

## HUMAN NUTRITION

**Title:** Effects of red meat on type 2 diabetes risk factors and markers of chronic inflammation: A systematic review and meta-analysis of randomized controlled trials  
- **NPB #18-012**

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**Scientific Abstract:** Our objective was to conduct a systematic review and meta-analysis to assess effects of total red meat (TRM) intake on glycemic control and inflammation biomarkers using randomized controlled trials (RCTs) of individuals free from cardiometabolic disease. We hypothesized that higher TRM would negatively influence glycemic control and inflammation based on positive correlations between TRM and diabetes. We found 24 eligible studies (median duration 8 weeks) from 1,172 articles in PubMed, Cochrane, and CINAHL up to August 2019 that included 1) diet periods differing in TRM, 2) age  $\geq 19$  years, 3) males or non-pregnant/lactating females, 4) no diagnosed cardiometabolic disease, and 5) fasting glucose, insulin, Homeostatic Model Assessment of Insulin Resistance (HOMA-IR), Hemoglobin A1c (HbA1c), or cytokines including C-reactive protein (CRP). We used 1) repeated measures ANOVA to assess pre to post diet period changes, 2) random-effects meta-analyses to compare pre to post changes between diet periods with  $\geq$  vs  $< 0.5$  servings (35g)/day of TRM, and 3) meta-regressions for dose-response relationships. We also grouped diet periods to explore heterogeneity sources including risk of bias using National Heart, Lung, and Blood Institute's Quality Assessment of Controlled Interventions Studies. Glucose, insulin, and HOMA-IR decreased while HbA1c and CRP did not change during TRM or alternative diet periods. There was no difference in change values between diet periods with  $\geq$  vs  $< 0.5$  servings/day of TRM [weighted mean difference and 95% CI: 0.040 (-0.049, 0.129) mmol/L glucose, -0.710 (-6.582, 5.162) pmol/L insulin, 0.110 (-0.072, 0.293) HOMA-IR, and 2.424 (-1.460, 6.309) nmol/L CRP] and no dose response relationships ( $P > 0.2$ ). Risk of bias (85% of studies were fair to good) did not influence results. Total red meat consumption, for up to 16 weeks, does not affect biomarkers of glycemic control or inflammation for adults free of, but at risk for, cardiometabolic disease.

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