

Zinc-to-copper ratio in blood and colorectal cancer occurrence

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Abstract:

Colorectal cancer is a major global public health concern, identified as the third among all malignant tumors in terms of worldwide incidence. The rising frequencies observed in recent decades have been attributed to environmental factors, lifestyle behaviors, dietary patterns, smoking, and inherited genetic susceptibility. In the context of increasing scientific interest in the role of trace elements in cancer development, attention has turned to evaluating the levels of Zn, Cu and Zn/Cu ratio as potential biomarkers for colorectal occurrence and progression. Understanding the molecular and biological mechanisms influenced by these trace elements may contribute to the development of more effective strategies for the prevention and diagnosis of this malignancy.

The present case-control study involved 187 patients diagnosed with colorectal cancer and 187 healthy matched controls. Blood levels of Zn and Cu were measured using inductively coupled plasma mass spectrometry, and the Zn/Cu ratio was calculated. Obtained values were recategorized into categorical variables, with individual ranges defined based on the quartile distribution observed among healthy controls. In order to determine the association between colorectal cancer occurrence and the Zn/Cu ratio expressed in quarters, univariable conditional logistic regression models were applied. All statistical analyses and data management procedures were conducted in the R statistical computing environment using code specifically developed for this study.

It was observed that the lowest values of the Zn/Cu ratio were significantly associated with more than a 16-fold increased colorectal cancer occurrence (OR=16.19; 95%CI: 6.02-43.54; $p<0.001$). These findings suggest that the Zn/Cu ratio in blood can be considered as potential biomarker for this malignancy occurrence.