# Fistinctive metabolic disturbances associated with redox homeostasis, nervous and hormonal functions during gut microbial enrichment upon polystyrene microplastic exposure

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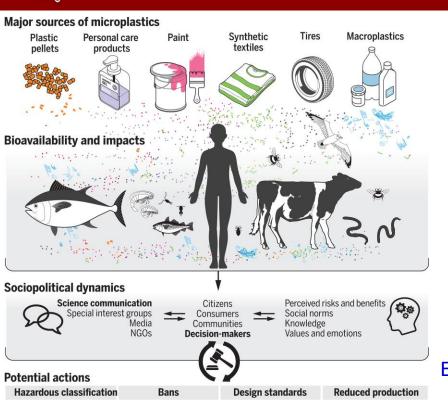
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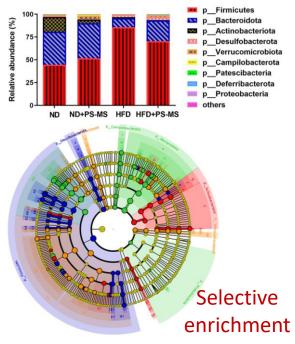


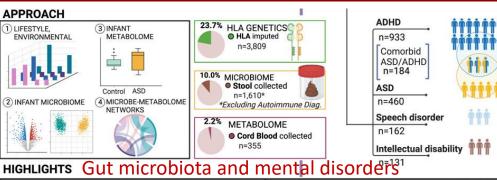
Guozhu Ye, Zeming Wu, Guoyou Chen, Xuyi Liu, Yifang Duan, Minghui Li, Qiansheng Huang. 2025. Distinctive metabolic disturbances associated with redox homeostasis, nervous and hormonal functions during gut microbial enrichment upon polystyrene microplastic exposure. *iMetaOmics* 2: e70043. <a href="https://doi.org/10.1002/imo2.70043">https://doi.org/10.1002/imo2.70043</a>

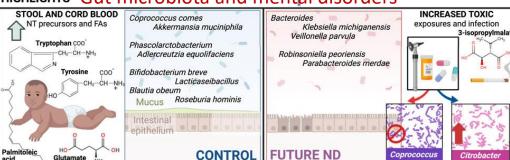


#### Introduction







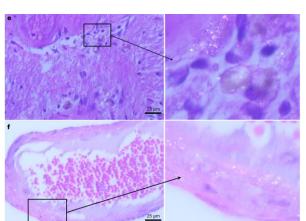


Environ. Health Persp., 2024 132: 97002.

Cell, 2024, 187(8): 1853-1873.e15

#### Widely present

Science, 2024, 386: eadl2746



Microplastics in the brain 7 to 30 times higher than in the kidneys and liver

Nat. Med., 2025, 31: 1114-1119

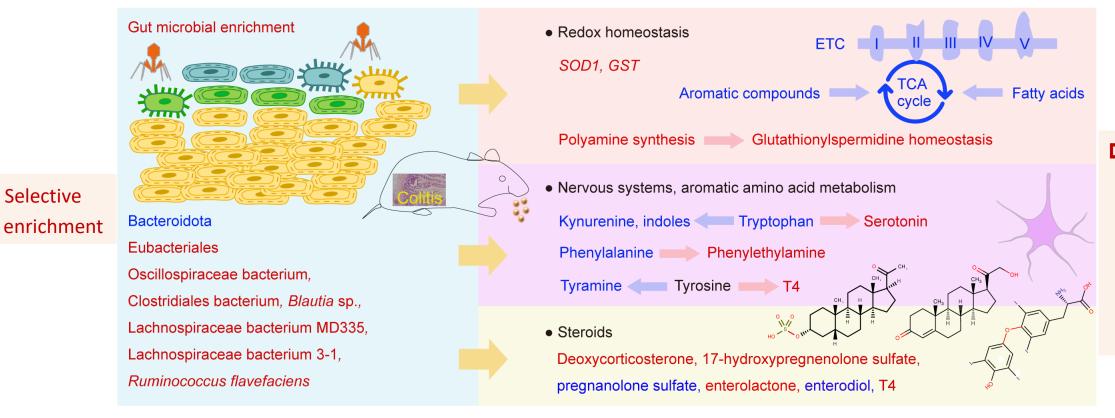
- Widespread in the environment and human
- ☐ Inducing selective enrichment and dysfunctions of gut microbiota.
- Gut microbiota mediates human health and disease
- Mechanisms underlying the selective enrichment and dysfunctions unclear .
  - Distinctive species enrichment at the species/strain level, metabolic signatures and underlying molecular driving mechanisms
  - Metabolic factors mediating gut microbiota-host interactions



■ Selective

## **Highlights**

☐ Increases in polyamine synthesis to maintain glutathionylspermidine homeostasis, and decreases in pathways related to energy and reactive oxygen species production.

