



# Multi-omics identifies microbiota-derived deoxycholic acid as a key mediator of blood-brain barrier dysfunction in Parkinson's disease

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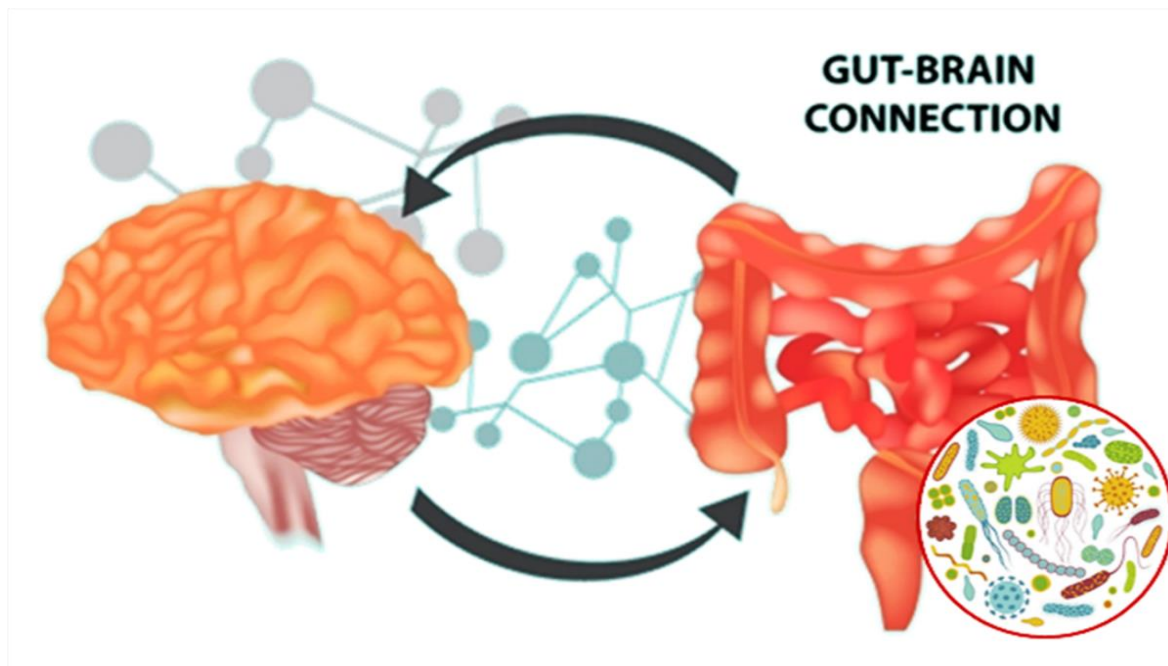


Zhe Zhao, Jing Chen, Yixuan Liu, Shiqi Wang, Danhua Zhao, Chaobo Bai, Meifang Wu, et al. 2025. Multi-omics identifies microbiota-derived deoxycholic acid as a key mediator of blood-brain barrier dysfunction in Parkinson's disease. *iMeta* 4: e70076. <https://doi.org/10.1002/imt2.70076>.

