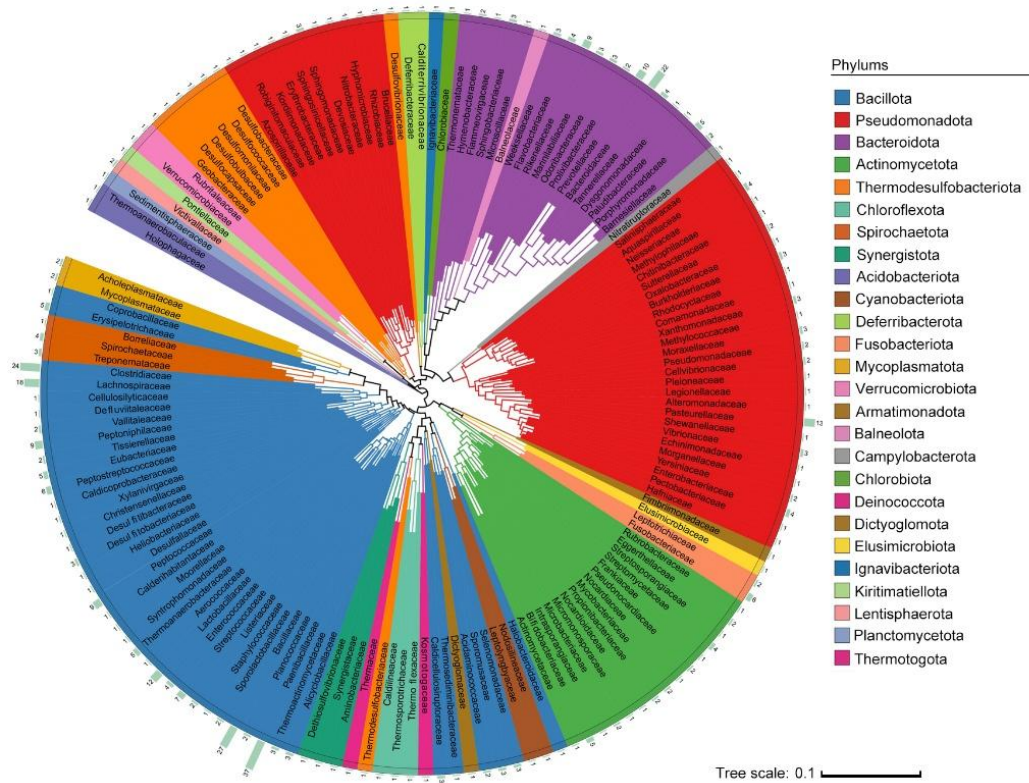


# 1 Supplementary Information

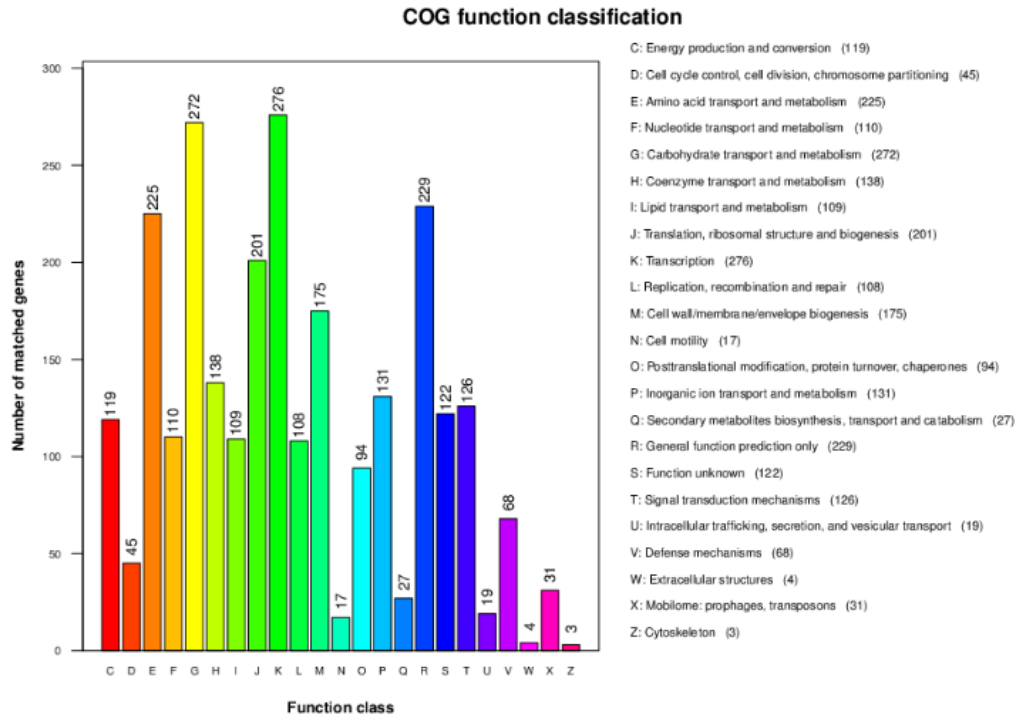
2



3

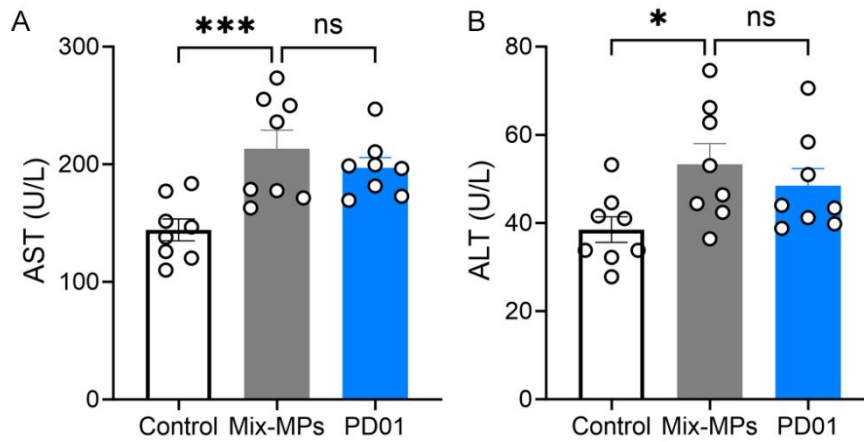
4 **Figure S1.** Phylogenetic tree of bacterial species that were significantly different  
 5 between  $L_{in}H_{ex}$  and  $L_{in}L_{ex}$  groups. The bars indicate the number of differentially  
 6 abundant species within each family.

7



8

9 **Figure S2.** COG annotation of *L. plantarum* PD01.