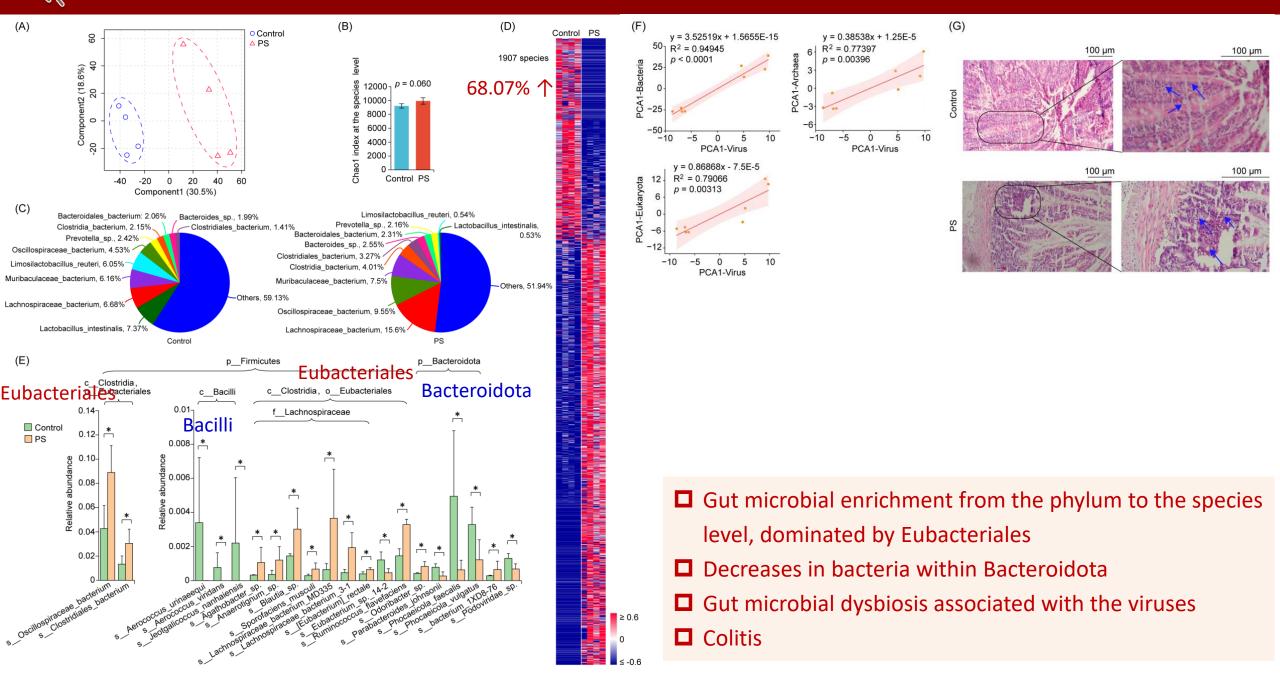


Disturbed aromatic amino acidneurotran smitter pathways

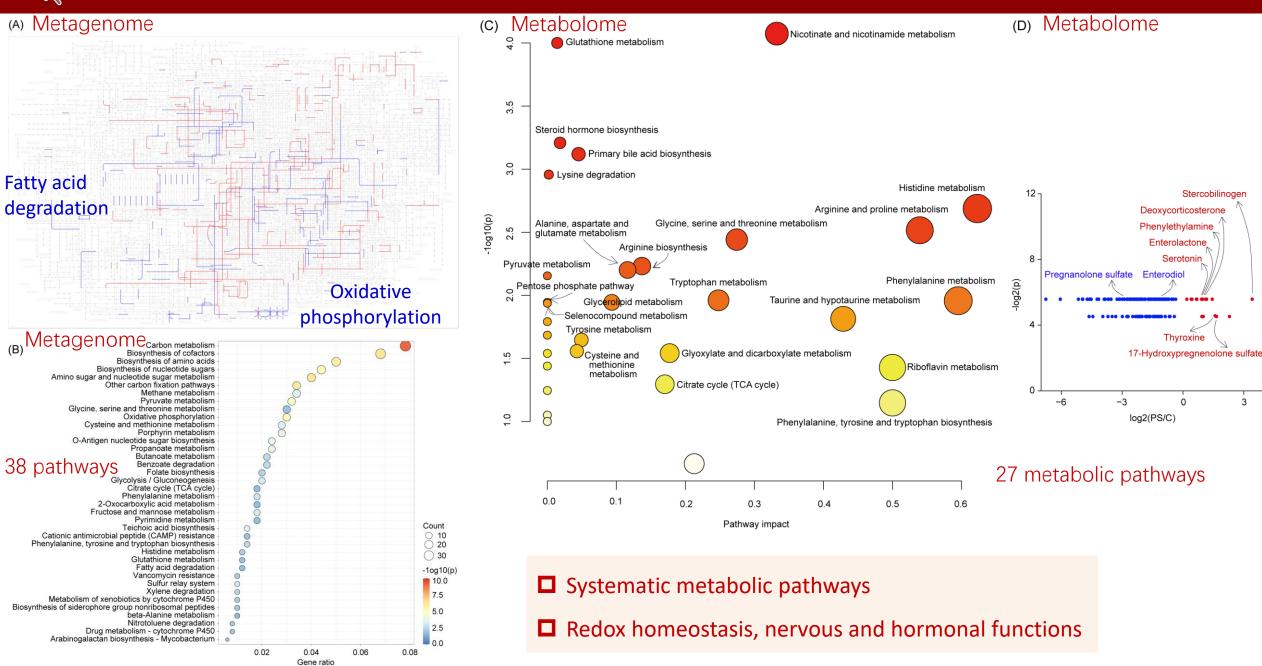
■ Key contributors to metabolic dysfunctions