# Background



PD initiates from gut: microbiota-gut-brain axis

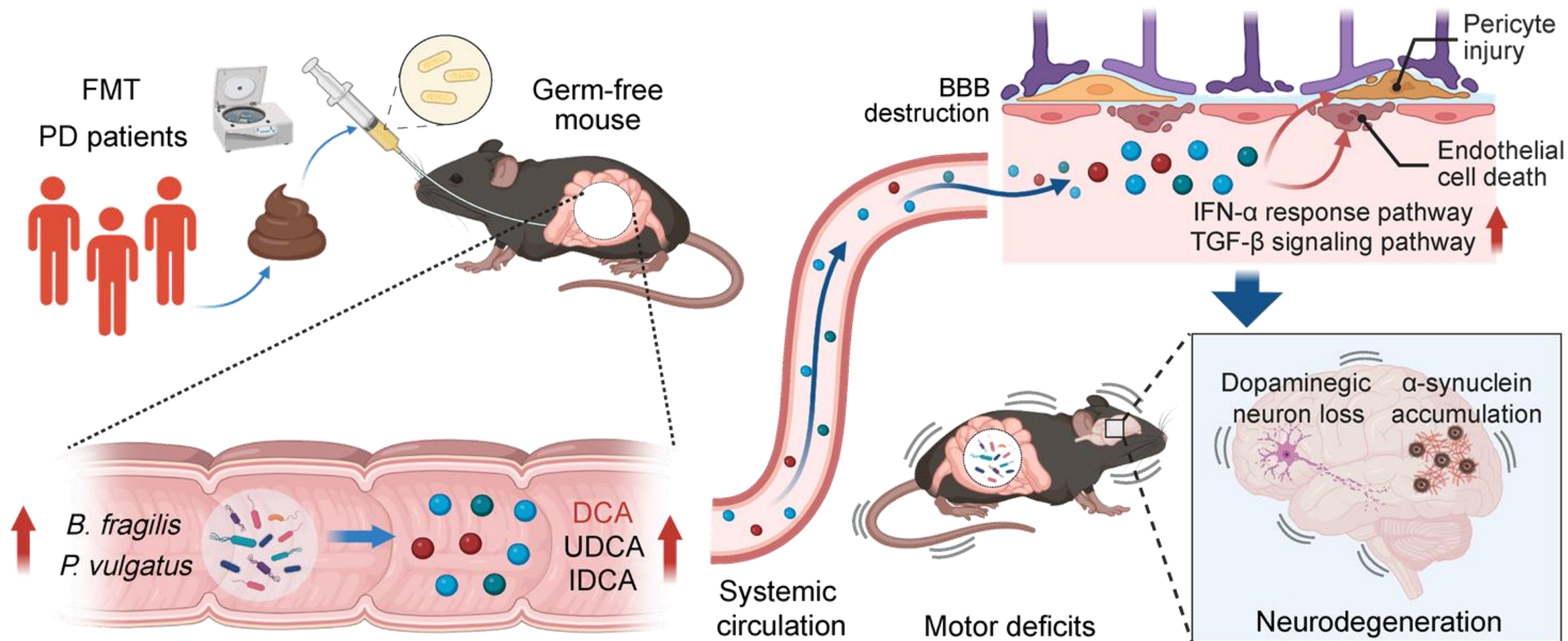


Family	Patients	Controls
Prevotellaceae	$2.70 \pm 0.32$	$12.06 \pm 3.73$
Lactobacillaceae	$0.44 \pm 0.04$	$0.02 \pm 0.00$
Verrucomicrobiaceae	$0.06 \pm 0.00$	$0.02 \pm 0.00$
Bradyrhizobiaceae	$0.16 \pm 0.00$	$0.03 \pm 0.00$
Clostridiales Incertae Sedis IV	$2.49 \pm 0.30$	$1.01 \pm 0.03$
Ruminococcaceae	$33.63 \pm 1.99$	$28.54 \pm 1.81$

