



# Age-Specific Reference Intervals for Plasma Amino Acids and Their Associations with Nutrient Intake in the Chinese Pediatric Population

Yang Wen<sup>1#</sup>, Qing Liu<sup>2#</sup>, Hongbo Zeng<sup>1</sup>, Lina Lyu<sup>3</sup>, Xuezhen He<sup>4</sup>, Xin Zhang<sup>3</sup>,  
Wentao Lyu<sup>1\*</sup>, Weijun Chen<sup>3\*</sup>, Yingping Xiao<sup>1\*</sup>

<sup>1</sup>Zhejiang Academy of Agricultural Sciences, China

<sup>2</sup>Zhejiang University of Technology, China

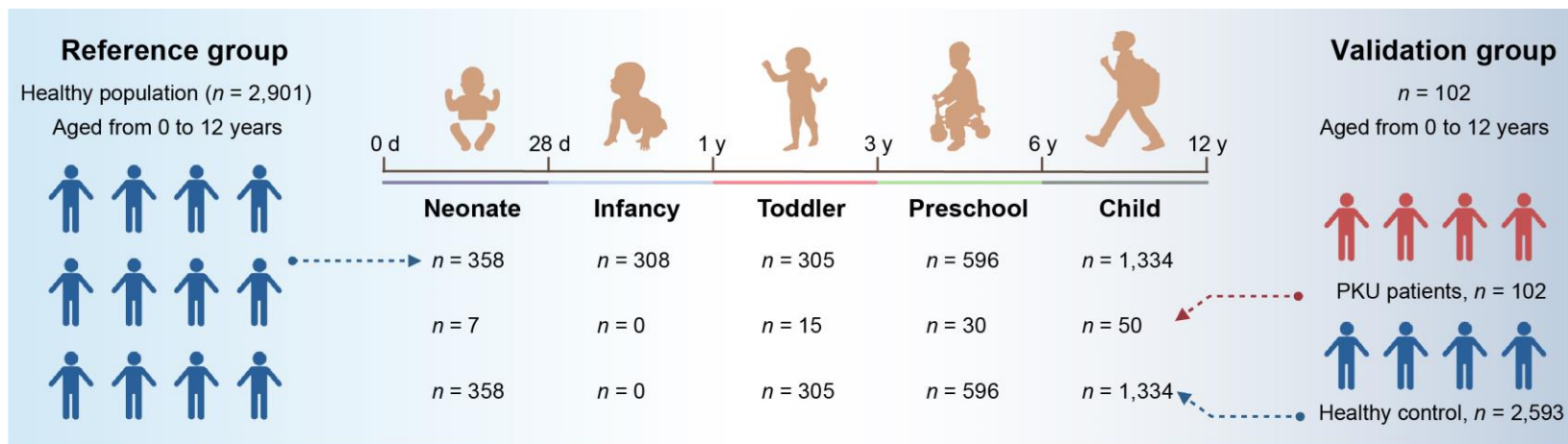
<sup>3</sup>Children's Hospital, Zhejiang University School of Medicine, China

