



Gut *Enterococcus faecium* derived leucic acid mediates the antiobesity effect of dietary fiber

Baifei Hu^{1,2,#}, Qianru Gao^{1,#}, Junmin Hui¹, Mengqiong Wang¹, Haiyan Gao^{1,2}, Kai Li^{1,2},
Junping Zheng^{1,2}, Zhe Dai^{3,*}, Songlin Liu^{1,2,*}, Hongtao Liu^{1,2,*}

¹College of Basic Medical Sciences; Key Laboratory of Chinese Medicinal Resource and Chinese Herbal Compound of the Ministry of Education, Hubei University of Chinese Medicine, Wuhan 430065, China

²Hubei Shizhen Laboratory, Wuhan 430061, China

³Zhongnan Hospital of Wuhan University, Wuhan 430071, China

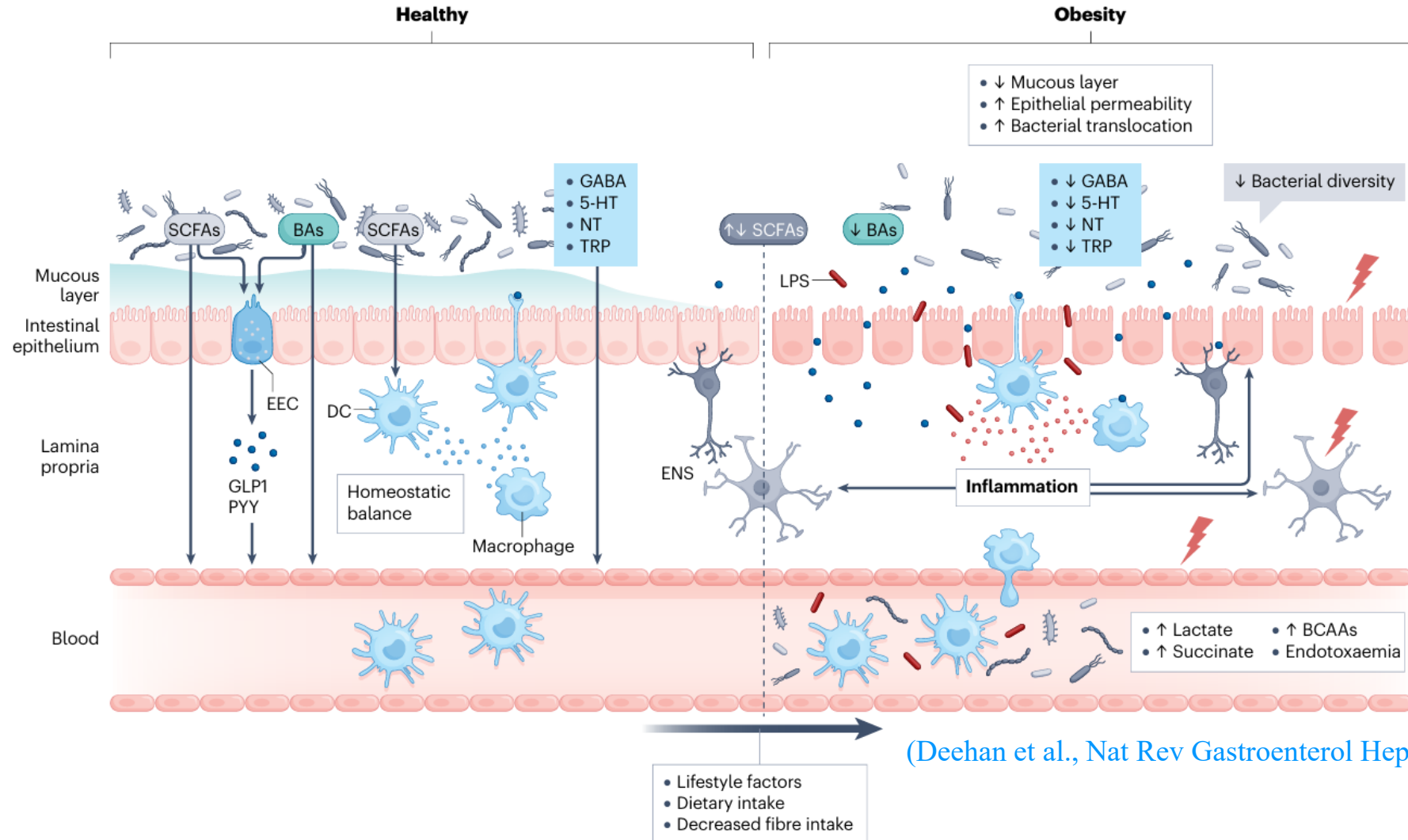


Baifei Hu, Qianru Gao, Junmin Hui, Mengqiong Wang, Haiyan Gao, Kai Li, Junping Zheng, et al. 2025. Gut *Enterococcus faecium* derived leucic acid mediates the antiobesity effect of dietary fiber. *iMeta* 5: e70173.

