Metabolic markers of inflammation, oxidative stress, lipid profile and procollagen type 1 content of spontaneously hypertensive rats fed a high-fat-high-carbohydrate diet

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Background: Consumption of high-fat-high-carbohydrate (HFHC) diets increases the risk of developing obesity, diabetes and cardiovascular disease. Hallmarks of such conditions include increased triglycerides, cholesterol, inflammation and oxidative stress in addition to increases in procollagen type 1 content that leads to remodelling of cardiac tissue. This study aimed to assess metabolic parameters associated with HFHC diet induced obesity in a spontaneously hypertensive rat (SHR) model of metabolic syndrome.

Method: Male SHR and WKY rats aged 16 weeks were fed a HFHC (23.9% fat, 51.5% carb) diet or standard chow (SC) for 20 weeks. Body weights and food intake were recorded weekly. After euthanisation at 36 weeks of age, blood samples were taken for analysis of interleukin-6, nitric oxide, 8-isoprostane, LDL, HDL, triglycerides, total cholesterol and procollagen type 1.

Results: Serum LDL (mg/dL) was increased in SHR-HFHC rats (123.06±8.32) compared to SC rats (54.44±3.50), as were triglyceride levels (mg/dL) (SHR-HFHC 1370.51±75.57; SC 181.30±21.04) and total cholesterol (SHR-HFHC 411.91±28.88; SC 137.01±4.26). HDL levels (mg/dL) were increased in WKY-HFHC rats (64.68±7.90) compared to SC rats (46.31±5.06) but decreased in SHR-HFHC rats (21.10±4.47). Procollagen type 1 concentration (mU) was increased in SHR-HFHC rats (0.860±0.030) compared to SC rats (0.741±0.026). Concentration of 8-isoprostane (pg/mL) was increased in SHR-HFHC rats (228.04±10.38) compared to SC rats (119.67±17.49). No change was observed in nitric oxide levels.

Conclusions: HFHC feeding induces obesity and alters lipid profile, oxidative stress status and induces cardiac remodelling in SHR and WKY rats. The adverse effects of a HFHC diet are enhanced with the co-occurrence of hypertension.

Biography
Kylie Connolly is a PhD student at CQUniversity, Australia, currently researching the prevention of cardiovascular dysfunction in animal models of obesity, hypertension and metabolic syndrome using the polyphenolic flavonoid epicatechin in comparison with the traditional ACE inhibitor perindopril.

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