

## Endurance training *per se* increases metabolic health of overweight men

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**Aim:** To investigate the effect of endurance training *per se* on metabolic health of overweight men.

**Methods:** In a randomized controlled trial 48 healthy overweight men (age:  $31 \pm 1$  [mean $\pm$ SEM] years, BMI:  $28.1 \pm 0.2$  kg/m<sup>2</sup>) underwent a 12-week intervention divided into 4 groups: Training (T), Training and increased Diet (T-iD), Diet (D) or Control (C). An energy deficit of 600 kCal/day was induced by either endurance training or diet in T and D. T-iD followed the same training regimen, but increased dietary intake by 600 kCal/day. C maintained their habitual lifestyle. Before and after the intervention body composition was determined by DXA, maximal oxygen consumption (Vo<sub>2</sub>max) and fat oxidation (FATmax) were determined by indirect calorimetry during bicycle exercise, insulin sensitivity was determined by the hyperinsulinemic euglycemic clamp technique (40mU/m<sup>2</sup>/min) and plasma lipids were determined by commercial assays.

**Results:** The interventions reduced ( $P < 0.001$ ) body mass in T and D by  $5.9 \pm 0.6$  and  $5.3 \pm 0.7$  kg, respectively, whereas T-iD and C remained weight stable. Fat mass was reduced ( $P < 0.01$ ) in T, T-iD and D by  $7.7 \pm 0.8$ ,  $1.9 \pm 0.3$  and  $4.4 \pm 0.7$  kg, respectively. Vo<sub>2</sub>max increased ( $P < 0.001$ ) in T and T-iD by  $0.5 \pm 0.3$  and  $0.5 \pm 0.1$  L/min, respectively. Vo<sub>2</sub>max did not change in D and C. FATmax increased ( $P < 0.05$ ) in T, T-iD and D by  $0.17 \pm 0.14$ ,  $0.13 \pm 0.08$  and  $0.10 \pm 0.06$  g<sub>fat</sub>/min, respectively. Glucose clearance increased ( $P < 0.01$ ) in T and T-iD by  $1.8 \pm 0.4$  and  $1.0 \pm 0.2$  mL/min/kg, respectively, and remained unchanged in D ( $P = 0.09$ ) and C ( $P = 0.9$ ). Plasma total cholesterol and LDL decreased ( $P < 0.05$ ) in T and D, and plasma HDL and ApoA1 increased ( $P < 0.01$ ) and VLDL decreased ( $P < 0.01$ ) in T-iD.

**Conclusion:** Endurance training, irrespective of weight loss, induces beneficial changes in the metabolic health of overweight men.