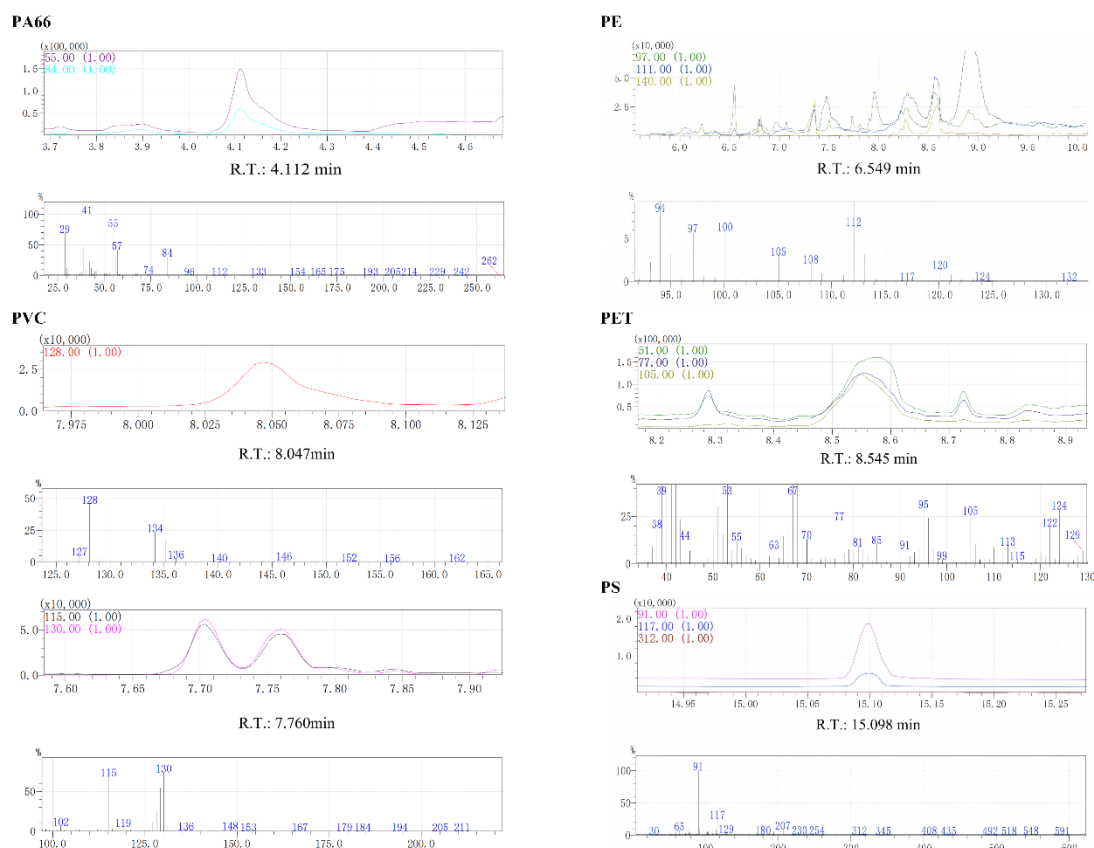


10

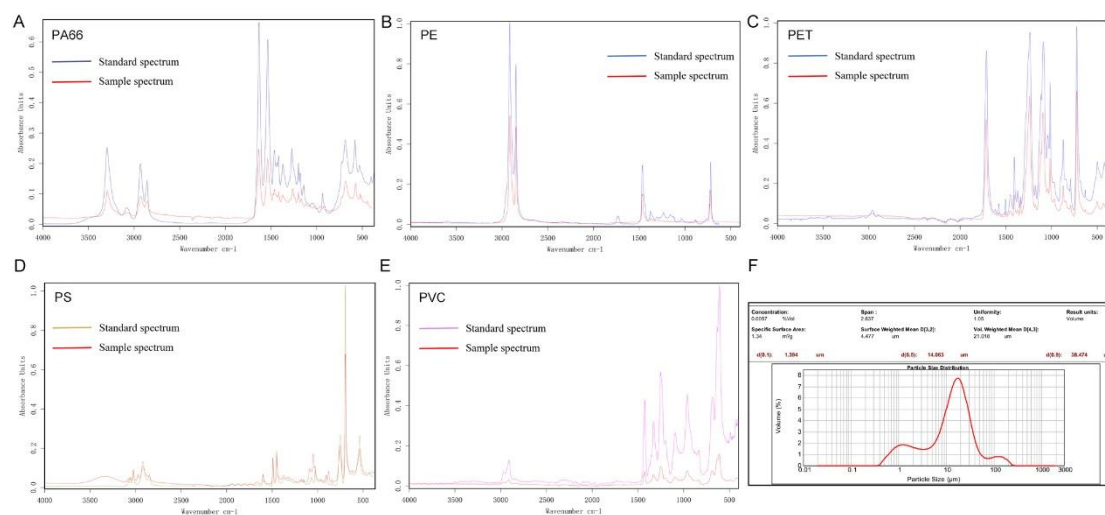
11 **Figure S3.** Serum level of markers of liver injury, AST and ALT.

