Activity Profile (HAP) questionnaire and objective PA with log-transformed accelerometry counts from an Actigraph accelerometer worn over a 14-day period.
- Multivariable linear regression was used to test associations between CKD status with ATPmax in nested models separately adjusting for HAP scores or accelerometry values.

Table 1. Participant characteristics

	CKD (N=40)	Control (N=19)
Age (years), mean (SD)	62 (14)	60 (8)
Female, No (%)	22 (55)	6 (32)
Black, No (%)	5 (13)	2 (11)
Diabetes, No (%)	12 (30)	6 (32)
BMI (kg/m^2), mean (SD)	28.7 (6)	27.2 (5)
Systolic BP (mmHg), mean (SD)	127 (18)	129 (12)
eGFRcr-cysc (ml/min per 1.73m^2) (SD)	38 (19)	98 (14)
Hemoglobin (gm/dL), mean (SD)	13 (2)	14.3 (2)
Bicarbonate (mmol/L) , mean (SD)	21.9 (3)	22.8 (1.7)

RESULTS

Figure 1. Association of ATPmax with objective PA

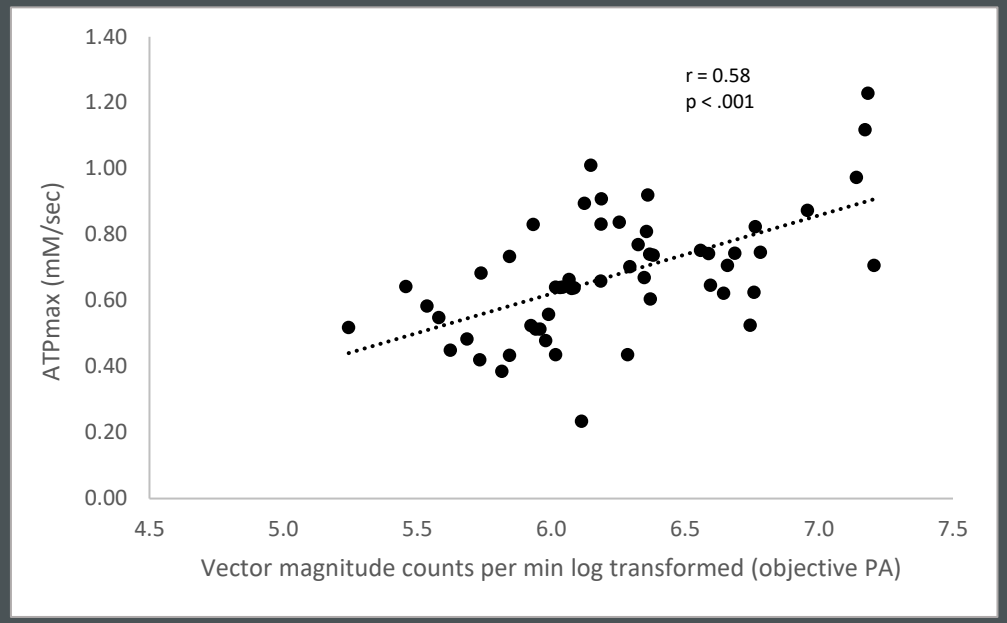
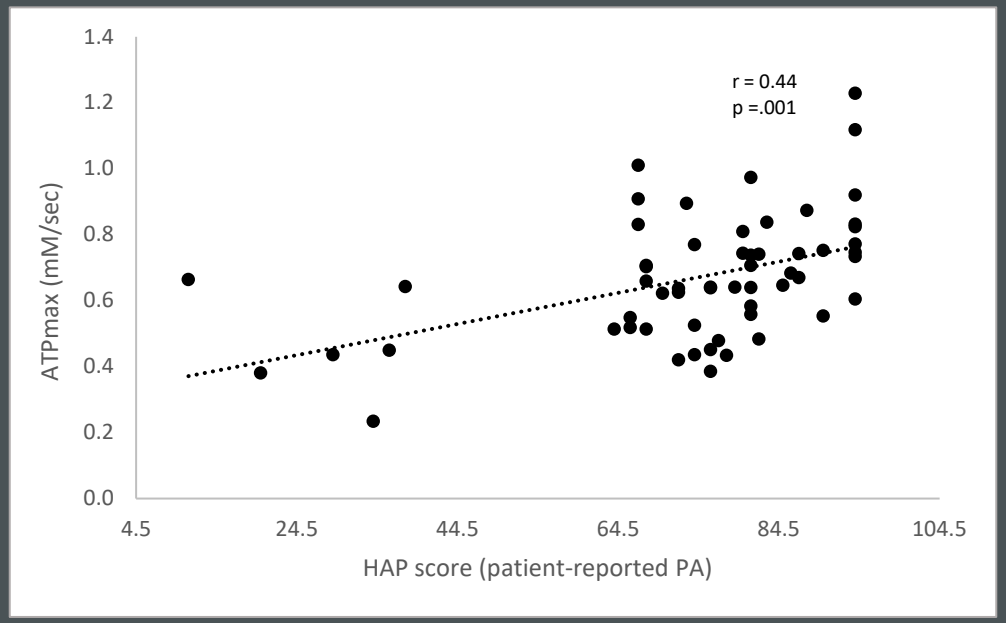


