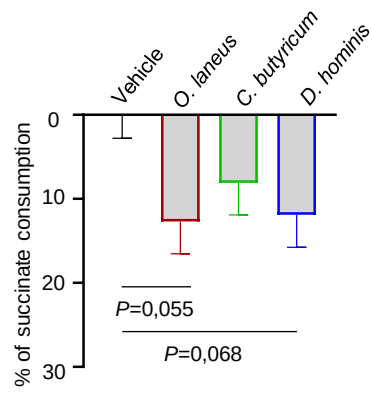
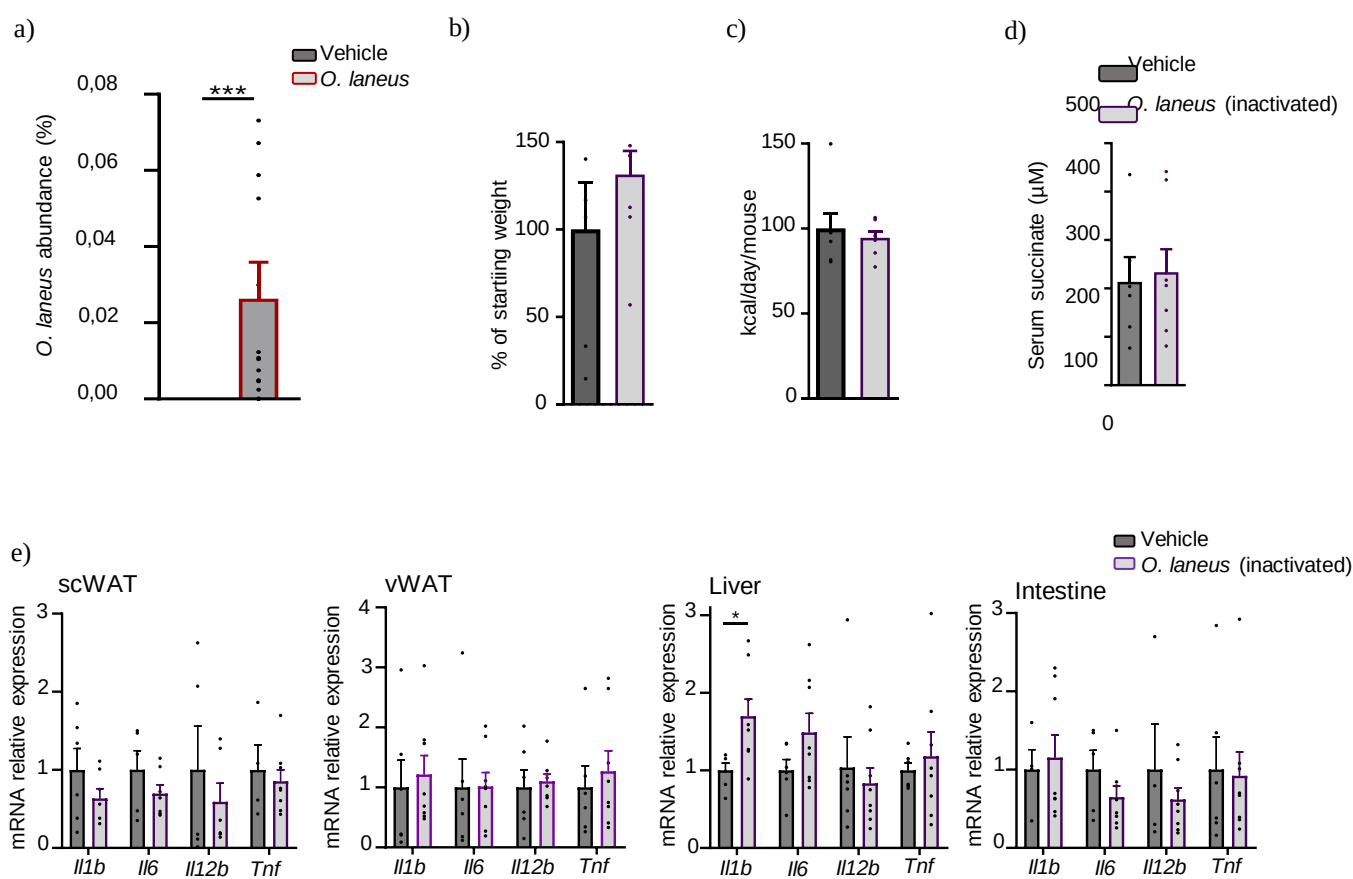
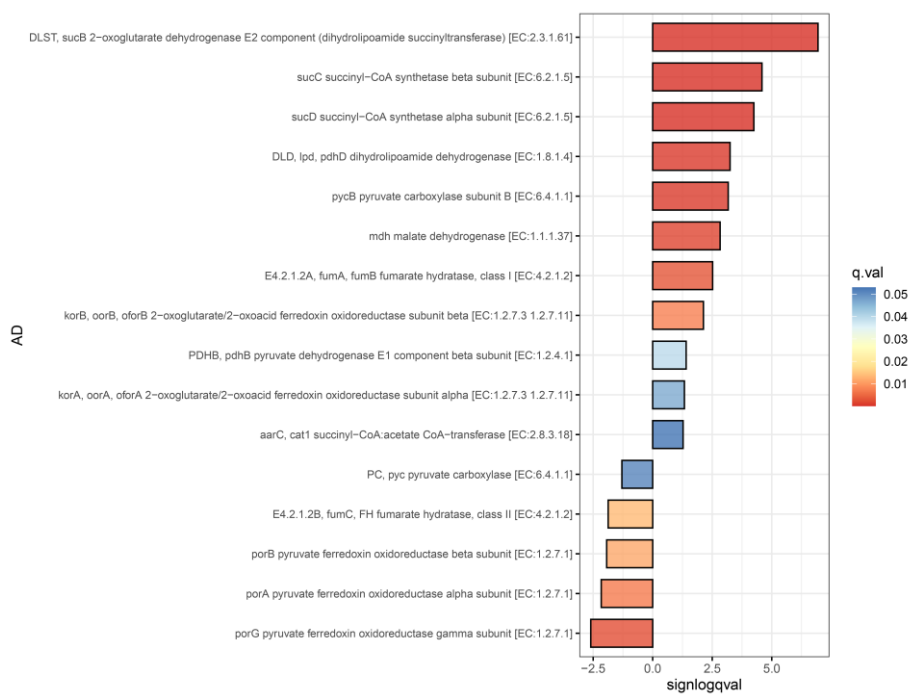




