**Effects of dietary chromium-methionine supplementation on blood metabolites and insulin**

**resistance index in fructose-fed diabetic rats model**

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**Introduction** Insulin resistance (IR) is a problem in periparturient dairy cows (Hayirli, 2000). The transition period is a

critical phase for dairy cows and can cause negative energy balance and physiological stresses that develops in to IR.

Chromium has the potential for lowering plasma free fatty acids and cholesterol concentrations that potentiates

predominantly the IR by causing secretion of inflammatory cytokines from insulin dependent adipose tissues. The role of

chromium is probably associated with increasing the insulin internalization and amplifying insulin signalling through

activation of cellular insulin receptors. The exact evaluation of chromium in ruminants, necessitates the use of modelling

for simulation IR in laboratory animals (Jalal, 2007). The aim of this experiment was to evaluate the effects of organic

chromium on blood metabolites and IR index in fructose-fed insulin resistant (diabetic) rats.

**Material and methods** Twenty six Wistar male rats (mean BW of 225± 25g), were provided by the Iranian Pastor Institute

and housed individually in standard cages, in an air conditioned (22± 2°C) room with a 12h light and dark cycle. All rats

were nourished with 15g standard rat chow. After 1 week adaptation, 10 rats were used as healthy control group and 16 rats

received fructose (10% weight/volume) in drinking water for 5 weeks. The insulin resistant (fructose-fed) rats were divided

into two groups. Eight rats were fed 50 ppm chromium-methionine (Cr-met) supplement in the diet and the others remained

in the previous feeding state for 6 weeks. Animals were blood sampled prior to chromium administration in order to test for

IR inducing as well as after the end of the experiment for determination of blood serum parameters including fasting

glucose, triglyceride, cholesterol and insulin contents. Centrifuged and extracted serum samples were stored at -20°C and

transported to Mashhad Medical University labs for analysis. IR index was calculated by HomA-IR (Homeostatic model

assessment of IR) software (Oxford University). Data were analysed using general linear model of SAS (2000) as

completely randomized design with analysis of covariance.

**Results** The effect of fructose on blood parameters are shown in Table 1. In the first period of the study, IR was induced

significantly (P <0.05) in rats receiving fructose. Serum fasting glucose, insulin, IR index (HomA-IR) and triglyceride

contents, were significantly increased (P <0.05) in the fructose-fed group in comparison with the control rats. These

changes could be the result of the fructose

metabolite effects on insulin signaling in adipose

tissues. Gene expression of insulin signaling

mediators under the indirect effect of increased

triglyceride of blood serum is another possibility.

According to the results obtained in the second

period of this study, IR index significantly (P

<0.05) decreased after Cr-met supplementation

(Table2). The fasting insulin, glucose and

triglycerides concentration in Cr-met treated group

was lower (P<0.05) than

the fructose-fed insulin

resistant group.

**Conclusions** the result of

this study indicated that

chromium

supplementation as Crmet

could be effective in

lowering IR index, fasting

insulin, glucose and

triglyceride in insulin resistant rats. It is possible that the mode of action of chromium supplementation follows the similar

model in ruminant animals, although more studies are required.

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**References**

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