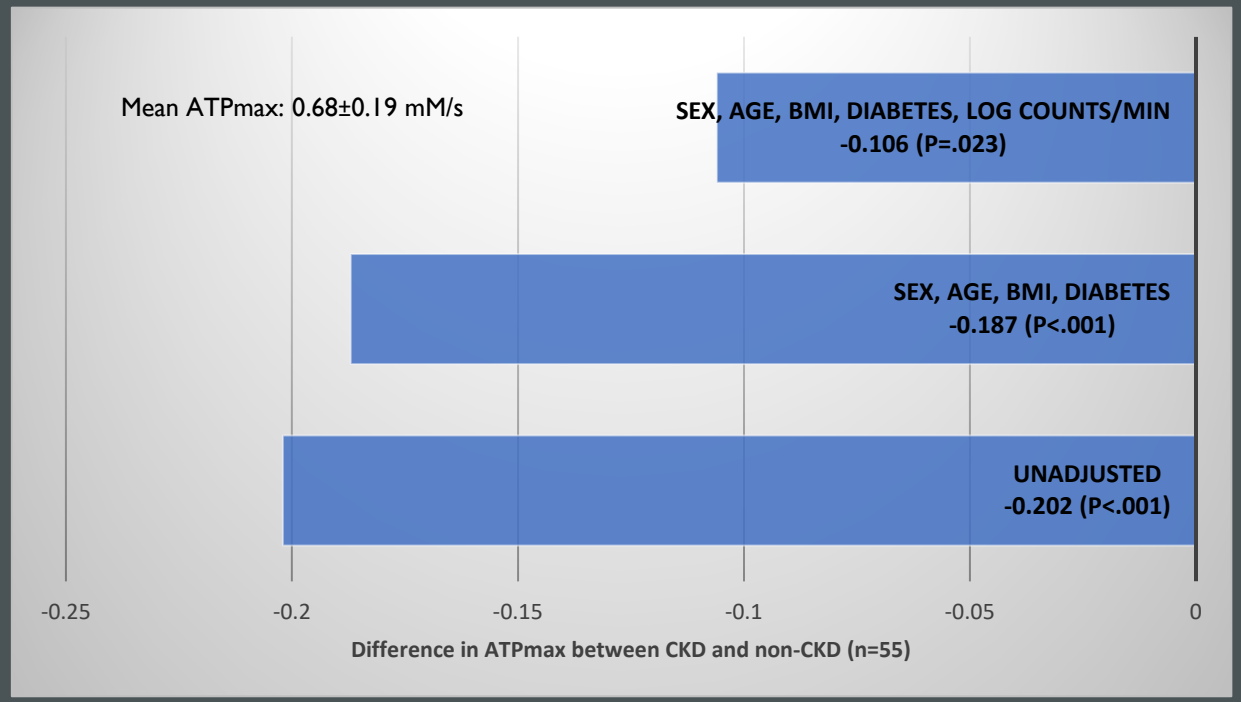
Figure 2. Association of ATPmax with self-reported PA



ATPmax was more strongly associated with accelerometry counts (objective PA) than HAP scores (self-reported PA).

RESULTS

Figure 3. Linear regression models of the association of CKD with ATPmax



- Accelerometry counts explained 43% of the difference in leg muscle ATPmax between CKD and controls (-0.106 mM/s, p=0.02) while HAP scores accounted for 15% of the ATPmax differences (-0.158 mM/s, p<0.01) after adjusting for sex, age, BMI, and diabetes.
- Diabetes and CKD were independently associated with lower ATPmax (-0.118 mM/s, p<0.01 and -0.186 mM/s, p<0.01, respectively).

CONCLUSIONS

- Objective PA measure of accelerometry counts is more strongly associated with ATPmax and explains more of the differences in ATPmax between CKD and controls than self-reported PA.
- Objective physical activity better captures the influence of habitual physical activity on muscle mitochondrial capacity.
- Further studies are needed to demonstrate if increased structured PA can improve mitochondrial oxidative capacity.

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