# Background



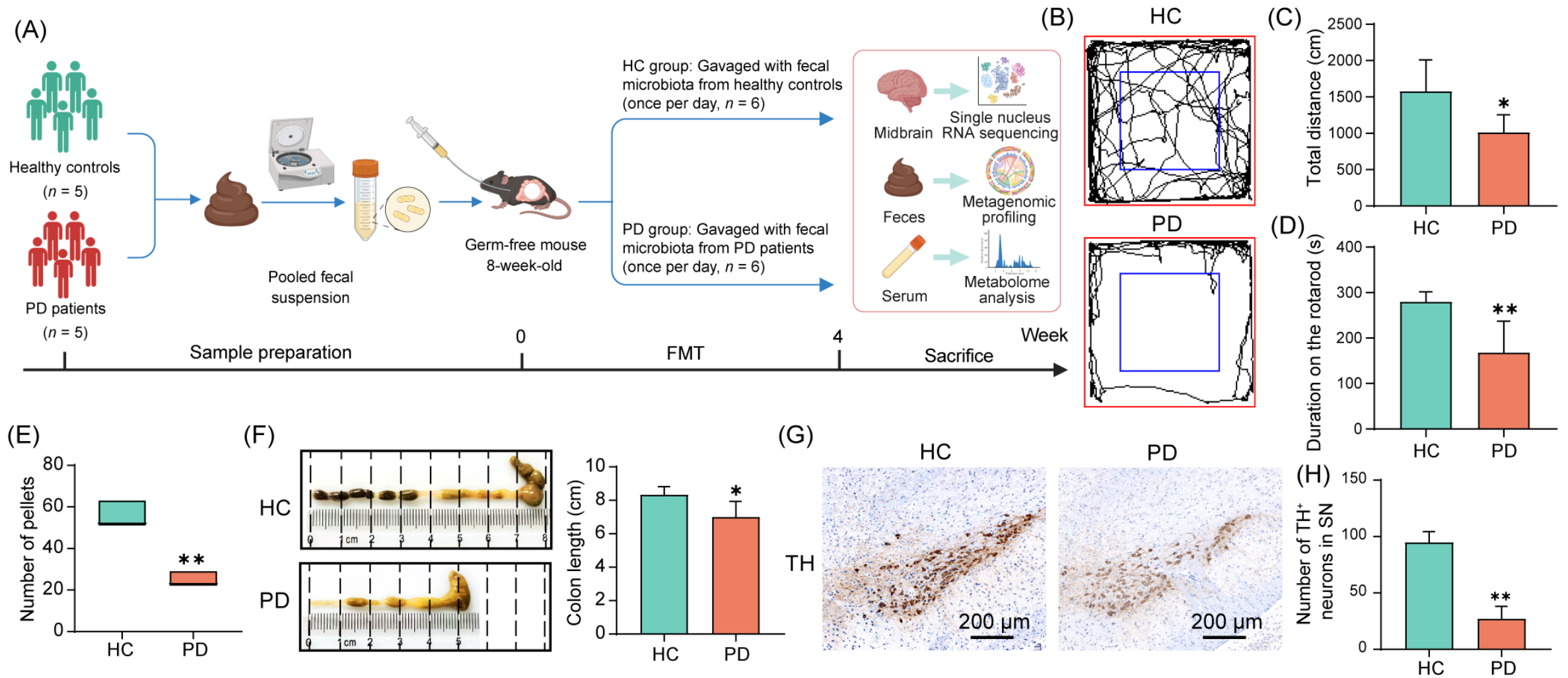
## Study purpose





# Results

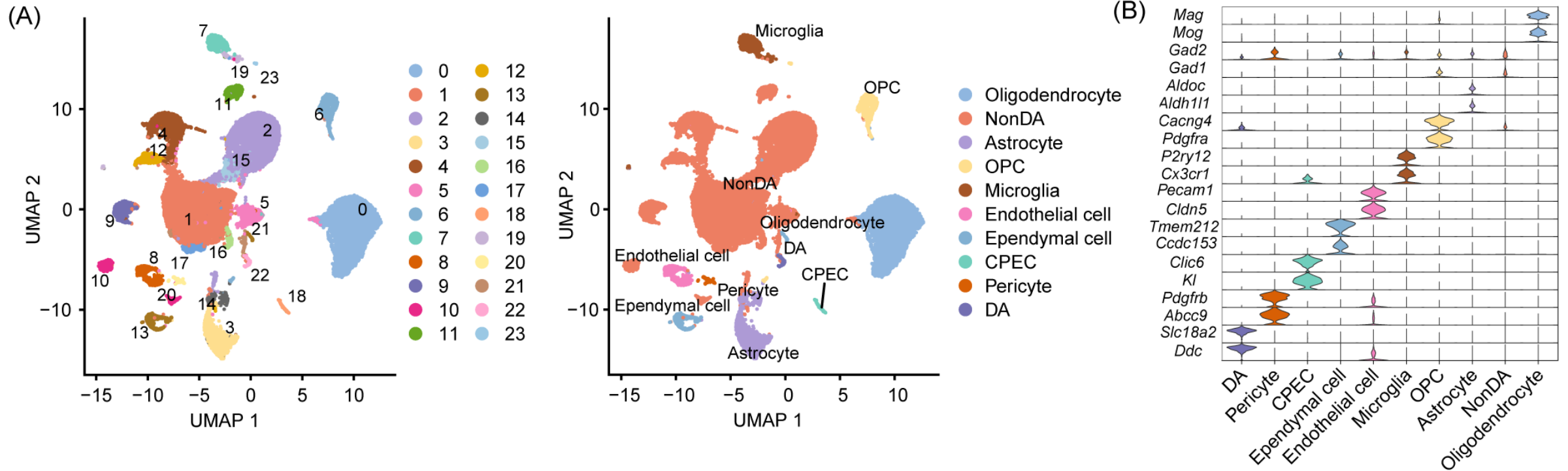
## Gut microbiota transplantation from PD patients promotes PD phenotypes in the GF mice





