**Supplementary information**

Supplementary Figure 1. Split-feces assay. A) Schematics showing gnotobiotic germ-free B6 mice gut colonization using different microbial exposures (Env MT, mouse FMT, human FMT#1, and human FMT#2) and split-fecal assay to test microbial density and floatation (n=5 fecal samples per group of 5 mice each). The illustration was created using in BioRender.com.

Supplementary Figure 2. Efficacy of LIFT in TFS over 24-hour time-period in different groups of gut-colonized mice (n=5 fecal samples per group of 5 mice each).

Supplementary Table 1. List of gasogenic commensal gut microorganisms.

Supplementary Table 2. Observed frequencies of gasogenic gut microorganisms in feces.
| List of known or predicted gasogenic gut microorganisms |
|--------------------------------------------------------|
| Anaerostipes caccae                                   |
| Atopobium parvulum                                    |
| Bacillus anthracis                                    |
| Bacillus subtilis                                     |
| Bacteroides fragilis                                  |
| Bacteroides ovatus                                    |
| Bacteroides thetaiotaomicron                          |
| Bacteroides uniformis                                 |
| Bacteroides vulgates                                   |
| Bifidobacterium bifidus                               |
| Bifidobacterium breve                                 |
| Bifidobacterium infantis                              |
| Bifidobacterium pseudocatenulatum                      |
| Bilophila wadsworthia                                 |
| Blautia coccoides                                     |
| Blautia hydrogenotrophica                             |
| Christensenella minuta                                |
| Citrobacter freundii                                  |
| Clostridium histolyticum                              |
| Clostridium leptum                                    |
| Clostridium perfringens                               |
| Clostridium ramosum                                   |
| Deinococcus radiodurans                              |
| Desulfotobacterium hafniense                          |
| Desulfovibrio acetoxidans                             |
| Desulfovibrio desulfuricans                           |
| Desulfovibrio farfieldensis                           |
| Desulfovibrio piger                                   |
| Desulfovibrio vulgaris                                |
| Edwardsiella tarda                                    |
| Enterobacter aerogenes                                 |
| Enterobacter cloacae                                  |
| Escherichia coli                                      |
| Eubacterium hallii                                    |
| Fusobacterium nucleatum                               |
| Lactobacillus acidophilus                             |
| Lactobacillus rhamnosus                               |
| Lactobacillus shirola                                 |
| Methaninobrevibacter smithii                          |
| Methanobrevibacter ruminantium                        |
| Methanococcus maripaludis                             |
| Methanosphaera stadtmannae                            |
| Parabacteroides distasonis                            |
| Proteus vulgaris                                      |
| Ruminococcus hydrogenotrophicus                       |
| Salmonella typhimurium                                |
| Veillonella ratti                                     |
## Supplementary Table 2. Observed frequencies of gasogenic gut microorganisms in feces.

| Name                          | Conventional#1 | Conventional#2 | Mouse_FMT#1 | Mouse_FMT#2 | Mouse_FMT#3 | Mouse_FMT#4 | Conventional#3 (donor) |
|-------------------------------|----------------|----------------|-------------|-------------|-------------|-------------|------------------------|
| *Bacteroides ovatus*          | 0.481675797    | 0.144329671    | 0.000149785 | 0.022491187 | 0.191628505 | 0.023910416 | 0.052449192             |
| *Bacteroides fragilis*        | 0.015744498    | 0.005363504    | 9.36154E-06 | 0.04920094  | 0.006631645 | 0.127485169 | 0.001733877             |
| *Bacteroides thetaiotaomicron* | 0.004700832   | 0.001465757    | 0           | 0.0089953   | 0.001837869 | 0.011225808 | 0.000416034             |
| *Bacteroides vulgatus*        | 0.001357653    | 0.000463063    | 0           | 0.004459459 | 0.000673885 | 0.004932131 | 0.000262126             |
| *Clostridium leptum*          | 8.05387E-05    | 6.92771E-05    | 0.000318292 | 9.40071E-05 | 0.000329285 | 0.000694666 | 4.32868E-05             |
| *Blautia hydrogenotrophica*   | 0.000131492    | 0.000102093    | 0.000140423 | 9.40071E-05 | 0.000153156 | 0.00012504 | 6.01206E-05             |
| *Escherichia coli*            | 1.47928E-05    | 2.1877E-05     | 7.48923E-05 | 2.93772E-05 | 0.000145498 | 6.94666E-05 | 9.61929E-06             |
| *Anaerostipes caccae*         | 1.47928E-05    | 4.74001E-05    | 7.48923E-05 | 2.35018E-05 | 0           | 4.168E-05  | 1.44289E-05             |
| *Lactobacillus acidophilus*   | 9.86188E-06    | 1.82308E-05    | 9.36154E-06 | 1.17509E-05 | 3.82889E-05 | 2.77867E-05 | 4.32868E-05             |
| *Bacteroides uniformis*       | 8.21824E-06    | 3.64616E-06    | 0           | 5.2879E-05  | 3.06312E-05 | 9.72533E-05 | 2.40482E-06             |
| *Parabacteroides distasonis*  | 1.64365E-06    | 7.29232E-06    | 0           | 0           | 0           | 2.77867E-05 | 4.80965E-05             |
| *Clostridium perfringens*     | 1.64365E-06    | 1.82308E-05    | 0           | 5.87544E-06 | 0           | 0           | 1.92386E-05             |
| *Desulfotomaculum acetoxidans* | 0              | 3.64616E-06    | 0           | 0           | 0           | 0           | 0                      |
| *Citrobacter freundii*        | 0              | 0              | 0           | 0           | 0           | 0           | 0                      |
| *Desulfovibrio piger*         | 0              | 0              | 0           | 0           | 0           | 0           | 0                      |

Total Gasogenic  | 0.503741763 | 0.151913688 | 0.000777008 | 0.085458284 | 0.201468764 | 0.168637204 | 0.055101712 |
Other non-gasogenic  | 0.496258237 | 0.848086312 | 0.999222992 | 0.914541716 | 0.798531236 | 0.831362796 | 0.944898288 |

Note: *C. freundii* and *D. piger* are occasionally detected in minor frequency in fecal samples from older B6 mice (data not shown) but not in these 8 week old.