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13

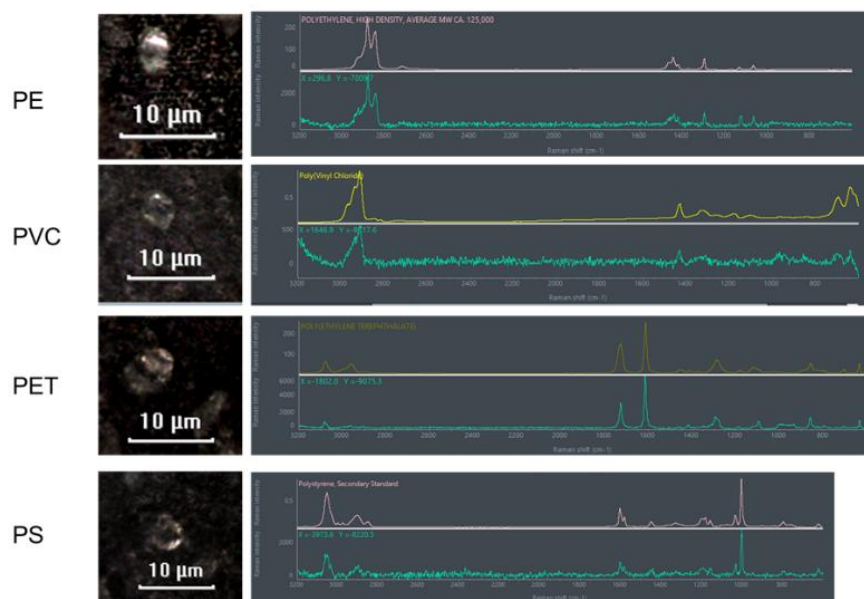


**Figure S4.** Representative py-GCMS spectra of MPs.



**Figure S5.** Characterization of MPs incorporated into mouse chow.

(A-E). Spectra of MPs scanned with Fourier transform infrared spectrometer. (F). Particle size distribution analyzed by laser particle size analyzer.



22

23 **Figure S6.** Representative Raman spectra of MPs.

24

25 **Table S1.** Genomic information of *L. plantarum* PD01 and reference strains.

| Strain                            | GenBank ID      | Isolation source                           | Total<br>length (bp) | ANI     |
|-----------------------------------|-----------------|--------------------------------------------|----------------------|---------|
| <i>L. plantarum</i><br>PD01       | GCA_052495795.1 | Human gut                                  | 3,339,739            | 100.00% |
| <i>L. plantarum</i><br>WCFS1      | GCA_000203855.3 | Human saliva                               | 3,348,624            | 99.11%  |
| <i>L. plantarum</i><br>SRCM100442 | GCA_009913655.1 | infant faecal                              | 3,223,643            | 99.13%  |
| <i>L. plantarum</i><br>DSM20174   | GCA_014131735.1 | pickled cabbage                            | 3,250,154            | 99.23%  |
| <i>L. plantarum</i><br>ATCC202195 | GCA_018351295.1 | healthy infant<br>feces                    | 3,353,701            | 99.24%  |
| <i>L. plantarum</i><br>CCFM605    | GCA_003344825.1 | yogurt-like dairy<br>product               | 3,314,628            | 99.02%  |
| <i>L. plantarum</i><br>CCFM8610   | GCA_051391195.1 | Fermented<br>vegetables                    | 3,263,922            | 99.71%  |
| <i>L. plantarum</i><br>KLDS10386  | GCA_017576965.1 | Traditional<br>fermented dairy<br>products | 3,274,275            | 99.09%  |
| <i>L. plantarum</i><br>RS20D      | GCA_030758995.1 | fermented<br>vegetable                     | 3,432,810            | 99.10%  |
| <i>L. plantarum</i> P9            | GCA_024181685.1 | Sour porridge                              | 3,314,193            | 99.11%  |
| <i>L. plantarum</i><br>299v       | GCA_001888735.1 | human intestinal<br>mucosa                 | 3,302,055            | 99.69%  |

26 **Table S2.** Primers for quantitative real-time PCR.

| Primer name   | Primer sequence (5' to 3') | Length (bp) | T <sub>m</sub> (°C) |
|---------------|----------------------------|-------------|---------------------|
| β-actin-F     | TCACCCACACTGTGCCCAT        | 19          | 60                  |
| β-actin-R     | TCCTTAATGTACGCACGATTT      | 22          | 60                  |
| ZO-1-F        | TTCACGCAGTTACGAGCAAG       | 20          | 60                  |
| ZO-1-R        | TTGGTGTTTGAAGGCAGAGC       | 20          | 60                  |
| Occludin-F    | GGGCATTGCTCATCCTGAAG       | 20          | 60                  |
| Occludin-R    | GCCTGTAAGGAGGTGGACTT       | 20          | 60                  |
| CAT-F         | AGCTTAGCGTTCATCCGTGT       | 20          | 60                  |
| CAT-R         | GCCACTAGCTTGCATTTG         | 18          | 60                  |
| GPX1-F        | TCCGGGACTACACCCAGATG       | 20          | 60                  |
| GPX1-R        | TCTTGGCGTTCTCCTGATGC       | 20          | 60                  |
| SOD1-F        | TGCAGGTCCTCACTTTAATCCTC    | 23          | 60                  |
| SOD1-R        | AGTCTCCAACATGCCTCTCTTC     | 22          | 60                  |
| SOD2-F        | AGCCCAGATAGCTCTTCAGC       | 20          | 60                  |
| SOD2-R        | CCAGCAACTCCCCTTTGGG        | 19          | 60                  |
| Nox1-F        | TTGGAGCAGGAATTGGGGTC       | 20          | 60                  |
| Nox1-R        | TTGAGGTTGTGGTCTGCACA       | 20          | 60                  |
| mus-β-actin-F | GGCTGTATTCCCCTCCATCG       | 20          | 60                  |
| mus-β-actin-R | CCAGTTGGTAACAATGCCATGT     | 22          | 60                  |
| mus-ZO-1-F    | GATGAGCGGGCTACCTTA         | 18          | 60                  |
| mus-ZO-1-R    | TGGAGACTGCGTGGAATG         | 18          | 60                  |