# Results

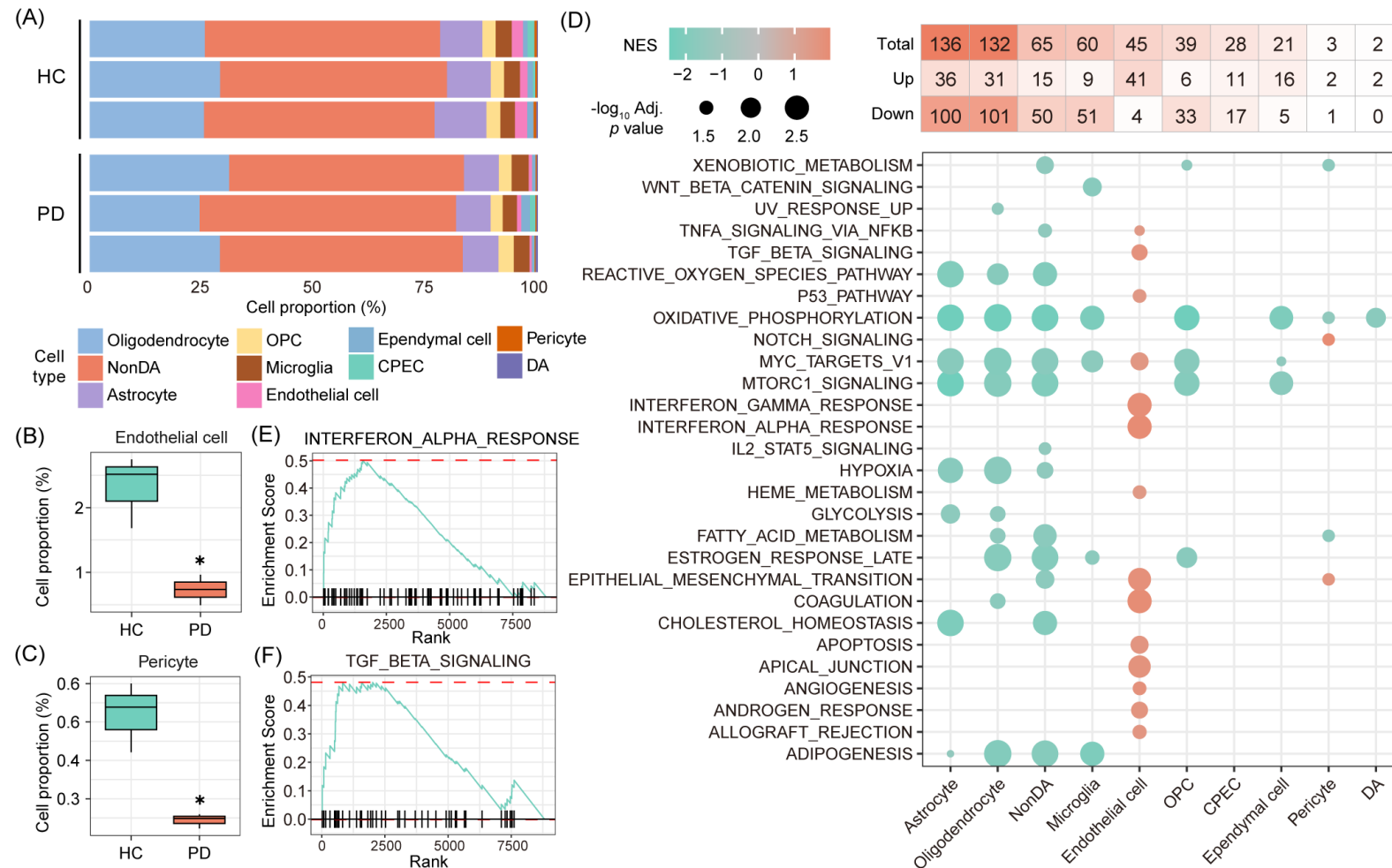
## Gut microbiota transplantation from PD patients remodels midbrain single-cell transcriptomes





# Results

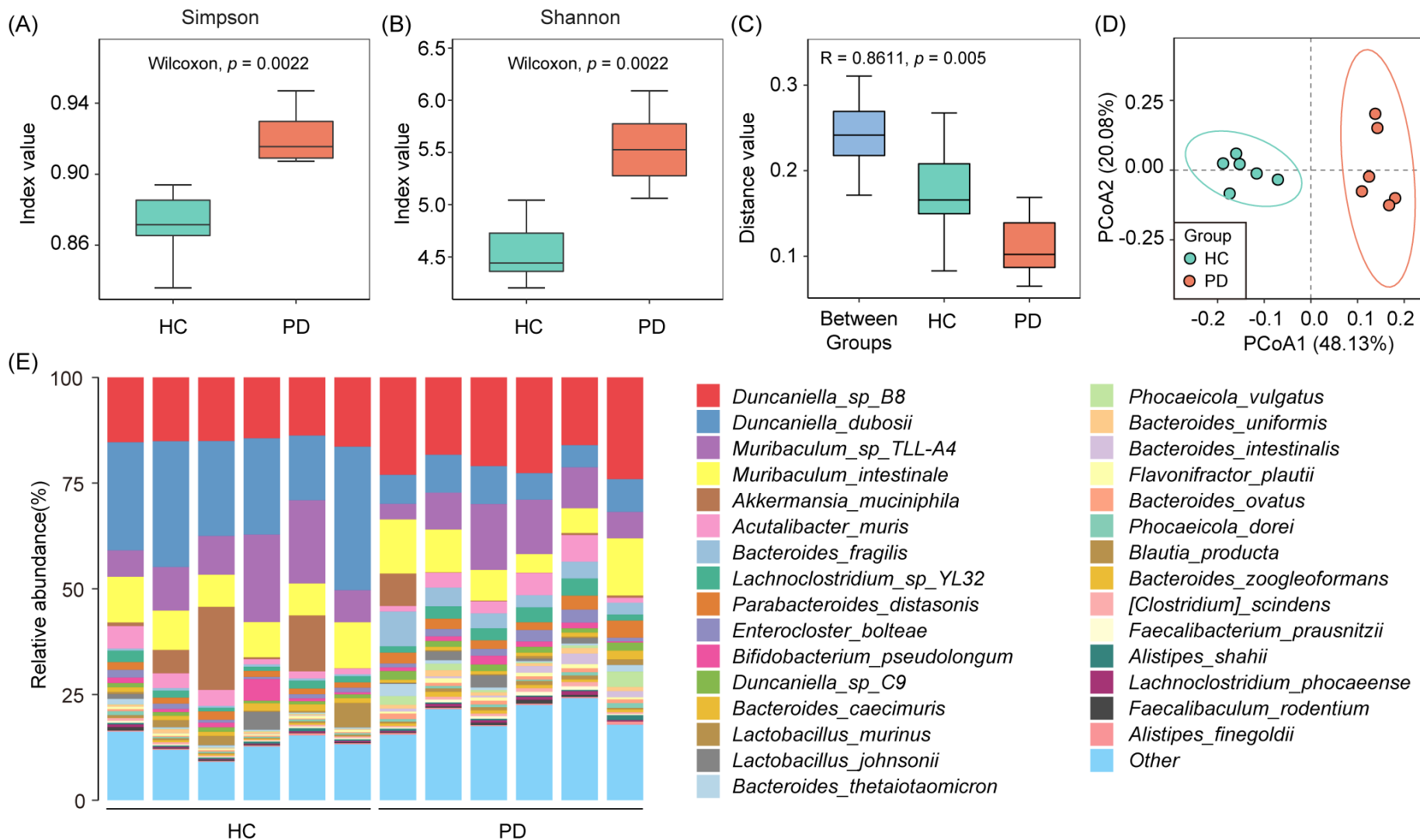
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# Results