<https://doi.org/10.1002/imt2.70173>



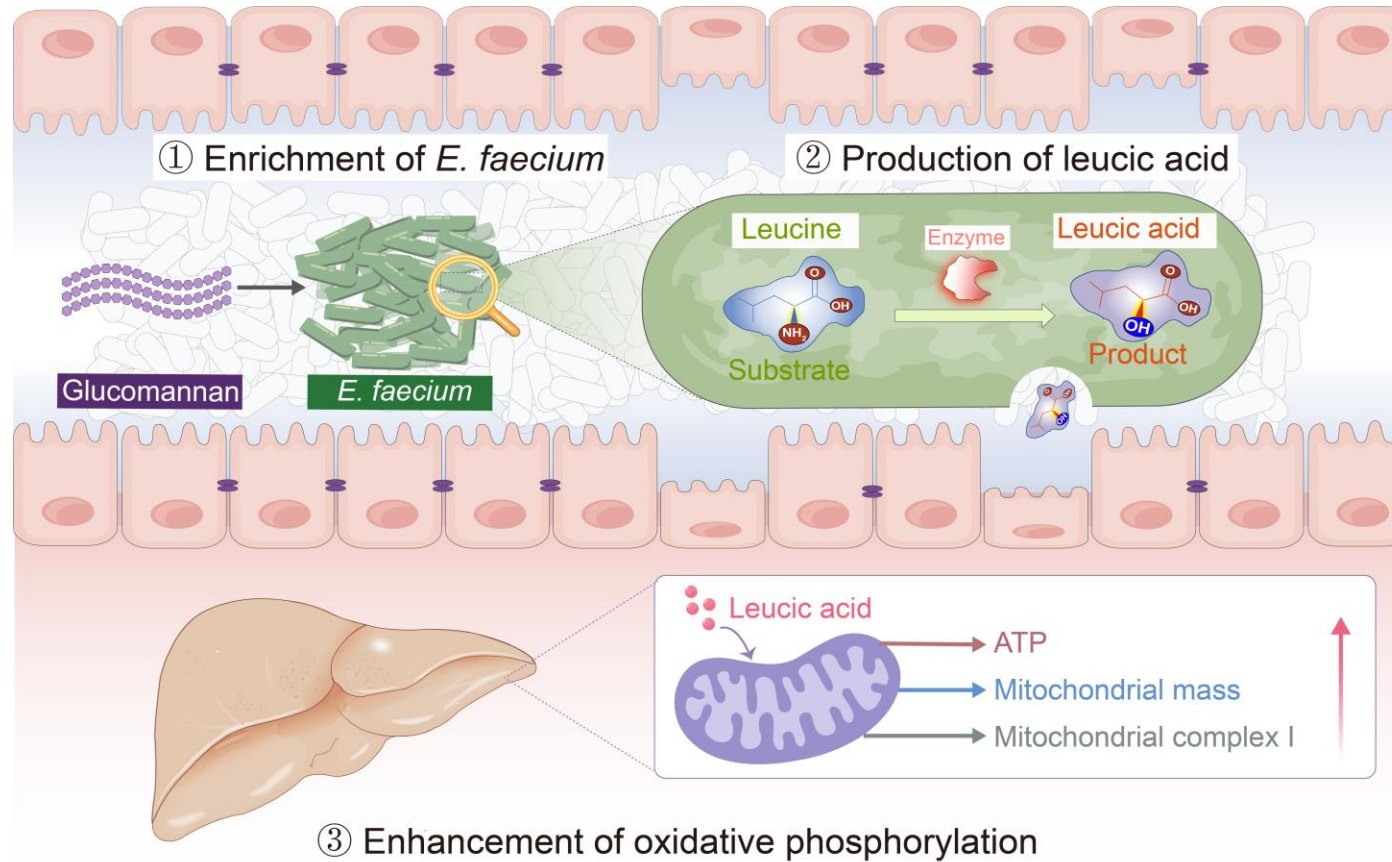
Introduction



The gut microbiota maintains host health by producing various metabolites. During obesity, the diversity of the gut microbiota decreases and beneficial bacteria are reduced, leading to insufficient production of related metabolites, which results in impaired intestinal barrier function and exacerbated inflammation, further promoting the progression of obesity. Dietary strategies such as dietary fiber can restore a healthy microbiota and the production of beneficial metabolites, thereby ameliorating obesity.