<sup>4</sup>Children's Health Center, Beiyuan community service center, China

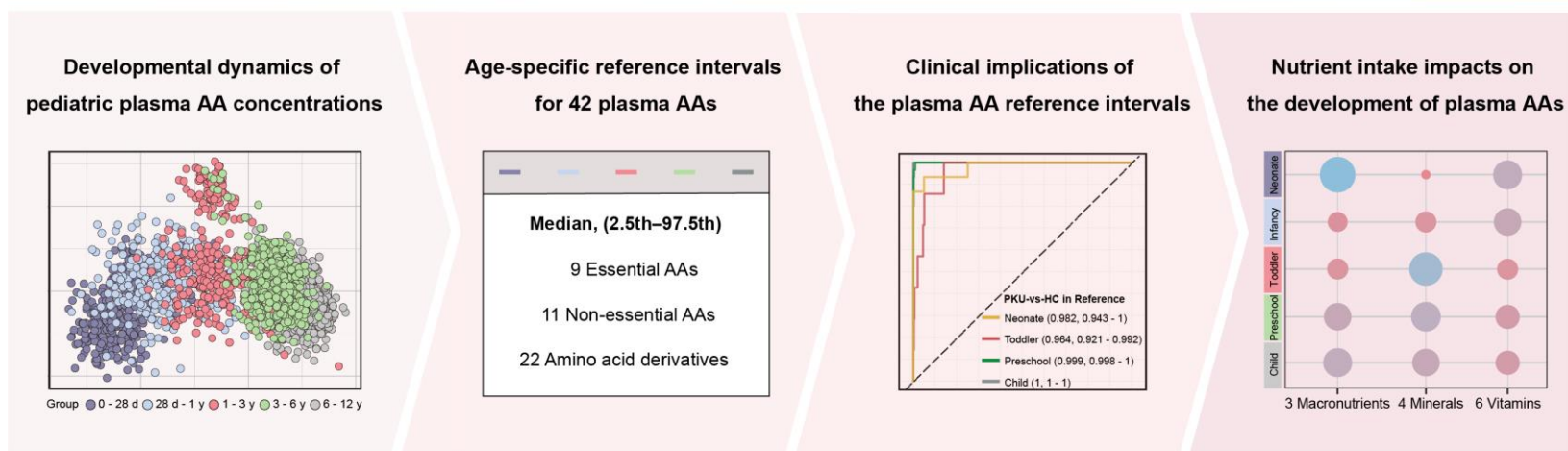


Wen, Yang, Qing Liu, Hongbo Zeng, Lina Lyu, Xuezhen He, Xin Zhang, Wentao Lyu, Weijun Chen, and Yingping Xiao. 2025. Age-Specific Reference Intervals for Plasma Amino Acids and Their Associations with Nutrient