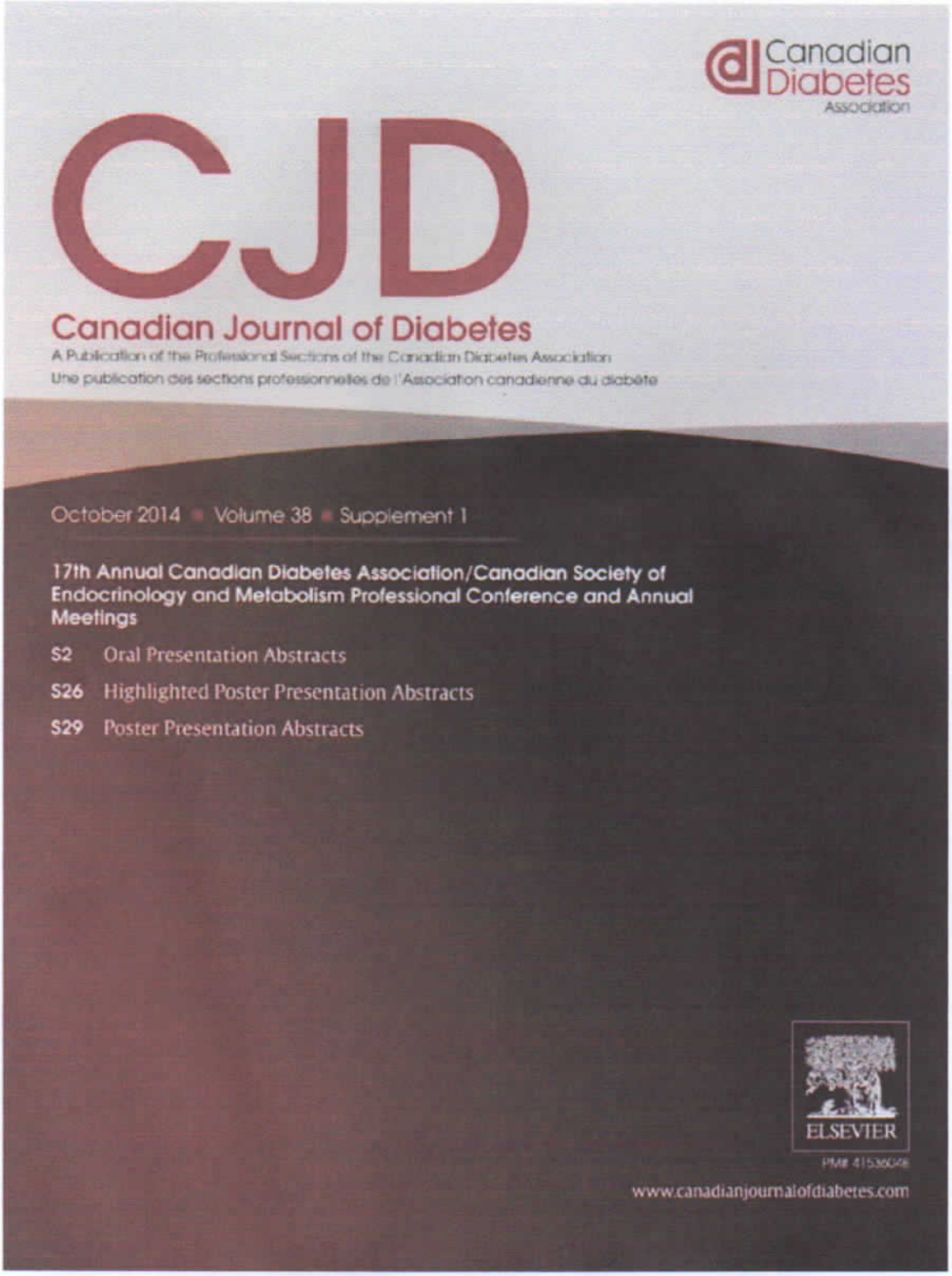
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# Cinnamon has Higher Efficacy in Attenuating Postprandial Hyperglycemia in Healthy Subjects When Taken After Intake of Glucose

