

Blood and Serum Copper and Zinc Levels and 10-Year Survival of Patients After Kidney Cancer Diagnosis

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Abstract

Background/Objectives: Copper (Cu) and zinc (Zn) are essential trace elements, and an imbalance in their levels may influence the progression of cancer. The role of Cu and Zn levels in blood and serum, as well as 10-year survival rates in kidney cancer patients, remains unclear. Our objective was to determine the association between these micronutrients and mortality of kidney cancer patients. In this prospective study, we examined 284 consecutive, unselected kidney cancer patients and assessed their 10-year survival in relation to Cu and Zn levels.

Methods: Micronutrient levels were measured using an inductively coupled plasma mass spectrometer. Each patient was categorized into one of four groups based on the distribution of Cu and Zn levels, ranked in increasing order. The multivariable models included factors such as age at diagnosis, gender, smoking history, type of surgery, and histopathological results.

Results: We observed a significantly higher risk of all-cause mortality in patients with the highest blood or serum copper levels compared to those with the lower levels (blood: HR = 4.89; $p < 0.001$; serum: HR = 3.75; $p < 0.001$). With regard to zinc, we found a trend where lower blood or serum zinc levels (I quartile) were associated with higher mortality. Additionally, we identified a significant correlation between the Zn/Cu ratio and mortality.

Conclusions: Patients in the lowest Zn/Cu ratio quartile had elevated hazard ratios compared to those in the higher quartile with HRs of 3.05 ($p < 0.002$) in blood and 5.72 ($p < 0.001$) in serum. To our knowledge, this study is the first to investigate the relationship between blood and serum levels of copper and zinc and kidney cancer survival.

Keywords: copper; kidney cancer; survival; zinc.