Intake in the Chinese Pediatric Population. *iMeta* 4: e70051. <https://doi.org/10.1002/imt2.70051>

# Introduction and Highlights

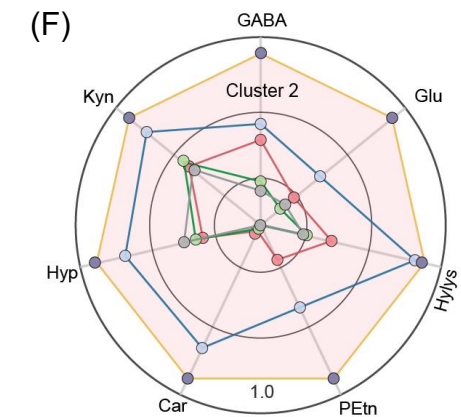
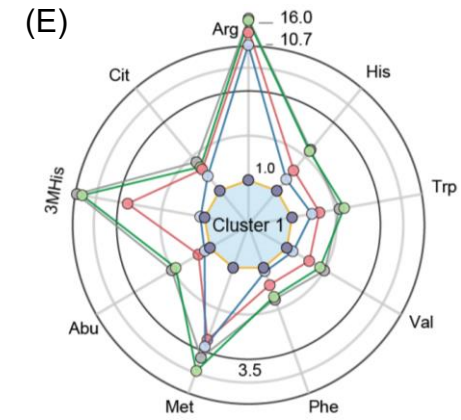
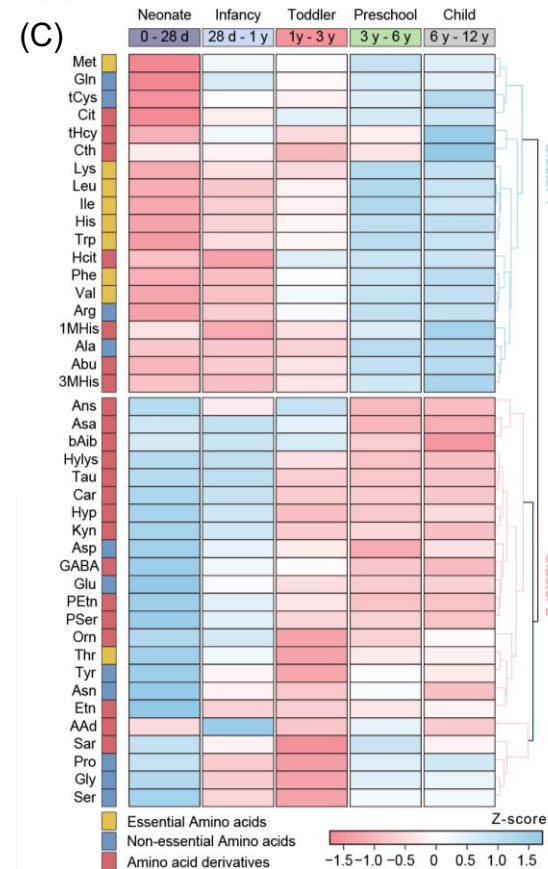
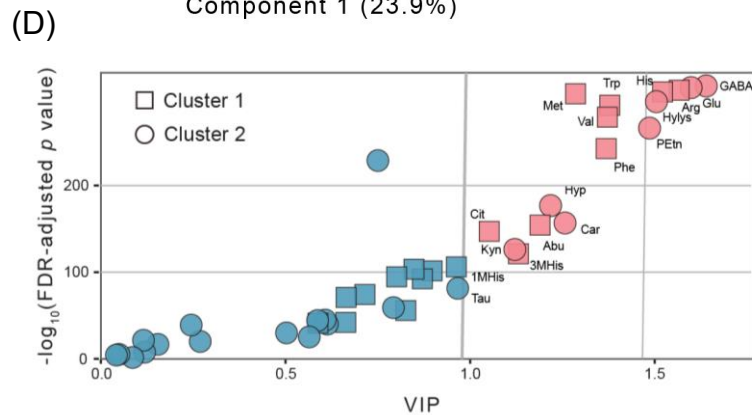
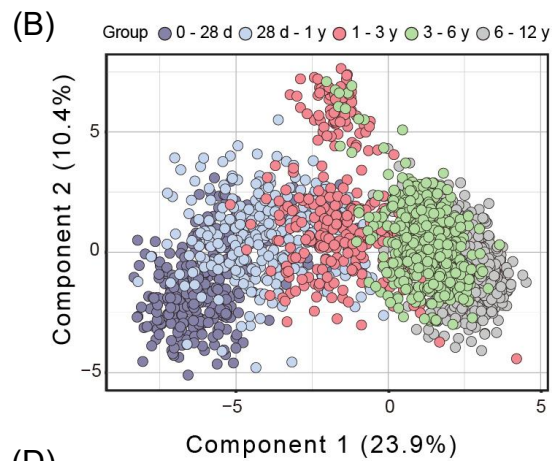