|                |                   |    |    |
|----------------|-------------------|----|----|
| mus-Occludin-F | CCTGGAGGTACTGGTCT | 17 | 60 |
| mus-Occludin-R | ATCTTTCTTCGGGTTTT | 17 | 60 |

27

28 **Table S3.** Demographical characteristics of study participants.

| Gender  |                          | Frequency of exercise    |                           |                           |                            |                           |
|---------|--------------------------|--------------------------|---------------------------|---------------------------|----------------------------|---------------------------|
| male    | n=32                     | everyday                 | n=9                       |                           |                            |                           |
| female  | n=106                    | 4-6 times/week           | n=31                      |                           |                            |                           |
|         |                          | 1-3 times/week           | n=76                      |                           |                            |                           |
|         |                          | never                    | n=22                      |                           |                            |                           |
|         |                          |                          |                           |                           |                            |                           |
|         | height (cm)              | age                      | weight (kg)               | BMI                       |                            |                           |
| Q25     | 161.0                    | 22.00                    | 51.20                     | 19.13                     |                            |                           |
| Q50     | 165.0                    | 24.00                    | 56.80                     | 21.00                     |                            |                           |
| Q75     | 170.0                    | 25.00                    | 63.00                     | 22.43                     |                            |                           |
| Average | 165.9                    | 23.52                    | 58.66                     | 21.18                     |                            |                           |
|         | PS<br>(µg/g dw)          | PE<br>(µg/g dw)          | PVC<br>(µg/g dw)          | PET<br>(µg/g dw)          | PA66<br>(µg/g dw)          | Sum<br>(µg/g dw)          |
| Q25     | 0.01                     | 9.46                     | 39.26                     | 0.01                      | 38.42                      | 107.45                    |
| Q50     | 0.54                     | 23.07                    | 56.23                     | 4.41                      | 66.73                      | 161.79                    |
| Q75     | 1.30                     | 42.56                    | 72.26                     | 19.90                     | 98.22                      | 243.01                    |
| Average | 1.28                     | 32.13                    | 63.76                     | 13.33                     | 70.84                      | 181.45                    |
|         | EDI_PS<br>(µg/kg bw/day) | EDI_PE<br>(µg/kg bw/day) | EDI_PVC<br>(µg/kg bw/day) | EDI_PET<br>(µg/kg bw/day) | EDI_PA66<br>(µg/kg bw/day) | EDI_Sum<br>(µg/kg bw/day) |
| Q25     | 0.000                    | 14.403                   | 59.918                    | 0.000                     | 57.445                     | 163.250                   |
| Q50     | 0.808                    | 32.388                   | 85.658                    | 6.993                     | 95.058                     | 251.965                   |
| Q75     | 1.825                    | 64.933                   | 112.998                   | 32.000                    | 148.901                    | 377.865                   |
| Average | 1.945                    | 50.737                   | 98.447                    | 20.682                    | 110.839                    | 282.650                   |

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31 **Data S1.** Significantly different bacterial species between high- and low- excretion  
32 individuals.

33

34 **Data S2.** Annotation results with CARD and VFDB databases.

35

36 **Data S3.** CAZy functional annotation of *L. plantarum* PD01 and reference strains.

37