Supplementary material

・Overweight/obesity is defined as a body mass index (BMI) ≥23 kg/m² in the Asian cohort or a BMI ≥25 kg/m² in the Caucasian cohort. The BMI calculated as weight in kilograms divided by squared height in meters (kg/m²).

・Type 2 diabetes mellitus is defined as HbA1c ≥ 6.5% or specific drug treatment.

・Metabolic risk abnormalities were defined as the presence of at least two of the following metabolic risk abnormalities: (1) Hypertension (systolic blood pressure ≥ 130 mmHg, diastolic blood pressure ≥ 85 mmHg, or specific drug treatment); (2) Hyperlipidemia (defined by specific drug treatment); and (3) Hyperglycemia (defined by specific drug treatment).

**Supplementary Table 1 Strain number of species used in this study**

Species	Strain number
Streptococcus salivarius	JCM 5707^T
Streptococcus thermophilus	JCM 17834^T
Streptococcus vestibularis	DSM 5636^T
Streptococcus mitis	Isolated strain from our laboratory
Streptococcus sanguinis	Isolated strain from our laboratory
Streptococcus austalis	Isolated strain from our laboratory
Streptococcus pneumoniae	Isolated strain from our laboratory
Streptococcus gordonii	Isolated strain from our laboratory

Staphylococcus aureus	ATCC 25923
Escherichia coli	ATCC 25922
Bifidobacterium bifidum	JCM 1255^T
Bacteroides uniformis	JCM 5828^T
Enterococcus faecalis	JCM 5803^T
Clostridium ramosum	JCM 1298^T
Eggerthella lenta	JCM 9979^T
Blautia coccoides	JCM 1395^T
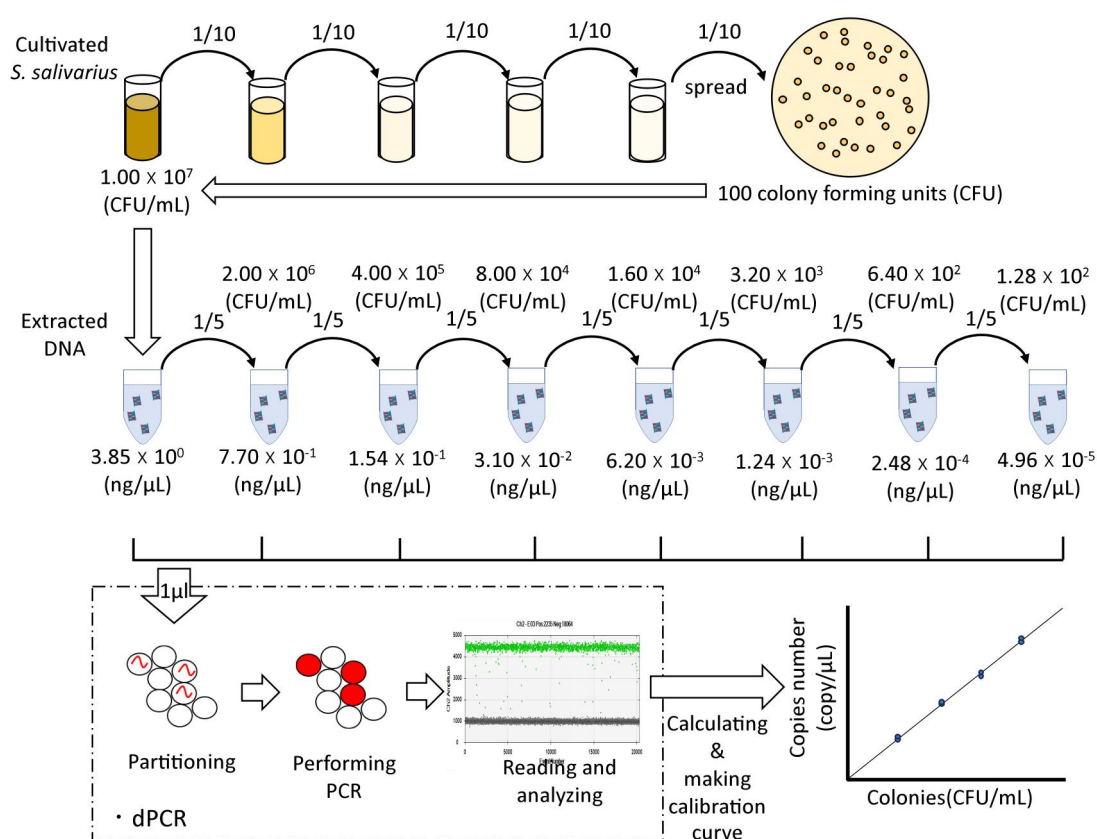
Supplemental Figure 1 Correlation calculation between bacterial count and copy number by digital PCR. Colony forming unit was calculated by serial dilution of the broth cultivated *Streptococcus salivarius*, and DNA was extracted

from the broth. The DNA solution was diluted and analyzed by digital PCR (dPCR). A standard curve was created between the copy number obtained by dPCR and the amount of bacteria. dPCR: Digital PCR; CFU: Colony forming unit; *S. salivarius*: *Streptococcus salivarius*.
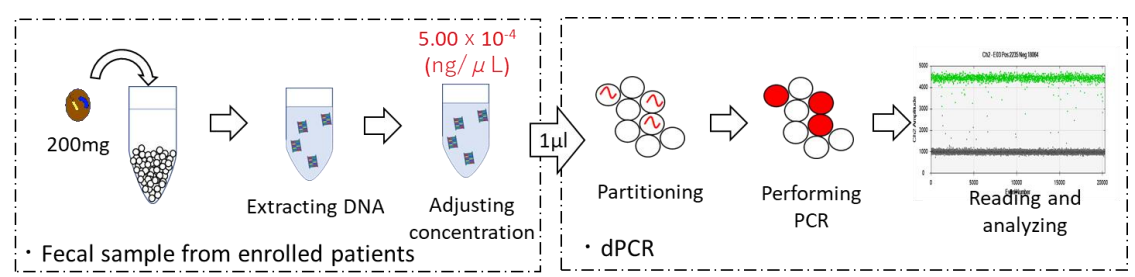
Supplemental Figure 2 Diagram for adjusting the concentration of extracted DNA from stool samples.dPCR: Digital PCR.