Highlights



- Metagenomic and clinical data verified *E. faecium* as an anti-obesity gut bacterium.
- *E. faecium* alleviated obesity via leucine conversion to leucic acid (LEA).
- LEA modulated mitochondrial oxidative phosphorylation against obesity.
- Glucomannan inhibited obesity by enriching *E. faecium* for microbiota intervention.

Result

◆ *E. faecium* was the candidate strain of dietary fiber for obesity prevention

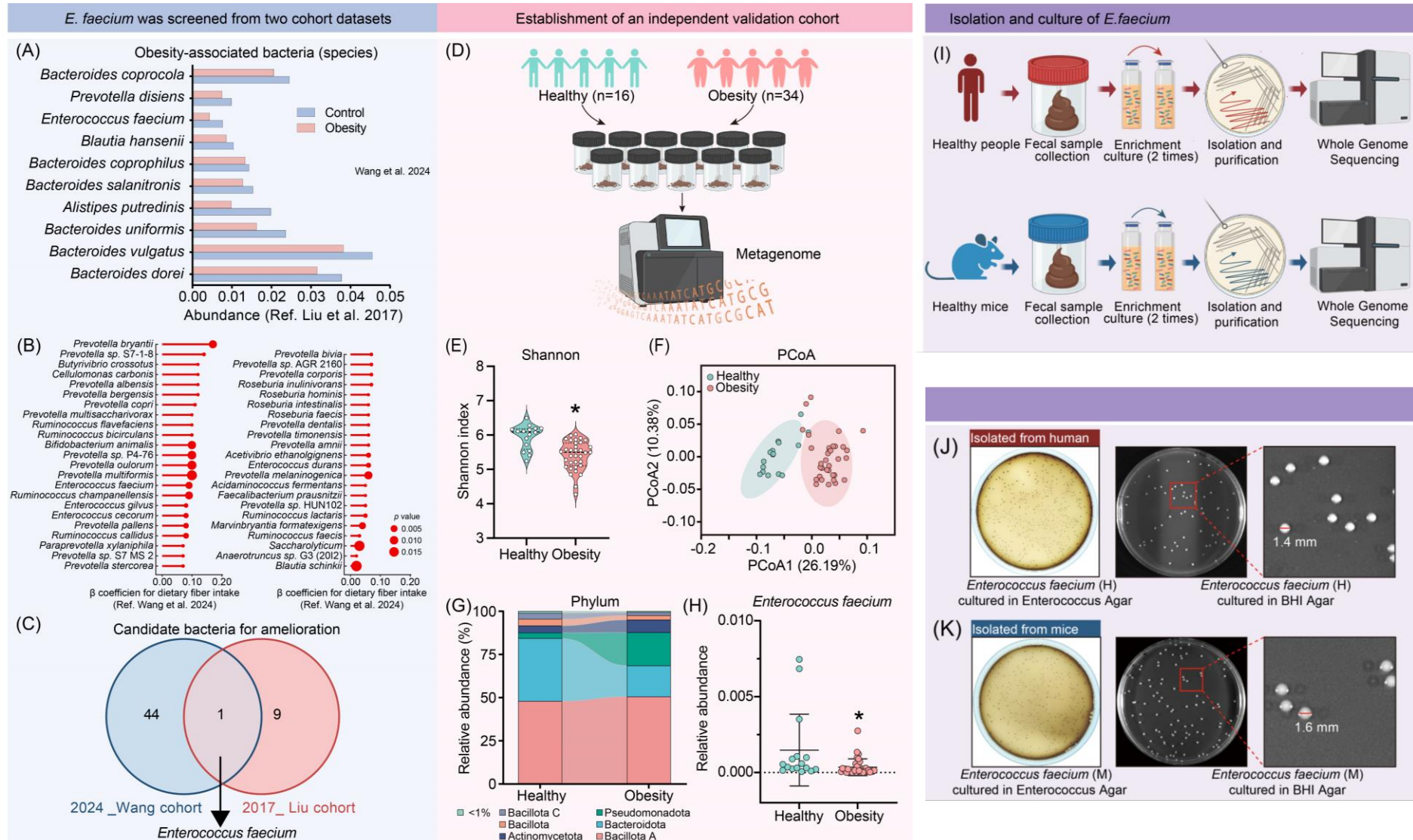


Figure 1. Screening of candidate strains for obesity prevention with dietary fiber.

