NSA Concurrent Oral Session 4: Lipids

The effect of dietary saturated fat on endothelial function

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Background - The impact different dietary fatty acid profiles have on endothelial function is not well understood.
Objective - To determine whether diets high in unsaturated fats induce greater endothelial vasodilation compared to diets high in saturated fat (SFA) or carbohydrate (CARB).
Design - Cross-over design of 40 healthy subjects (19 men; 21 women) stratified by high or low (1.22mmol/l women; 0.9mmol/l men) high-density lipoprotein cholesterol (HDL-C) concentrations. Subjects were randomly assigned to 4 diets of 3 weeks duration which were isocaloric and enriched with approximately 20% energy as polyunsaturated fat (PUFA), monounsaturated fat (MUFA), SFA or CARB. Flow Mediated Dilatation (FMD) and fasting lipids were measured following each intervention.
Outcomes - FMD was impaired following the SFA diet (5.41 ± 2.45% vs 10.80 ± 3.69% for all other diets, $P<0.01$). LDL cholesterol concentrations were elevated after SFA compared to all the other diets ($P<0.005$). Triglyceride concentrations rose in the low HDL-C group following CARB (High HDL-C group 1.20 ± 0.58 vs Low HDL-C group 2.90 ± 1.67, $P=0.008$).
Conclusions - Diets high in saturated fat impair endothelial function assessed by FMD compared to diets high in PUFA, MUFA or CARB. Subjects with low HDL-C had an increase in triglyceride on CARB but this had no impact on FMD.

Macadamia or olive oil enriched diets induce changes in heart structure and function similar to regular exercise in rats

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Background- Previously, we found that the hearts of rats fed olive oil as a sole fat source developed non-pathological hypertrophy, characterised by larger left ventricular volumes, increased cardiac outputs, and a greater resistance to ischaemic stress. These changes are similar to those observed in 6-week exercise trained rats on a standard rat chow (SRC) diet.
Objectives- to determine if dietary macadamia and olive oil (oleic acid rich), generate similar adaptations in heart physiology, and to test if such changes translate into an endurance advantage.
Design- Rats were divided into 3 groups of 12 rats. Each group received one of three diets differing only in oil source. One group received a control diet (SRC), one group received a diet containing extra virgin olive oil, and one group received a diet containing macadamia oil. Each diet group of rats was further divided into two subgroups of 6 rats, one subgroup being run-trained for 30min/day run at 0.8km/h for 5 days on a treadmill. The other subgroup was left untrained. All rats were run challenged to exhaustion on the 6^{th} day and rested on the 7^{th}. After 7 weeks of diet with or without exercise training, rats underwent *in vivo* echocardiography to calculate cardiac function. Hearts were then isolated and perfused to examine tolerance to 20 min of ischemia followed by 30 min of reperfusion.
Outcomes- Improved cardiac structure, endurance performance *in vivo* and recovery after ischaemia in animals fed macadamia or olive oil, compared to the control diet. Exercise did not appear additive to diet although macadamia fed animals had the highest exercise endurance times.
Conclusions- These findings suggest macadamia oil confers similar beneficial effects on the cardiovascular system to those seen with olive oil. These favourable events resemble (but are not amplified by) those evoked by regular exercise in rats.