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## Role of dietary fatty acids and acute hyperglycemia in modulating cardiac cell death

Sanjoy Ghosh <sup>1</sup>, Ding An, Thomas Pulinilkunnil, Dake Qi, Howard C S Lau, Ashraf Abrahani, Sheila M Innis, Brian Rodrigues

Affiliations

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### Abstract

**Objective:** We examined the effect of dietary manipulation of palmitic acid (20% [w/w] palm oil [PO]) on cardiomyocyte apoptosis in the rat heart under normoglycemic and hyperglycemic conditions *in vivo*. We used 20% (w/w) sunflower oil (SO; a diet rich in omega-6 polyunsaturated fatty acids) as an isocaloric control.

**Methods:** Adult male Wistar rats were fed experimental diets containing normal laboratory chow (5% corn oil) or a high fat diet (AIN-76A with PO or SO) for 4 wk. Subsequently, to induce diabetes, rats were injected with streptozotocin (55 mg/kg, intravenously). After 4 d of diabetes, hearts were tested for evidence of lipotoxicity and cell death, and the serum for its related markers.

**Results:** Feeding PO and SO magnified palmitic and linoleic acid contents within lipoproteins and hearts respectively. Compared with SO, PO diabetic hearts demonstrated significantly higher levels of apoptosis, with an altered Bax:Bcl-2 ratio, augmented lipid peroxidation, and protein modification by formation of nitrotyrosine. Interestingly, SO-fed diabetic animals demonstrated an increase in serum lactate dehydrogenase and myocardial necrotic changes.

**Conclusion:** In marked contrast to results obtained *in vitro*, PO feeding led to only a minor fraction of cardiomyocytes undergoing apoptosis and suggests that, in the intact heart, protective mechanisms could be triggered that dampen excessive apoptosis. Of greater clinical significance was the observation that "heart-friendly" vegetable oils such as SO, rich in omega-6 polyunsaturated fatty acids, could precipitate cardiac necrosis, and questions its beneficial role in the cardiovascular system, especially following diabetes.

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