Increases in enterolactone synthesis and cholesterol-derived hormone synthesis

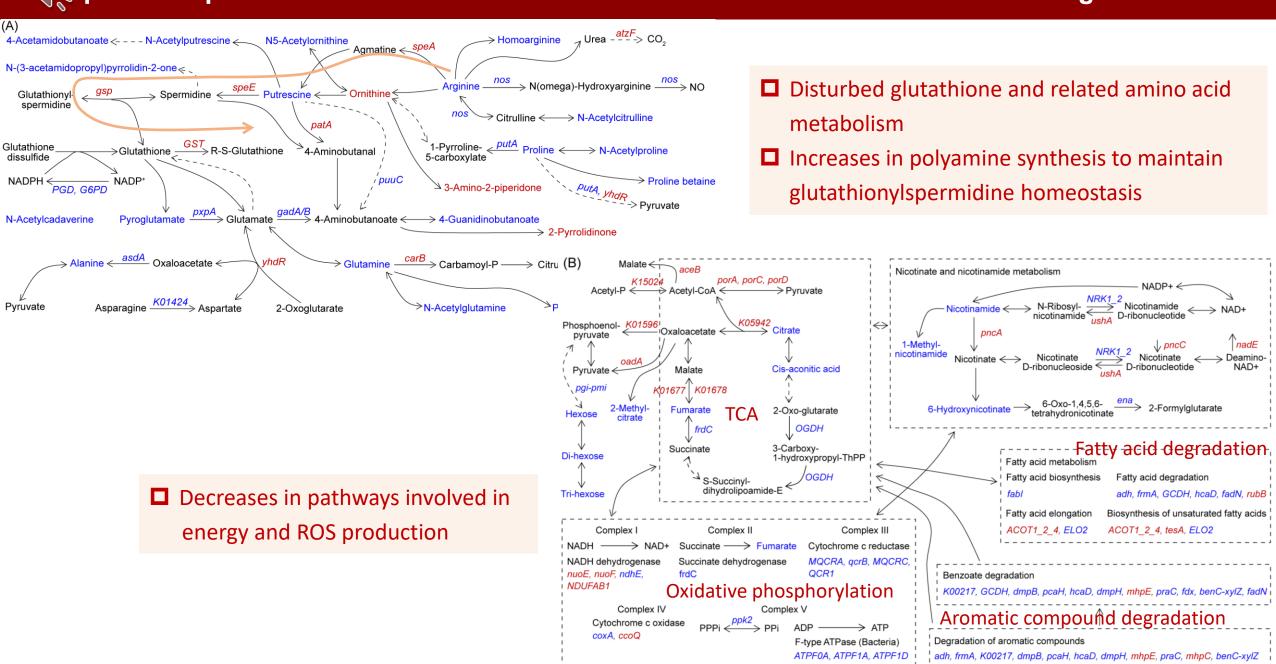
#### Microplastic exposure induces gut microbial enrichment from the phylum to the species level



