**TRACE MINERAL ABSORPTION: EVIDENCE OF NEW PATHWAYS**

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**Abstract:**

Historically, divalent transition metals have been shown to use specific transporter proteins for absorption on the epithelial surface. For example, Zn uses primarily ZIP4 transporter in the intestinal lumen, while Cu uses Ctr1, and Mn and Fe use DMT1. Other transport proteins have been characterized for different tissues, for export and import (e.g. ZIP1-14 and ZnT1-10). Recent methods have allowed for the elucidation of other transport methods or routes. Research has shown that divalent trace minerals (specifically Cu and Zn) may be absorbed by other mechanisms than inorganic transporters. For example, research conducted using brush-border membrane vesicles showed Zn amino acid complex mediated pathways may be used. Research also showed that Cu amino acid complexes may be transportable via specific amino acid transporters. Further research demonstrated the presence of uptake pathways for Zn that included amino acid-mediated mechanisms. More recent mechanistic research showed enhanced absorption of Cu as Cu amino acid complexes. This research also demonstrated that carboplatin, the Ctr1 transporter inhibitor, did not affect the absorption of Cu as Cu methionine complex, suggesting that Ctr1 is not the primary mechanism of Cu absorption from Cu amino acid complexes. Further, recent research using Caco-2 cells and enterocytes differentiated from human pluripotent stem cells from control and Acrodermatitis enteropathica patients show that Zn amino acid complexes are taken up by AA transporters. These mechanistic studies are supported by numerous in vivo performance studies in multiple species demonstrating the benefits of quality trace mineral amino acid complexes for livestock, poultry, and aquaculture.

Key Words: trace mineral absorption