Result

◆ *E. faecium* alleviated the pathological phenotypes of high fat diet (HFD)-induced obesity

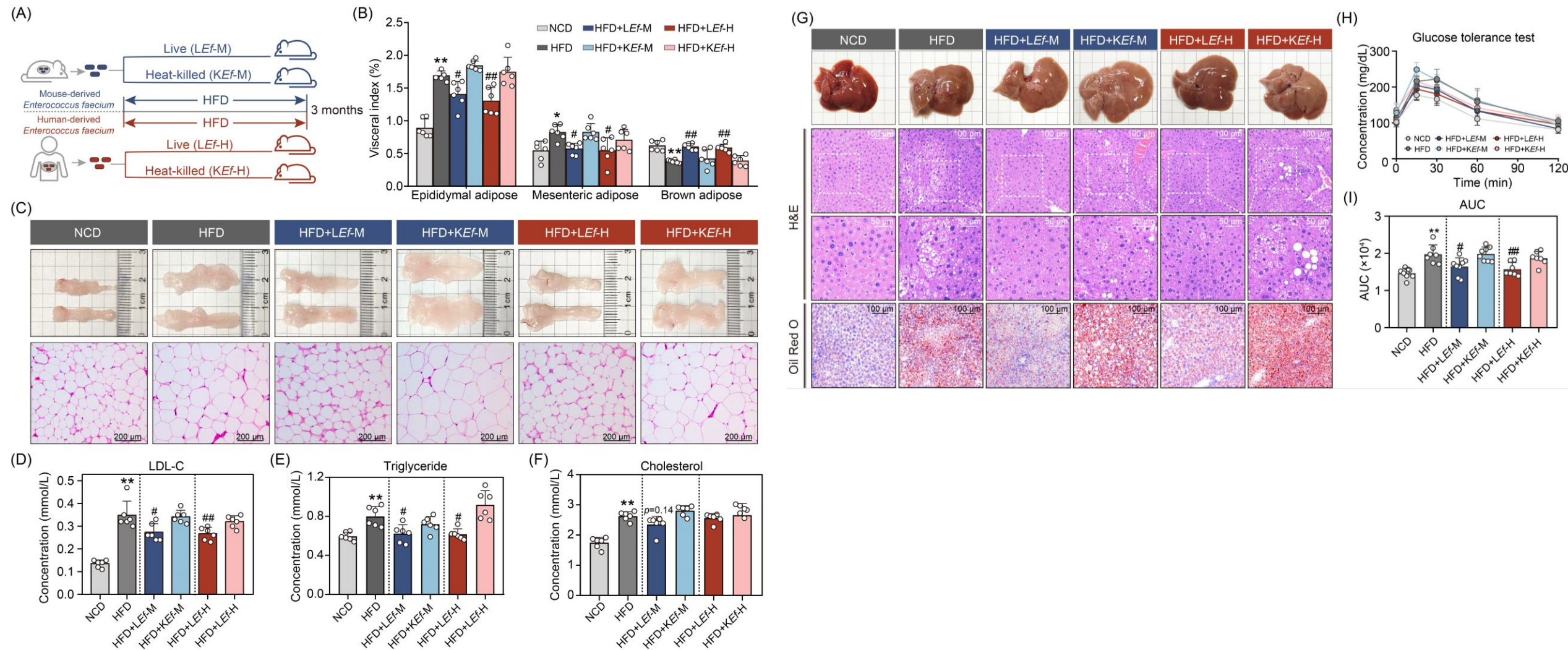
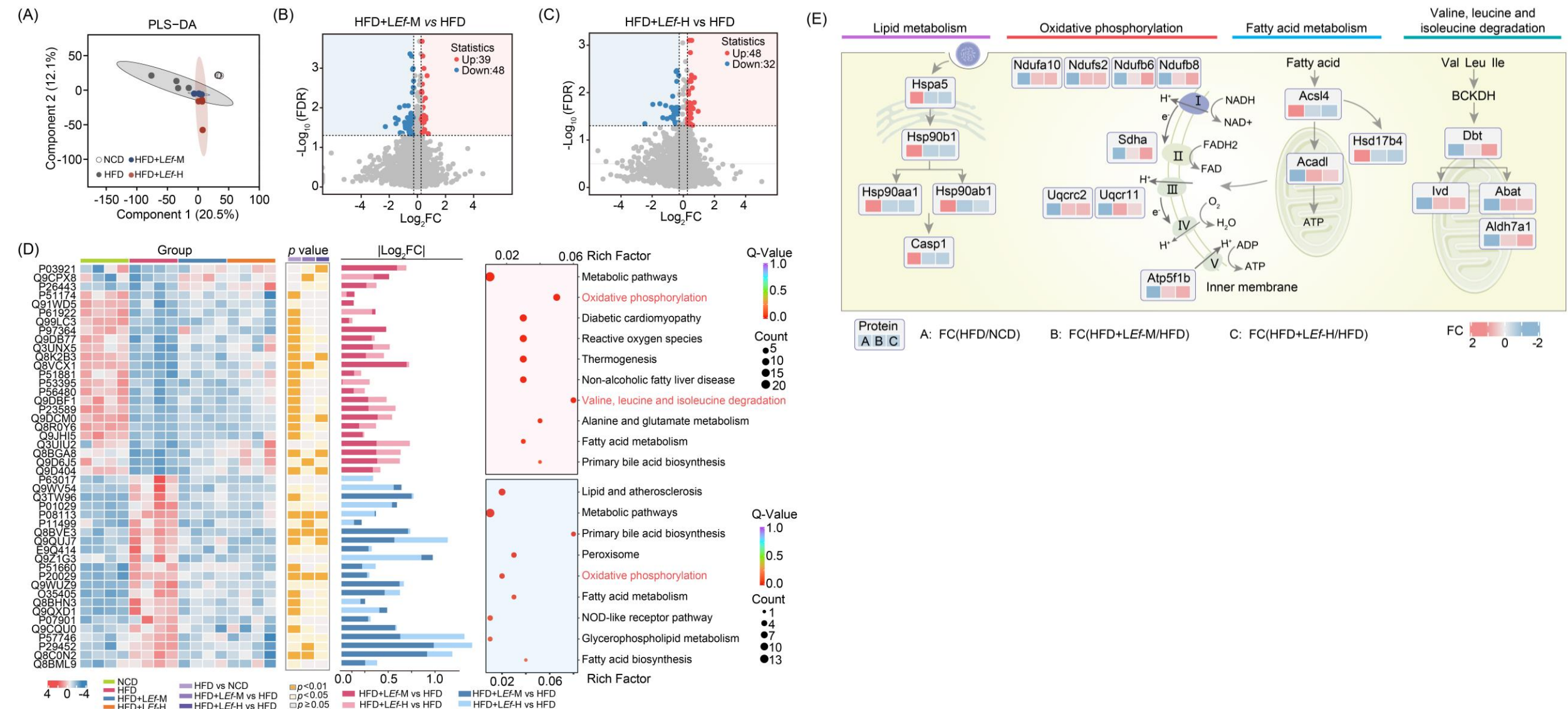