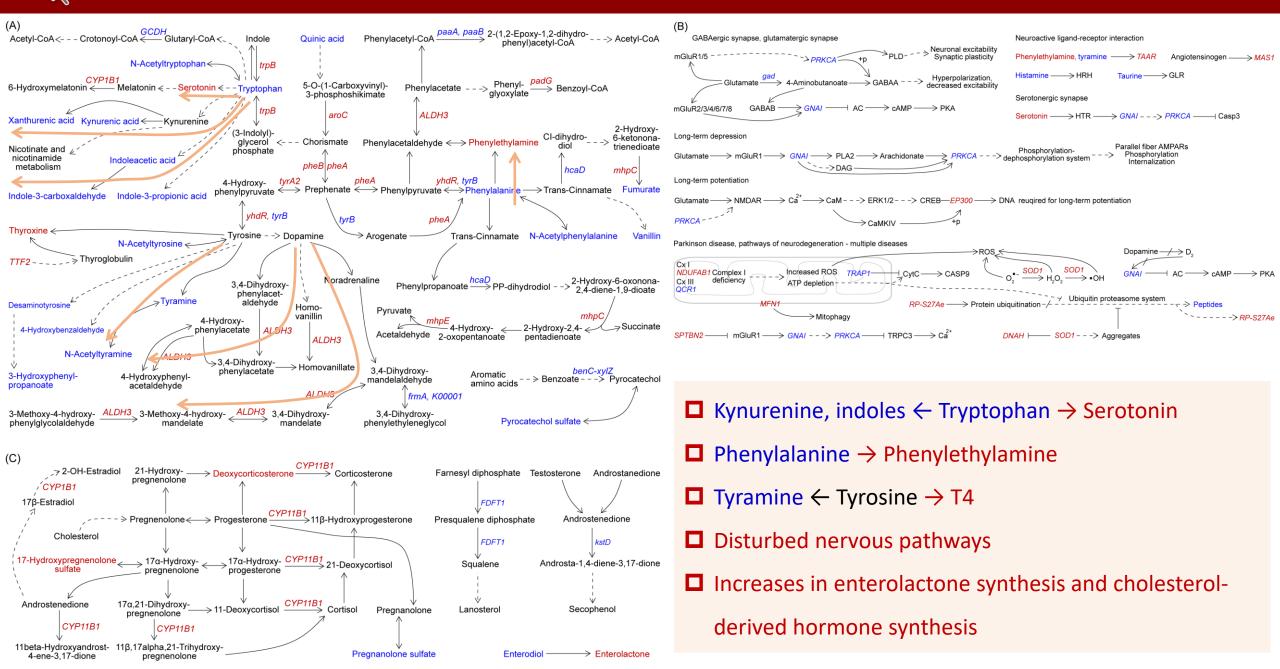
#### Troplastic exposure induces systemic metabolic disorders related to gut microbial enrichment