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Cinnamon's potential efficacy in regulating hyperglycemia has been gaining interest. Evidence from animal studies proves its efficacy as an insulin mimetic and insulin-sensitizing agent. Other studies on humans reported that this spice lowers fasting blood glucose after several weeks of consumption. This study investigated the ability of cinnamon to attenuate postprandial hyperglycemia and whether time of ingestion is a determining factor of its efficacy in normal subjects. The study was approved by the university ethical committee. Thirty healthy subjects fasted for 10–12 hours prior to each experiment of the study and each of this experiment has a 1-week washout period. For the control (C) experiment, the subjects were given 75 g of D-(+)-glucose monohydrate alone, whereas for the treatment experiments subjects were given 6 g of cinnamon at different times such as 30 minutes before (B), 30 minutes after (A) ingestion of glucose and simultaneously (S) given with glucose. At 0, 30, 60, 90 and 120 minutes after treatment blood sample was taken then measured its glucose content using Accu-chek Performa®. The total iAUC (±SEM) measured are as follows: C (17,262±351), B (15,592±345), A (13,025±305) and S (14,668±460). One-way ANOVA test was used to compare means of iAUC among the control and treatment groups and the significance of the difference of each pair is C-vs-B (p=.021), C-vs-S (p=.000), C-vs-A (p=.000), B-vs-S (p=.038), B-vs-A (p=.000), S-vs-A (p=.024). It is concluded that cinnamon significantly attenuates postprandial hyperglycemia and it has higher efficacy when taken 30 min after ingestion of glucose.

completing antiviral therapy he no longer required any diabetes medications. Two years after the completion of HCV treatment, the patient has maintained an HbA1c of 5.8% without diabetes medication.

**Lessons learned:** This case provides further evidence of the important relationship between HCV and diabetes and highlights the potential reversibility of glucose abnormalities with successful eradication of HCV. Increased awareness of this association may improve detection of undiagnosed HCV infection, identify patients with reversible causes of diabetes, guide therapeutic decisions for HCV treatment and improve outcomes in patients afflicted with both diseases.

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### Determining the Role of Adiponectin Processing in Improving Insulin Resistance

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Secretion of adiponectin, an anti-atherogenic and anti-diabetic adipokine is decreased in obesity, as fat accumulates and adipocytes enlarge. Even though a link between adipose dysfunction, insulin resistance and diabetes has been identified, the direct physiological effects of adiponectin processing on obesity-induced diabetes have yet to be investigated. Recently, it was hypothesized that full-length adiponectin (fAcrp) is inactive and that globular adiponectin (gAcrp) is the functional form. Our preliminary studies showed that the gAcrp and not fAcrp inhibited the proliferation of primary smooth muscle cells in vitro in response to platelet-derived growth factor. Hence we hypothesize that the generation of gAcrp from fAcrp is essential for eliciting the beneficial actions of adiponectin in reversing insulin resistance. Our aim is to compare the effects of different forms of adiponectin namely fAcrp, gAcrp and prAcrp (protease resistant mutant of fAcrp that cannot be cleaved into gAcrp) on insulin resistance in a diet-induced obese adiponectin knockout (APN−/−) mouse model and at the molecular level using primary human endothelial cells and HepG2 hepatoma cells. Our group has identified that thrombin and not trypsin or leukocyte elastase as generally believed, is the protease responsible for generating gAcrp from fAcrp. Treatment of fAcrp but not prAcrp with thrombin resulted in the formation of gAcrp. The expression levels of adiponectin receptors R1, R2 and T-cadherin (a third adiponectin receptor) were found to be similar in different endothelial cell types and HepG2 cells.

