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## Mean Corpuscular Volume and Mortality in Patients with CKD

Yao-Peng Hsieh<sup>\*,†,‡,§</sup>, Chia-Chu Chang<sup>\*,§</sup>, Chew-Teng Kor<sup>\*</sup>,  
Yu Yang<sup>\*,§</sup>, Yao-Ko Wen<sup>\*</sup>, Ping-Fang Chiu<sup>\*,§</sup>

☐ Author Affiliations

### Correspondence:

Dr. Yao-Peng Hsieh, Division of Nephrology, Internal Medicine, Changhua Christian Hospital, 135 Nanxiao Street, Changhua City, 500 Taiwan, Republic of China. Email: 102407@cch.org.tw

### Abstract

**Background and objectives** Mean corpuscular volume is the measure of the average size of the circulatory erythrocyte, and it is principally used as an index for the differential diagnosis of anemia. Recently, mean corpuscular volume has been associated with mortality in many clinical settings. However, the association of mean corpuscular volume with mortality in patients with CKD has not been fully addressed.

**Design, setting, participants, & measurements** We conducted a retrospective observational cohort study of 1439 patients with stages 3–5 CKD and baseline mean corpuscular volume values from 2004 to 2012 in a medical center. The study cohort was divided into the high-mean corpuscular volume group and the low-mean corpuscular volume group by the median value (90.8 fl) of mean corpuscular volume. The baseline patient information included demographic data, laboratory parameters, medications, and comorbid conditions. The independent association of mean corpuscular volume with mortality was examined using multivariate Cox regression analysis.

**Results** Of the 1439 participants, 234 patients (16.2%) died during a median follow-up of 1.9 years (interquartile range, 1.1–3.8 years). The crude overall mortality rate was significantly higher in the high-mean corpuscular volume group (high-mean corpuscular volume group, 22.7%; low-mean corpuscular volume group, 9.7%;  $P<0.001$ ). In the fully adjusted models, the high-mean corpuscular volume group was associated with higher risks of all-cause mortality (hazard ratio, 2.19; 95% confidence interval, 1.62 to 2.96;  $P<0.001$ ), cardiovascular mortality (hazard ratio, 3.57; 95% confidence interval, 1.80 to 7.06;  $P<0.001$ ), and infection-related mortality (hazard ratio, 2.22; 95% confidence interval, 1.41 to 3.49;  $P=0.001$ ) compared with the low-mean corpuscular volume group.

**Conclusions** In patients with stages 3–5 CKD, mean corpuscular volume was associated with all-cause mortality, cardiovascular disease mortality, and infection-associated mortality, independent of other factors. The underlying pathophysiologic mechanisms warrant additional investigation.

cardiovascular disease chronic kidney disease  
mean corpuscular volume (MCV) mortality anemia Biomarkers  
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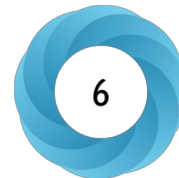
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