- A total of 2,901 healthy Chinese children aged 0–12 years were enrolled in the reference group; 102 confirmed Phenylketonuria cases were included as validation individuals.
- Establishing the age-specific reference intervals of 42 plasma amino acids (AAs) in Chinese pediatric populations.
- Profiling dynamic interactions between multiple nutrient intake and amino acid change patterns.



# Age-specific reference intervals for plasma AAs of the pediatric population aged 0–12 years

- 42 AAs showed a biphasic pattern: Cluster 1, rich in essential AAs; 2, rich in non-essential AAs and derivatives
- Based on a reference dataset of plasma AAs from 2,901 healthy Chinese children aged 0-12 years, the age-specific reference ranges for the corresponding amino acids were established

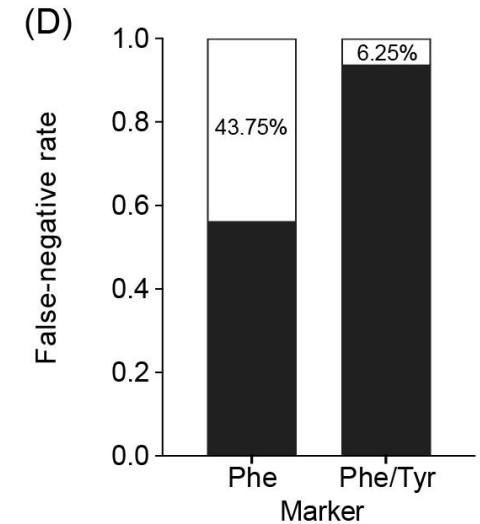
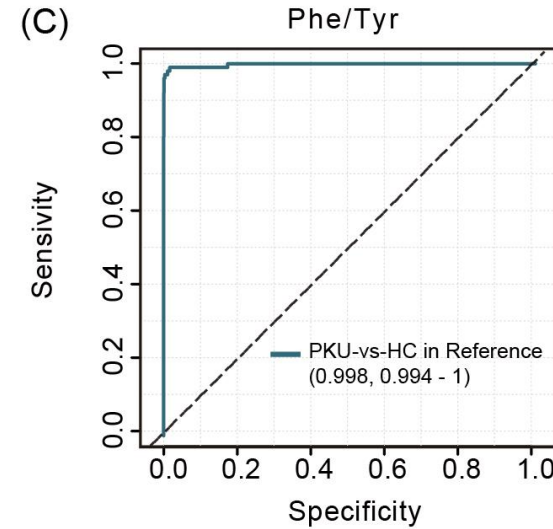
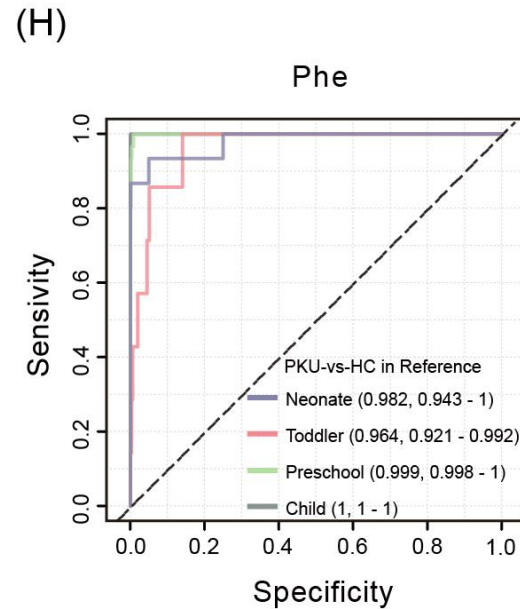
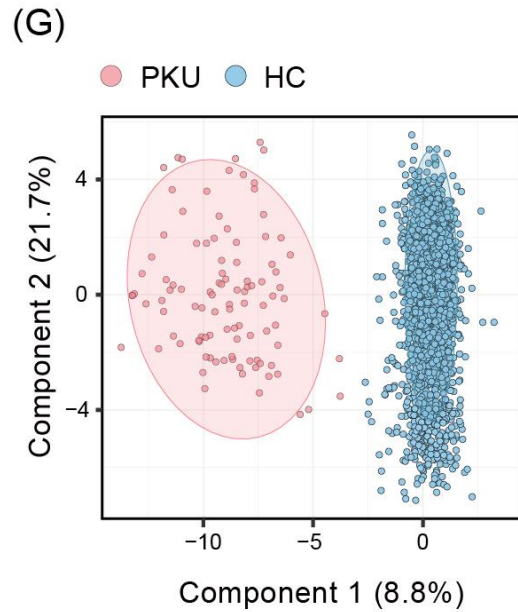


Profiles of age-specific changes in 42 plasma amino acid concentrations across 0 to 12 years.



# The clinical implications of the established plasma AA reference intervals

- Using patients with phenylketonuria (PKU) as an example, the established reference interval of plasma AAs was simulated for clinical application to validate its applicability for clinical diagnosis
- Combined phenylalanine/tyrosine target screening reduces the false-negative rate in borderline PKU patients