Figure 2. Human-derived and mouse-derived *E. faecium* improved HFD-induced obesity in mice.

Result

◆ *E. faecium* alleviated the pathological phenotypes of high fat diet (HFD)-induced obesity



Result

◆ LEA was identified as a functional candidate produced by *E. faecium*

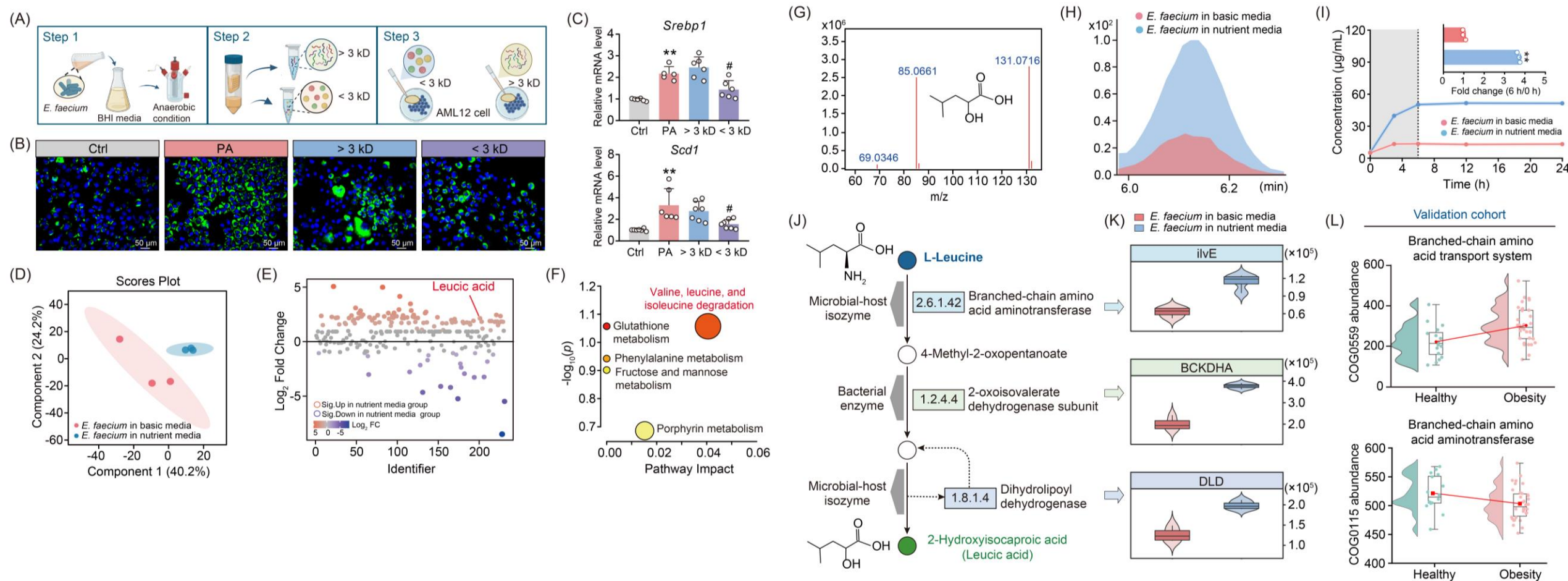


Figure 4. Identification of leucic acid (LEA) as a key bioactive metabolite produced by *Enterococcus faecium*.



