**Highlight:**

We explored the role of lipid accumulation products and visceral adiposity on the association between Red meat consumption (RMC) and markers of insulin resistance (IR) and inflammation in US adults.

In adjusted models, a lower RMC was significantly associated with a cardio-protective profile of IR and inflammation

Body mass index (BMI) had significant mediation effects on the associations between RMC and C-reactive protein (CRP), Apolipoprotein-B, fasting glucose (FBG) and insulin.

Both waist circumference and anthropometrically predicted visceral adipose tissue (apVAT) mediated the association between RCM with CRP, FBG, HbA1c, TG: HDL ratio and TyG index.