**Supplementary Figure S1: *In vitro* succinate consumption rates.** *O. laneus*, *D. hominis* and *C. butyricum* were tested in YCFA medium supplemented with 1% succinate Percentage of consumed succinate is shown (n=3). Data are presented as mean + s.e.m (unpaired t-test)



**Supplementary Figure S2: Probiotic administration of inactivated *O. laneus* does not reduce circulating succinate or inflammation in *db/db* mice.** Probiotic intervention with *Odoribacter laneus* increases the abundance of *O. laneus* in cecum of *db/db* mice treated with vehicle or with *O. laneus*. (n = 15). (a). Changes in body weight (b), food consumption (c), and fasted succinate serum levels (d) after administration of inactivated *O. laneus* (n = 6–8). Mean mRNA expression levels of inflammatory genes in scWAT, vWAT, liver and intestine (e). (n = 4–8). Data are presented as mean + s.e.m.; \*p < 0.05 \*\*\*p < 0.001 (unpaired t-test)



**Supplementary Figure S3: Metagenomic study of TCA genes.** Manhattan-like plot of significantly expressed KEGG metagenome functions of the TCA cycle associated with fecal succinate.

| Detector     | Taqman probes | Gene probes                 |
|--------------|---------------|-----------------------------|
| <i>B2m</i>   | Mm00437762_m1 | Beta-2-microglobulin        |
| <i>Il1b</i>  | Mm00434228_m1 | Interleukin 1 Beta          |
| <i>Il6</i>   | Mm00446190_m1 | Interleukin 6               |
| <i>Il12b</i> | Mm01288989_m1 | Interleukin 12              |
| <i>Tnf</i>   | Mm00443258_m1 | Tumor necrosis factor alpha |

**Supplementary Table S1. Mouse gene expression Taqman probes.** Results were calculated using the comparative Ct method and expressed relative to the expression of the housekeeping gene *B2m*.