Result

◆ LEA improved metabolic phenotypes and regulated mitochondrial oxidative phosphorylation pathway in obese mice

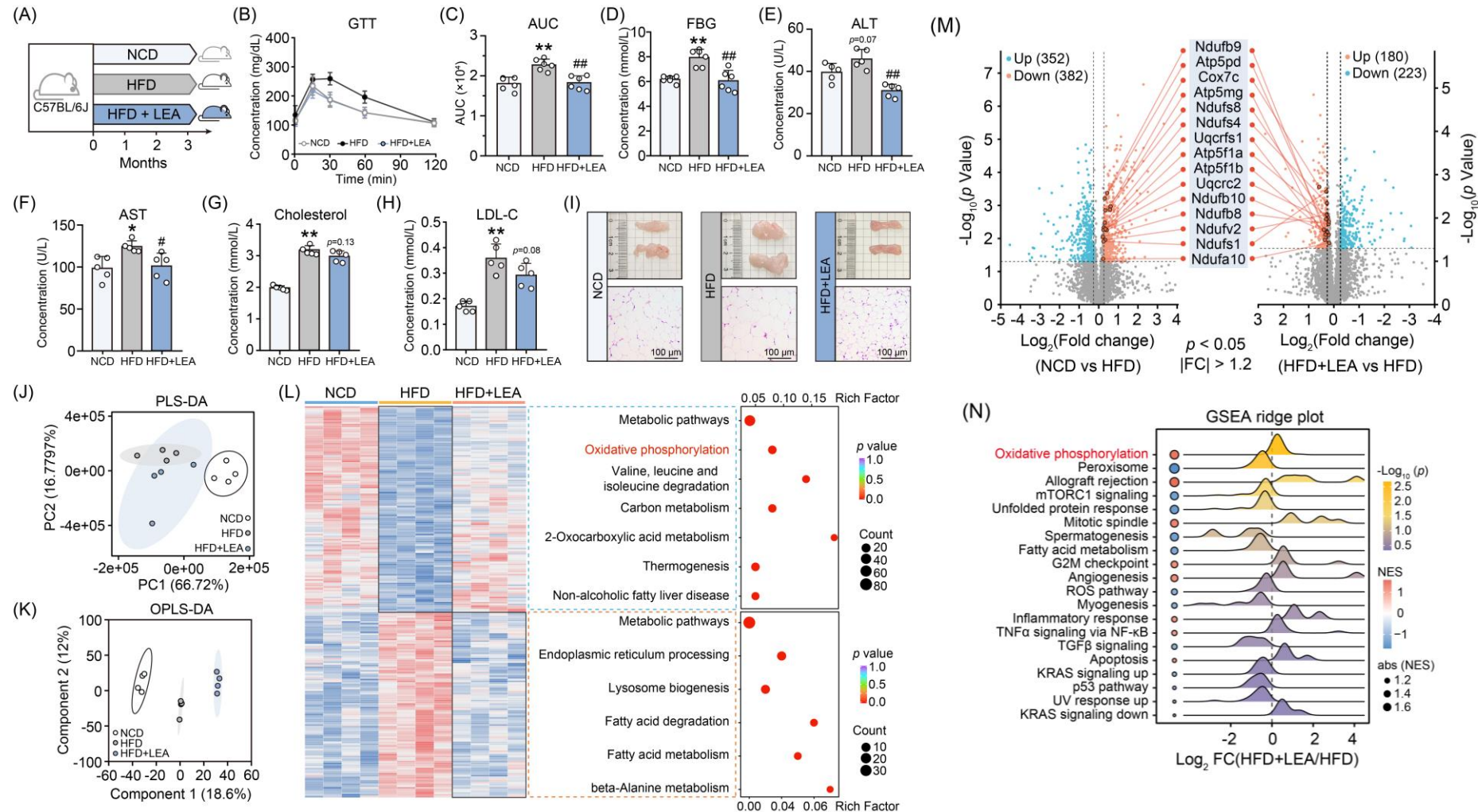


Figure 5. LEA alleviated obesity and activated oxidative phosphorylation in liver tissues.