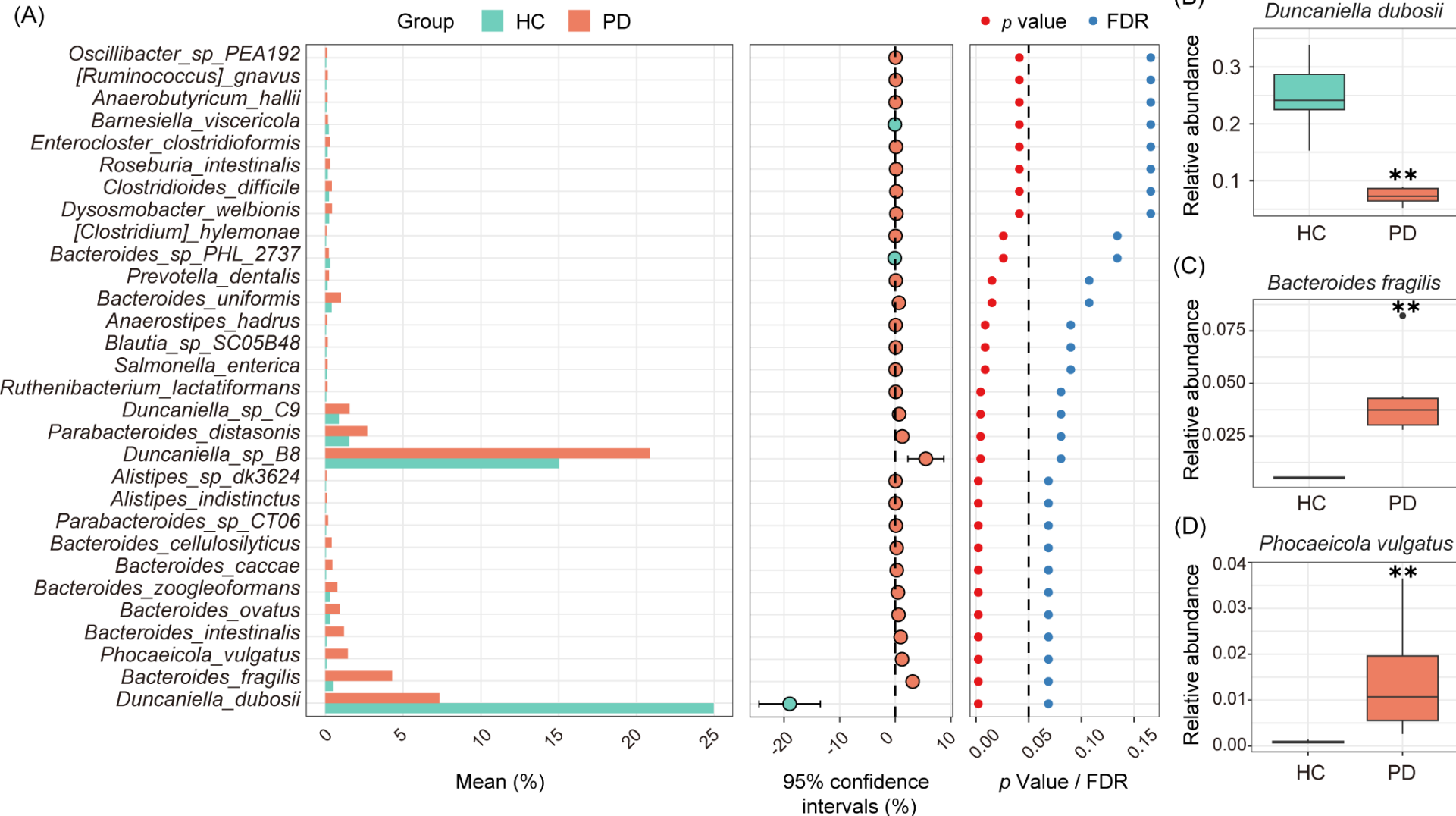
## Gut microbiota transplantation from PD patients alters gut microbiota community





