Concurrent Session 12: Interventions in Obesity

Effect of weight loss on a high red meat diet compared to a high carbohydrate/low red meat diet on IGF concentration in obese subjects

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Background – Insulin-like growth factors (IGF) are thought to play a major role in the link between obesity and increased colorectal cancer risk. IGF-I and -II are positively associated with obesity and their concentration can be modulated by diet. Observational studies suggest that fasting and energy restriction lowers total IGF-I, where as total protein and red meat are positively associated with total IGF-I. However, the association for protein and red meat with IGF-I is unconfirmed in clinical investigations. Furthermore, the effect of total protein and red meat on circulating IGF-II, soluble IGF-II receptor and IGF binding protein-2 (IGFBP-2) concentration is not known.
Objective – Our aims were to investigate 1) whether a moderate energy restriction diet (7000kJ) over 12 weeks, altered IGF-I and –II, IGFBP-2 and IGF-II receptor concentration in obese men, and 2) whether a high protein diet, high in red meat (HP) affected IGF-I and –II, IGFBP-2 and IGF-II receptor concentration to a similar extent as a high carbohydrate diet (HC).
Design – One hundred and twenty three overweight or obese men were randomised to one of the two parallel isocaloric dietary interventions, HP (n=61) and HC (n=62). Blood samples collected at baseline, and after 12 weeks of intensive weight loss, were analysed for total IGF-I and -II, IGF-II soluble receptor and IGFBP-2.
Outcomes – After 12 weeks, both diets significantly reduced body weight (HP 9.1±4.6kg HC 8.7±3.9kg, P<0.001) and increased total IGF-I (HP 40 ± 7 μg/L (22%) HC 35 ± 6 μg/L (19%), P<0.0001) with no significant difference between diets (P= 0.423). Although IGFBP-2 increased for both diets following weight loss (HP 39 ± 12 μg/L (33%) HC 65 ± 10 μg/L (51%), P < 0.0001), total IGF-II concentration did not change (P=0.066). Furthermore, soluble IGF-II receptor levels decreased following both diets (HP 4.7 ± 1.4 μg/L (7%) HC 5.0 ± 1.2 μg/L (8%), P<0.005).
Conclusion – Energy restriction had the largest influence on total IGF-I, IGFBP-2 and IGF-2 soluble receptor concentration, which was independent of type of diet, protein or red meat content.

Does a high protein diet induce renal dysfunction via activation of the advanced glycation pathway?

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Background – It is well established that consumption of a high protein diet induces renal dysfunction in rodents. Activation of the advanced glycation end product pathway (AGE) and oxidative stress are involved in renal damage in both diabetes and end stage renal disease. Previous human studies of the Atkins diet have shown an increase in circulating methylglyoxal, a potent glycating agent.
Objective – To investigate the effects of a high protein diet on the AGE pathway and oxidative stress in the kidney.
Design – Healthy male Sprague-Dawley rats were fed either a standard diet (control 20% protein) or high protein diet (HPD 50% protein) for 24 weeks and renal function, AGE accumulation and oxidative stress were assessed.
Outcomes – Consumption of a HPD for 24 weeks resulted in an 18% decrease in body weight compared to rats eating the standard diet. The HPD induced marked renal dysfunction as observed by a 20-fold increase in urinary albumin excretion and a 37% increase in creatinine clearance. Structural renal damage was also evident with glomerulosclerosis and tubulointerstitial fibrosis and elevations in the activity of renal cortical transforming growth factor-β (TGF-β) and vascular endothelial growth factor (VEGF). The HPD increased accumulation of AGEs in the circulation and the renal cortex and upregulated the receptor for AGEs, RAGE (both mRNA and protein) in the kidney. These changes were consistent with increased renal oxidative stress, reflected by excess superoxide production, hydrogen peroxide and nitrotyrosine content of the renal cortex.
Conclusion – These data indicate that consumption of a HPD activates the AGE and oxidative stress pathways in the kidney, possibly promoting renal dysfunction. Further studies are required to clarify these observations mechanistically.