Result

◆ LEA alleviated PA-induced lipid metabolism disorder in AML12 cells by improving mitochondrial oxidative phosphorylation

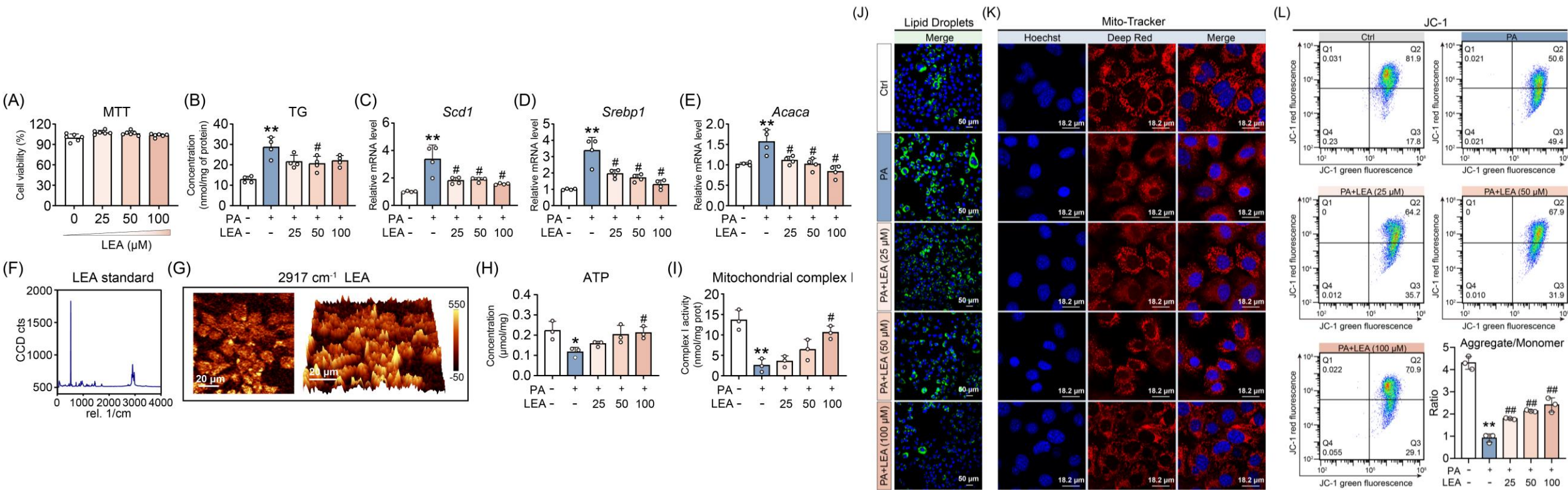


Figure 6. LEA ameliorated palmitic acid (PA)-induced lipid metabolism disorder and mitochondrial dysfunction in AML12 hepatocytes.

Result

◆ High-content screening for selecting dietary fiber for enriching *E. faecium*

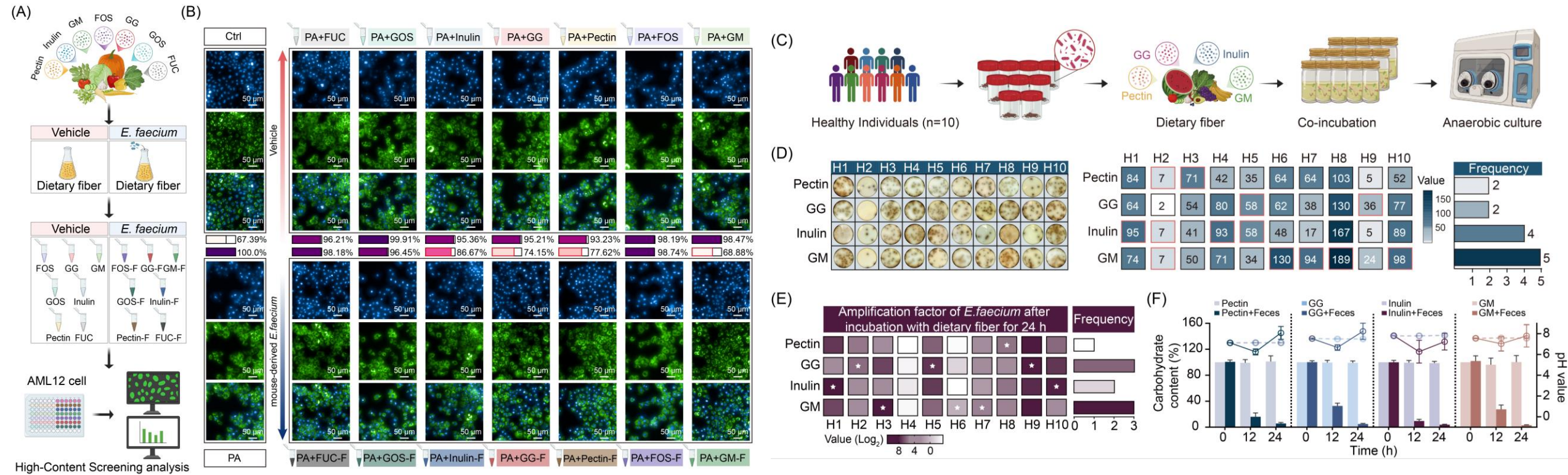


Figure 7. High-content screening system identified the optimal dietary fiber for enriching mouse-derived *E. faecium*.