# Results

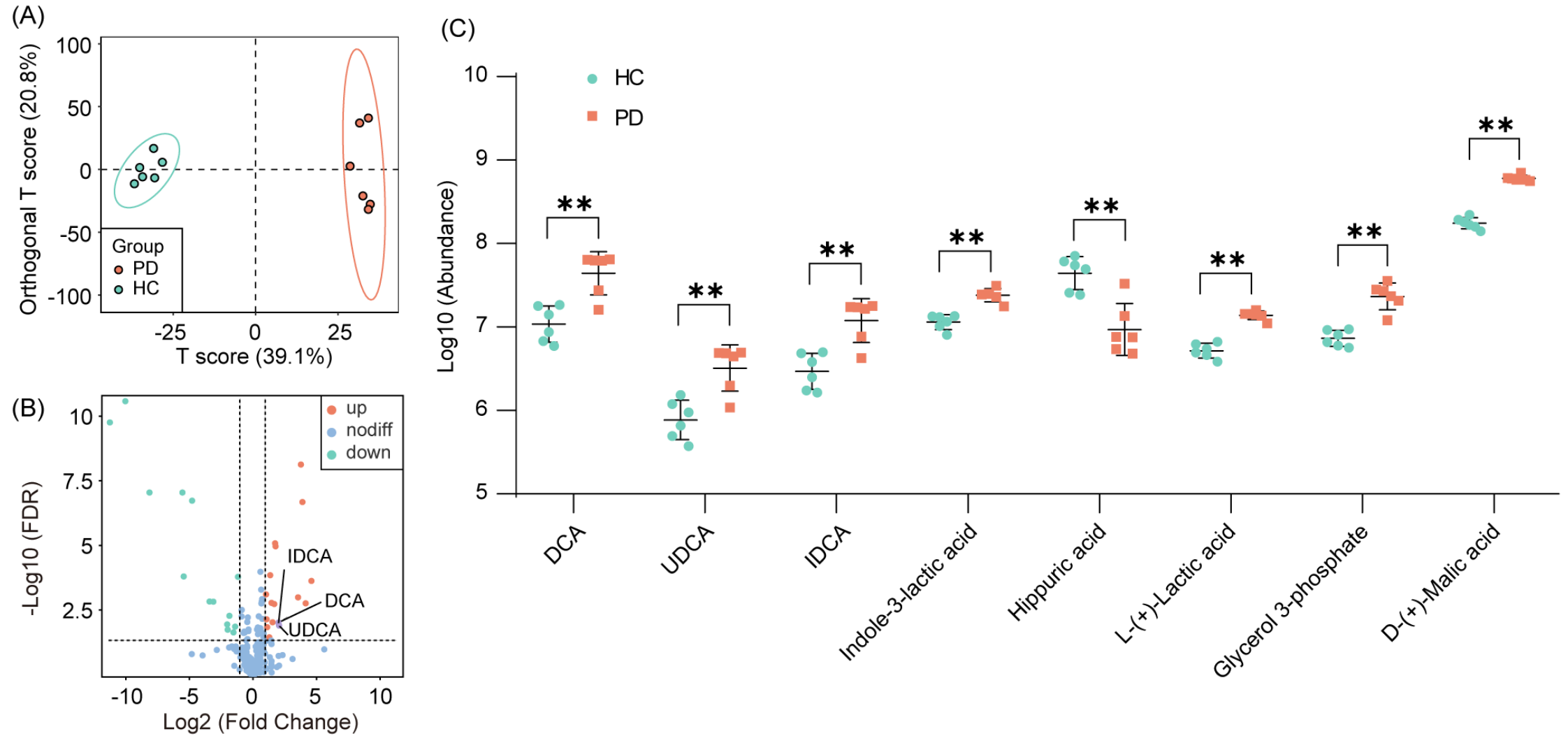
## Gut microbiota transplantation from PD patients alters gut microbiota community