| SPECIES                                                     | FAMILY                       | PHYLUM                | GROWTH RATE<br>obtained from<br>FBA (h <sup>-1</sup> ) | Succinate<br>production<br>(positive) or<br>consumption<br>(negative) rate<br>(mmol/gDW/h) |
|-------------------------------------------------------------|------------------------------|-----------------------|--------------------------------------------------------|--------------------------------------------------------------------------------------------|
| <i>Acidaminococcus<br/>provencensis</i>                     | <i>Acidaminococcaceae</i>    | <i>Firmicutes</i>     | 0.308                                                  | 41.655                                                                                     |
| <i>Bacillus firmus</i> DS1                                  | <i>Bacillaceae</i>           | <i>Firmicutes</i>     | 0.571                                                  | 49.898                                                                                     |
| <i>Bacillus flexus</i>                                      | <i>Bacillaceae</i>           | <i>Firmicutes</i>     | 0.427                                                  | 49.786                                                                                     |
| <i>Bacteroides<br/>thetaiotaomicron</i>                     | <i>Bacteroidaceae</i>        | <i>Bacteroidetes</i>  | 0.506                                                  | 38.725                                                                                     |
| <i>Caecibacter<br/>massiliensis</i>                         | <i>Veillonaceae</i>          | <i>Firmicutes</i>     | Not simulated                                          | Not simulated                                                                              |
| <i>Dialister invisus</i>                                    | <i>Veillonaceae</i>          | <i>Firmicutes</i>     | 0.211                                                  | 47.009                                                                                     |
| <i>Dialister<br/>propionificiens</i>                        | <i>Veillonaceae</i>          | <i>Firmicutes</i>     | Not simulated                                          | Not simulated                                                                              |
| <i>Dialister succinatiphilus</i>                            | <i>Veillonaceae</i>          | <i>Firmicutes</i>     | 0.307                                                  | -1.742                                                                                     |
| <i>Emergencia timonensis</i>                                | <i>Clostridiales</i>         | <i>Firmicutes</i>     | 0.392                                                  | 49.256                                                                                     |
| <i>Eubacterium hallii</i>                                   | <i>Lachnospiraceae</i>       | <i>Firmicutes</i>     | 0.405                                                  | 14.073                                                                                     |
| <i>Massilibacillus<br/>massiliensis</i>                     | <i>Veillonaceae</i>          | <i>Firmicutes</i>     | 0.348                                                  | 49.143                                                                                     |
| <i>Megamonas<br/>hypermegale</i>                            | <i>Selenomonadaceae</i>      | <i>Firmicutes</i>     | 0.301                                                  | 49.922                                                                                     |
| <i>Odoribacter laneus</i>                                   | <i>Odoribacteraceae</i>      | <i>Bacteroidetes</i>  | 0.335                                                  | -47.071                                                                                    |
| <i>Phascolarctobacterium<br/>faecium</i>                    | <i>Acidaminococcaceae</i>    | <i>Firmicutes</i>     | 0.174                                                  | 27.163                                                                                     |
| <i>Phascolarctobacterium<br/>succinatutens</i> YIT<br>12067 | <i>Acidaminococcaceae</i>    | <i>Firmicutes</i>     | 0.221                                                  | 38.505                                                                                     |
| <i>Romboutsia weinsteinii</i>                               | <i>Peptostreptococcaceae</i> | <i>Firmicutes</i>     | 0.316                                                  | 46.318                                                                                     |
| <i>Ruminococcus bromii</i>                                  | <i>Oscillospiraceae</i>      | <i>Firmicutes</i>     | 0.258                                                  | 8.205                                                                                      |
| <i>Selenomonas felix</i>                                    | <i>Selenomonadaceae</i>      | <i>Firmicutes</i>     | 0.419                                                  | -12.125                                                                                    |
| <i>Spirosoma linguale</i><br>DSM 74                         | <i>Cytophagaceae</i>         | <i>Bacteroidetes</i>  | 0.436                                                  | 0                                                                                          |
| <i>Succiniclasticum<br/>ruminis</i>                         | <i>Acidaminococcaceae</i>    | <i>Firmicutes</i>     | 0.265                                                  | 43.818                                                                                     |
| <i>Sutterella parvirubra</i>                                | <i>Sutterellaceae</i>        | <i>Proteobacteria</i> | 0.249                                                  | 49.931                                                                                     |
| <i>Veillonella parvula</i>                                  | <i>Veillonaceae</i>          | <i>Firmicutes</i>     | 0.417                                                  | 49.974                                                                                     |

**Supplementary Table S2: Succinate-consuming strains identified with computational genome-based metabolic modelling technology.** 22 potential succinate-consuming non-pathogenic strains were identified. Growth rates (expressed in h<sup>-1</sup>) and succinate production (positive) or consumption (negative), all obtained from Flux Balance Analysis, are shown. The FBA were performed in human gut conditions, i.e. using the western diet nutrient conditions previously described [27]. *C. massiliensis* and *D. proponificiens* could not be simulated because there is no genome assembly available