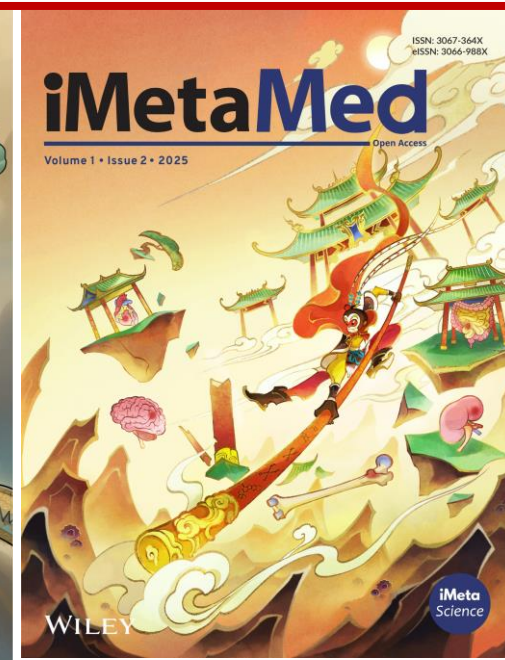
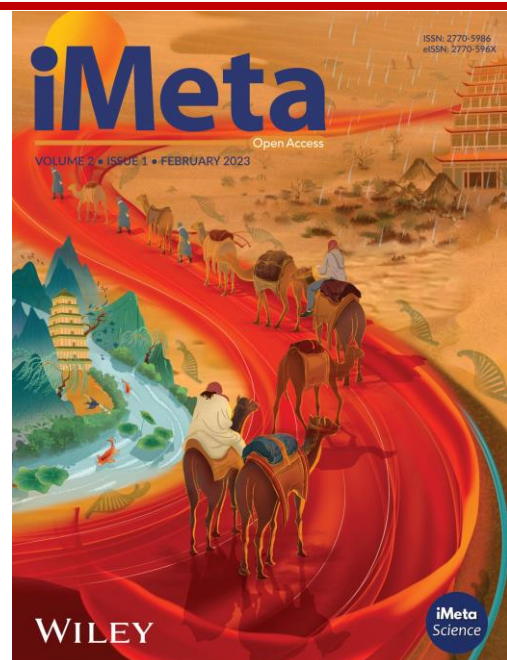


Summary

- ❑ In this study, we identified a gut bacterial strain with anti-obesity potential, *E. faecium*, through fecal metagenomic data mining combined with clinical cohort validation, and animal experiments demonstrated that colonization with *E. faecium* alleviated HFD-induced obesity.
- ❑ Mechanistically, *E. faecium* utilizes putative BCAAs metabolic enzymes to convert leucine into LEA, and exogenous LEA supplementation also regulated mitochondrial oxidative phosphorylation and improved energy metabolism.
- ❑ Furthermore, using high-content screening in conjunction with an in vitro fermentation model, this study found that the dietary fiber GM effectively enriched *E. faecium*, thereby exerting anti-obesity effects.

Baifei Hu, Qianru Gao, Junmin Hui, Mengqiong Wang, Haiyan Gao, Kai Li, Junping Zheng, et al. 2025. Gut *Enterococcus faecium* derived leucic acid mediates the antiobesity effect of dietary fiber. *iMeta* 5: e70173.

<https://doi.org/10.1002/imt2.70173>



“**iMeta**” launched in 2022 by iMeta Science Society, **impact factor (IF) 44.4**, **ranking top 47/22643 in the world**. It aims to publish innovative and high-quality papers with broad and diverse audiences. Its scope is similar to *Cell*, *Nature* and *Science*. Its unique features include video abstract, bilingual publication, and social media with 800,000 followers. Indexed by [SCIE/ESI](#), [PubMed](#), [Google Scholar](#) etc.

“**iMetaOmics**” launched in 2024, indexed by [ESCI](#), [PubMed](#), [Google Scholar](#), with a **target IF>15**, and its scope is similar to *Nature Communications*, *Science Advances*, *Advanced Science*, *Nucleic Acids Research*, 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

imetaomics@imeta.science



[Promotion Video](#)

Update
2026/6/17