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### Cinnamon has Higher Efficacy in Attenuating Postprandial Hyperglycemia in Healthy Subjects When Taken After Intake of Glucose

*ALBERT M. HUTAPEA, LYNA M.N. HUTAPEA, DWIGHT M.M. HUTAPEA*
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Cinnamon's potential efficacy in regulating hyperglycemia has been gaining interest. Evidence from animal studies proves its efficacy as an insulin mimetic and insulin-sensitizing agent. Other studies on humans reported that this spice lowers fasting blood glucose after several weeks of consumption. This study investigated the ability of cinnamon to attenuate postprandial hyperglycemia and whether time of ingestion is a determining factor of its efficacy in normal subjects. The study was approved by the university ethical committee. Thirty healthy subjects fasted for 10–12 hours prior to each experiment of the study and each of this experiment has a 1-week washout period. For the control (C) experiment, the subjects were given 75 g of D-(+)-glucose monohydrate alone, whereas for the treatment experiments subjects were given 6 g of cinnamon at different times such as 30 minutes before (B), 30 minutes after (A) ingestion of glucose and simultaneously (S) given with glucose. At 0, 30, 60, 90 and 120 minutes after treatment blood sample was taken then measured its glucose content using Accu-chek Performa®. The total iAUC (±SEM) measured are as follows: C (17,262±351), B (15,592±345), A (13,025±305) and S (14,668±460). One-way ANOVA test was used to compare means of iAUC among the control and treatment groups and the significance of the difference of each pair is C-vs-B ($p=.021$), C-vs-S ($p=.000$), C-vs-A ($p=.000$), B-vs-S ($p=.038$), B-vs-A ($p=.000$), S-vs-A ($p=.024$). It is concluded that cinnamon significantly attenuates postprandial hyperglycemia and it has higher efficacy when taken 30 min after ingestion of glucose.

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### Increased Glucose Uptake in L6 Rat Skeletal Muscle Cells by Rosemary

*MADINA NAIMI*, EVANGELIA L. TSIANI*
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Skeletal muscle (SKM) is important in glucose homeostasis and it is quantitatively the most important insulin-target tissue. Impaired insulin action in this tissue leads to insulin resistance (IR) and type 2 diabetes mellitus. In recent years, activation of the energy sensor, 5' AMP-activated kinase (AMPK), has been viewed as a targeted approach to counteract IR. Chemicals found in plant extracts such as polyphenols have attracted attention for their potential use for treating IR. Recent in-vitro and in-vivo studies indicate that rosemary extract (RE) has anti-diabetic properties, although its effects on muscle and exact mechanisms involved are not known. In the present study, we examined the effects of RE and the mechanism of regulation of glucose uptake (GU) in SKM cells. RE stimulated GU in L6 myotubes in a dose- and time-dependent manner. Maximum stimulation was seen with 5 μg/mL of RE for 4 h (184±5.07% of control, $p<0.001$), a response comparable to maximum insulin stimulation (191±5.26% of control, $p<0.001$). Furthermore, carnosic acid and rosmarinic acid, major polyphenols found in RE, increased GU indicating that these compounds may be responsible for the RE effects. RE did not affect Akt phosphorylation while significantly increasing AMPK phosphorylation. Furthermore, the increased GU with RE was significantly reduced by the AMPK inhibitor, compound C. Our study is the first to show a direct effect of RE on SKM GU by a mechanism that involves AMPK activation. Our findings are very important and suggest a potential use of RE to regulate glucose homeostasis and counteract IR.

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### Beneficial Effects of a Polyphenol-Rich Supplement from Strawberry and Cranberry on Glucose Metabolism in Free-Living Insulin-Resistant Men and Women

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**Background:** Polyphenols from berries are associated with several beneficial effects on health, but clinical studies on their impact on insulin sensitivity remain unclear.

**Objective:** The objective was to determine the effects of a polyphenol-rich preparation of strawberry and cranberry extracts on insulin sensitivity, glucose tolerance and insulin secretion, in free-living men and women with overweight and insulin resistance.

**Methods:** The study was a parallel, randomized, double-blinded, placebo-controlled, 6-week dietary intervention trial. A total of 41 insulin-resistant subjects (40 to 65 years old) who were overweight or obese (IMC $\geq 25$) completed the study. The experimental group consumed the polyphenol-rich supplement (333 mg polyphenols) daily in a liquid preparation, while the control group received a flavour-matched placebo liquid. A hyperinsulinemic-euglycemic

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