



**Supplementary Fig. 1.** (A) Oral glucose tolerance test (OGTT) for 2 hours after 16 hours fasting and glucose administration (2 g/kg) at 10 weeks of treatment with zinc (Zn) gluconate (10 mg/kg) and cyclo-His-Pro (CHP) (5 mg/kg) individually or in combination ( $n=6-8$ ). (B) Glycosylated hemoglobin (HbA1c) levels in KK-Ay mice at 11 weeks of treatment ( $n=6-8$ ). (C) Accumulated calorie intake during 20 weeks of treatment ( $n=7-8$ ). (D, E) Low-density lipoprotein (LDL) cholesterol (CHOL) and total CHOL level in plasma ( $n=7-8$ ). (F) Adipocyte size frequency of white adipose tissue ( $n=7-8$ ). Data shown represent mean  $\pm$  standard error of the mean. Unpaired Student's  $t$ -tests. CTRL, control; NS, not significant. <sup>a</sup> $P \leq 0.05$ , <sup>b</sup> $P \leq 0.01$ , <sup>c</sup> $P \leq 0.001$ .