

Understanding Kwashiorkor Better: New Clues from Advanced Biological Research

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Background

Edematous malnutrition, also termed kwashiorkor, is a phenotype of severe acute malnutrition characterized by bilateral edema, fatty liver, and skin and hair changes. Despite its high mortality, the etiology and pathophysiology of kwashiorkor remain poorly understood.

Methods

In this study, we employed plasma lipidomics, metabolomics, and proteomics with urine metabolomics and gut microbiome profiling to delineate molecular pathways specific to kwashiorkor in children aged 6–59 months from Niger compared to those with marasmus and non-malnourished children matched by age, sex, and clinical triage score. Features were defined as kwashiorkor-specific if they also correlated with edema severity and normalized following nutritional rehabilitation.

Results

Our analyses revealed that kwashiorkor is marked by increased extracellular matrix (ECM) degradation, evidenced by elevated plasma ECM proteins, and by disrupted sphingolipid homeostasis, evidenced by reduced plasma cholesterol- and sphingolipid-related lipids. Neither plasma nor urine metabolomic profiles, nor gut microbiome signatures, showed unique alterations associated with kwashiorkor.

Conclusion

These findings suggest that kwashiorkor may be a combination of malnutrition and an inflammatory syndrome leading to the disruption of the extracellular matrix and sphingolipid metabolism, with possible implications for capillary permeability and for the function of the lymphatic system.

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