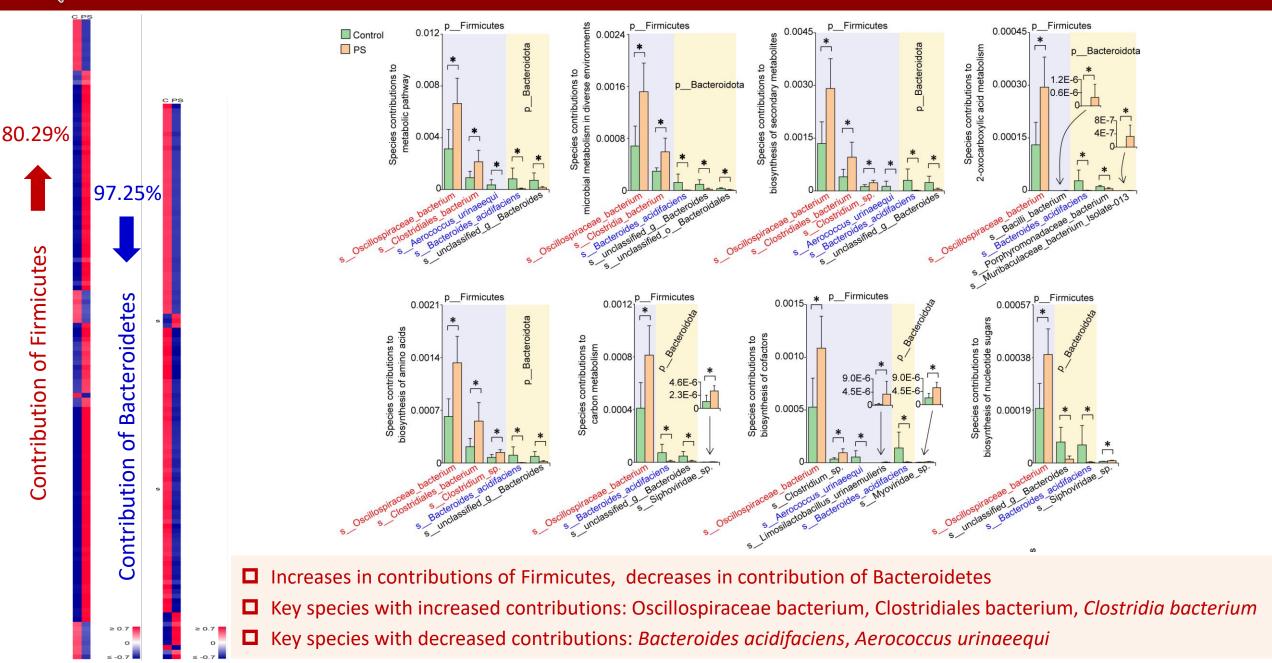
#### Missiplastic exposure induces metabolic disorders related to redox homeostasis in gut microbiota



#### Microplastic exposure induces metabolic disorders related to nervous and hormonal dysfunctions

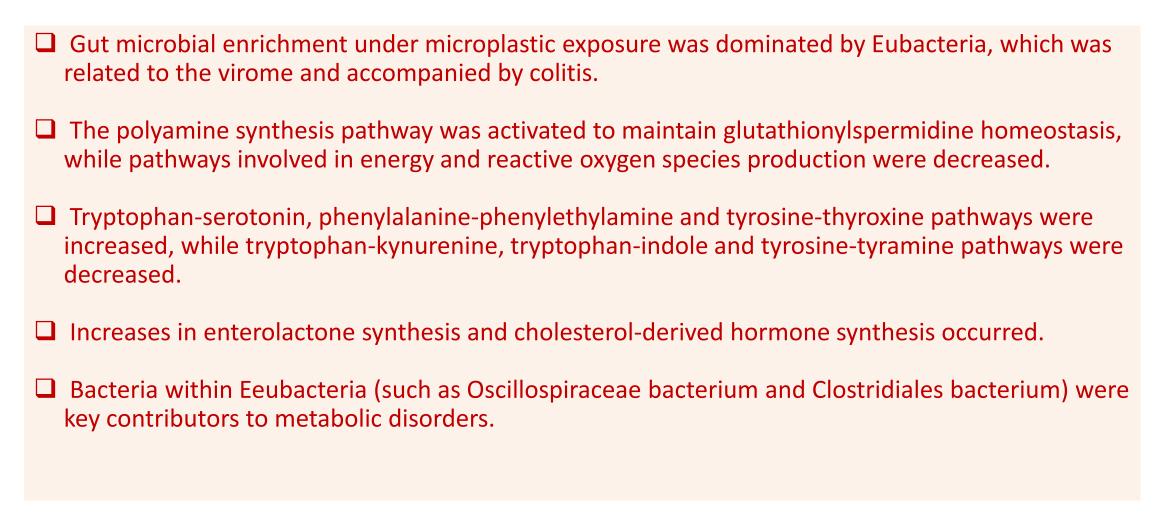


### Ey contributing species to metabolic disorders related to gut microbial enrichment





## **Summary**



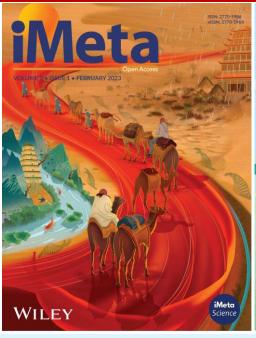
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