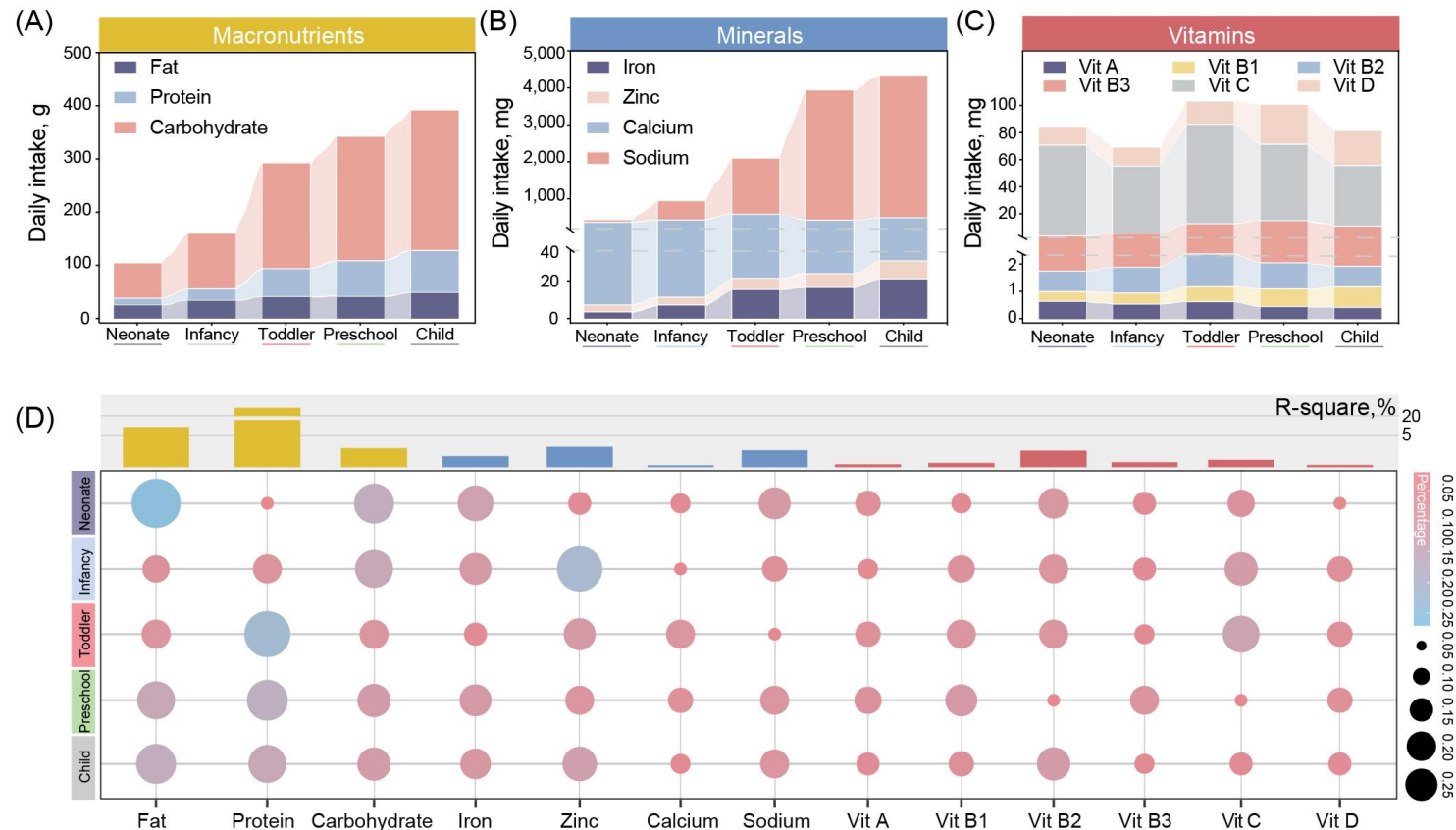


Clinical validation of the established plasma AA reference intervals.



# Nutrient intake impacts on the development of plasma AAs

- **Macronutrients and micronutrients exhibited distinct age-dependent intake trajectories in children aged 0–12 years**
- **Fat, carbohydrates and zinc dominate the change of plasma AAs at 0-1 years**
- **Protein becomes the main driver after 2 years old**