# Results

## Gut microbiota transplantation from PD patients alters serum metabolic profiles

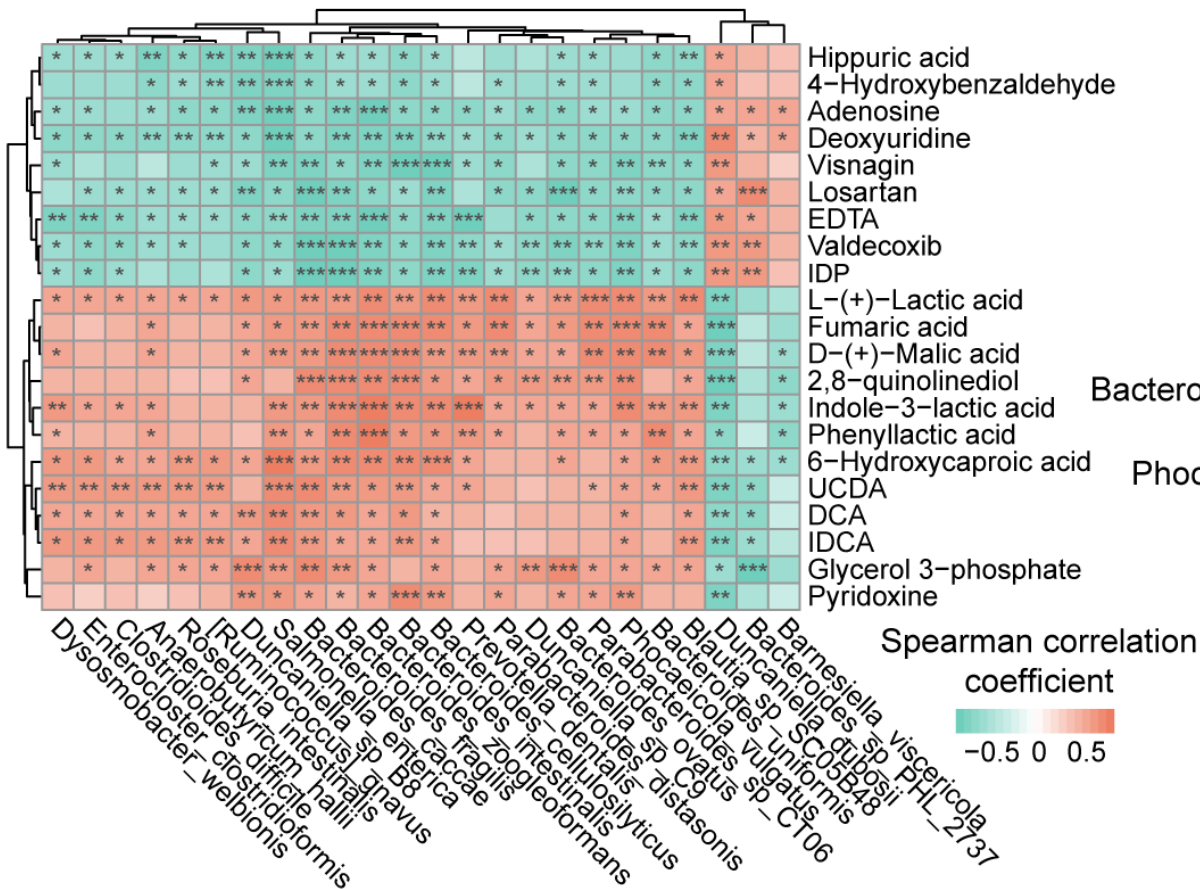


# Results

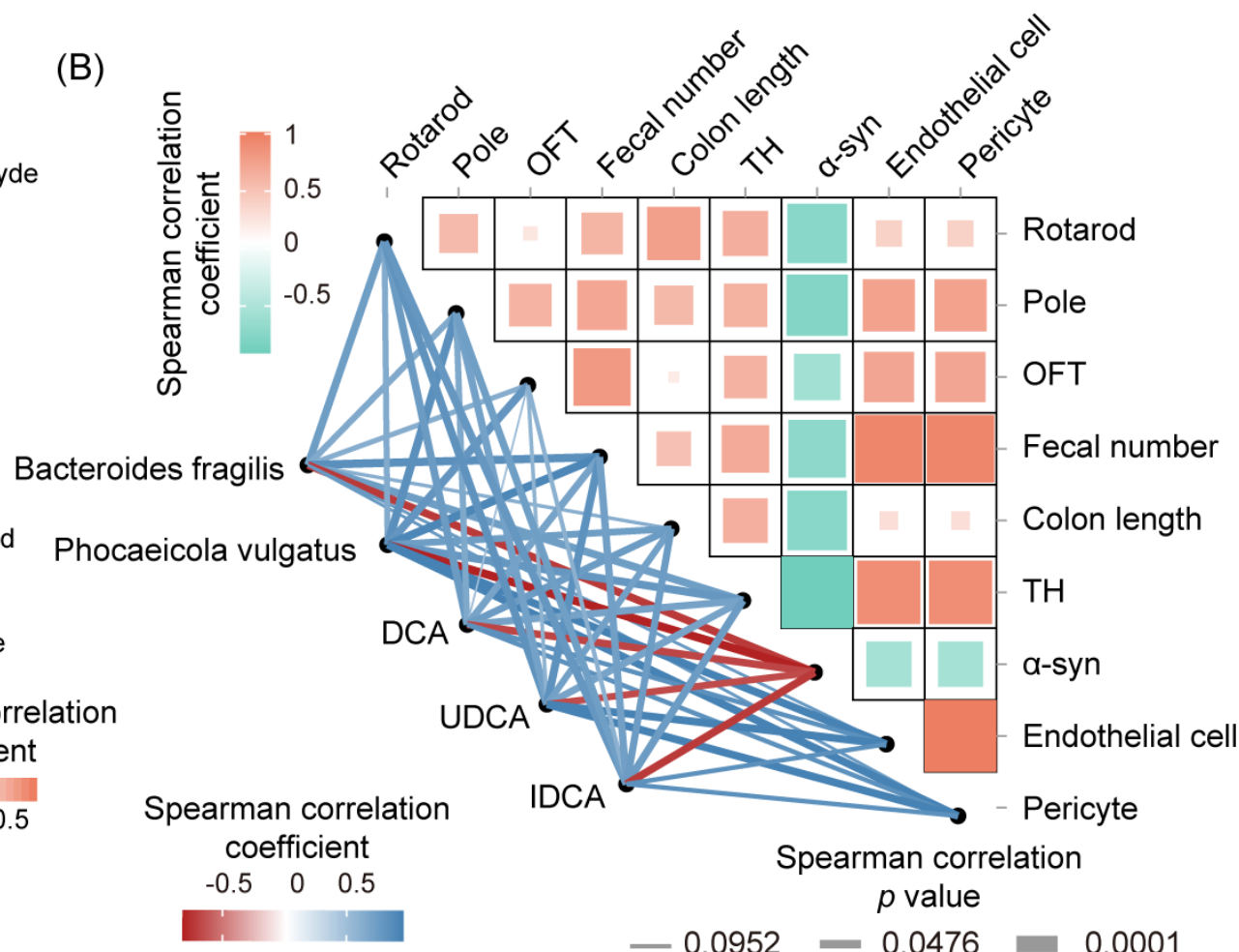


## Gut microbiota transplantation from PD patients alters gut microbiota community and serum metabolic profiles

(A)



(B)





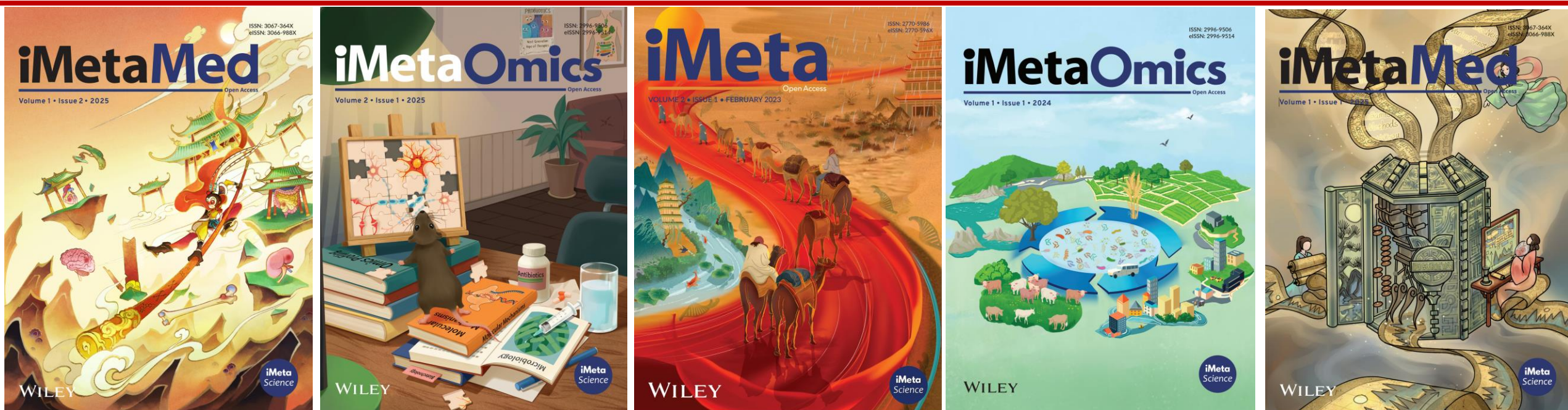
# Summary

- ❑ Gut microbiota transplantation from PD patients can induce PD symptoms in GF mice, including motor dysfunction, loss of dopamine neurons, and  $\alpha$ -synuclein deposition.
- ❑ In the gut microbiota of PD patients, *B. fragilis* and *P. vulgatus* are enriched, significantly elevating serum bile acid levels, revealing a causal link between microbiota and metabolites in PD.
- ❑ Bile acids damage the BBB through interferon- $\alpha$  and TGF- $\beta$  pathways.
- ❑ DCA treatment exacerbates symptoms in PD models, confirming bile acids as key molecules in PD development and providing new therapeutic targets for PD.

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