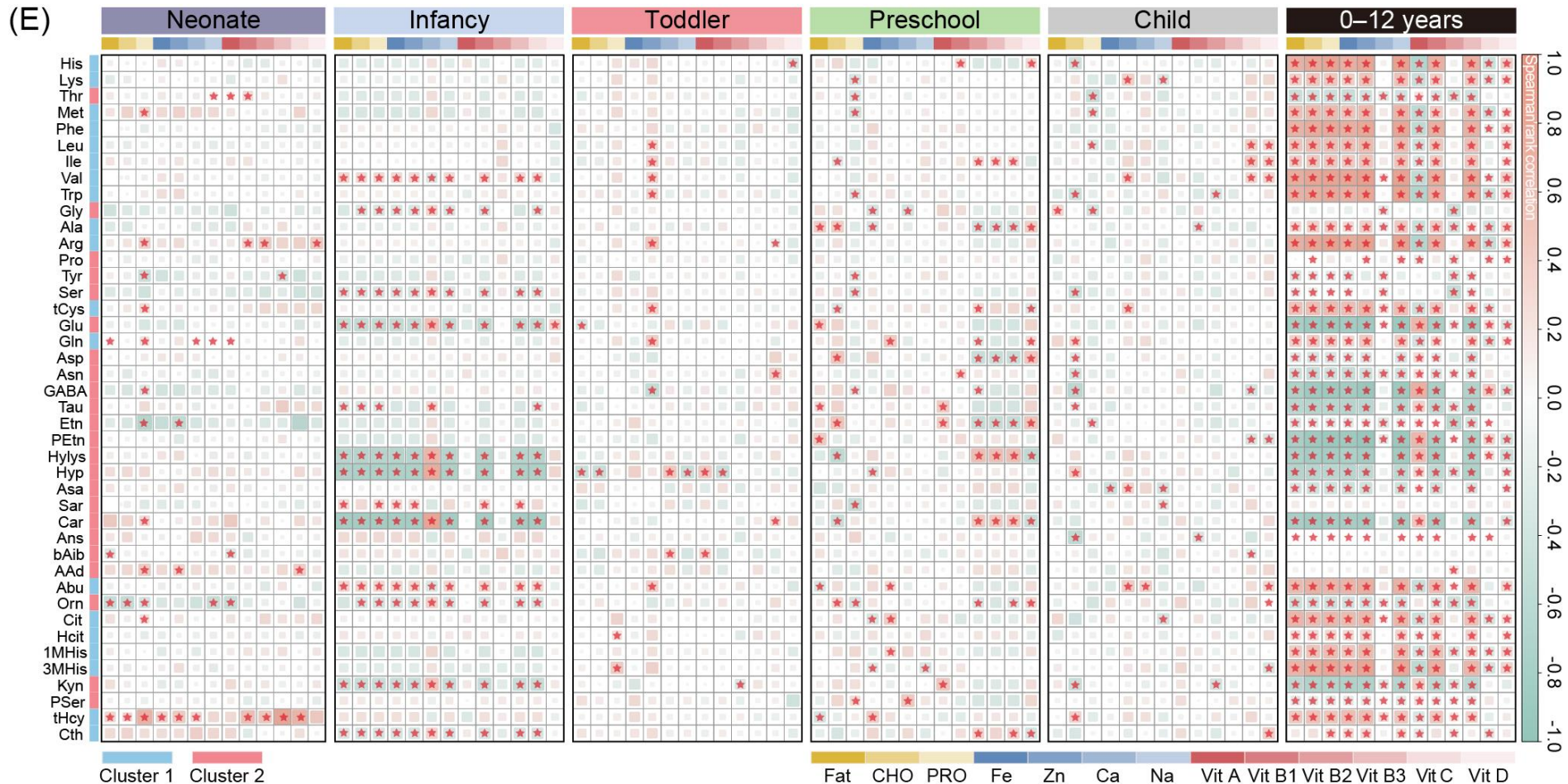


Nutrient intake impacts on the development of plasma AAs.



# Correlation of nutrient intake and changes in plasma AAs

- Multiple nutrient intakes are commonly associated with the plasma AA profiles in children
- Multiple regression models further showed the contributions of specific nutrients to plasma amino acid variations



Correlation of the nutrient intake and age-specific change patterns of plasma AAs in the pediatric population.

# Summary

- ❑ In summary, this study examined the developmental pattern of plasma AAs in Chinese children and established a more comprehensive reference interval of 42 plasma AAs for Chinese children aged 0-12 years;
- ❑ We investigated the dynamic variation characteristics between nutrient intake and plasma AA changes, and quantified the contribution of nutrient intake to plasma AAs development at specific ages;
- ❑ The findings provide a baseline for understanding the metabolic requirements of AAs in children's growth and development, early identification of disease risks, and formulation of nutritional intervention strategies.





“**iMeta**” launched by iMeta Science Society in 2022, **impact factor (IF) 23.8**, ranking top 107/21973 in world and 2/161 in the **microbiology**. It aims to publish innovative and high-quality papers with broad and diverse audiences. **Its scope is similar to Cell, Nature, Science, Nature Biotechnology/Methods/Microbiology/Medicine/Food**. Its unique features include video abstract, bilingual publication, and social media with 600,000 followers. Indexed by **SCIE/ESI, PubMed, Google Scholar** etc.

“**iMetaOmics**” launched in 2024, with a **target IF>10**, and its scope is similar to **Nature Communications, Cell Reports, Microbiome, ISME J, Nucleic Acids Research, Briefings in Bioinformatics**, etc.

“**iMetaMed**” launched in 2025, with a **target IF>15**, similar to **Med, Cell Reports Medicine, eBioMedicine, eClinicalMedicine** etc.



Society: <http://www.imeta.science>

Publisher: <https://wileyonlinelibrary.com/journal/imeta>

iMeta: <https://wiley.atyponrex.com/journal/IMT2>

Submission: iMetaOmics: <https://wiley.atyponrex.com/journal/IMO2>

iMetaMed: <https://wiley.atyponrex.com/journal/IMM3>



[iMetaScience](#)



[iMetaScience](#)



[office@imeta.science](mailto:office@imeta.science)  
[imetaomics@imeta.science](mailto:imetaomics@imeta.science)



[Promotion Video](#)

Update  
2025/5/21