Dietary Fructose vs Glucose Does Not Influence Iron Status in Rats

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ABSTRACT

The effect of dietary fructose vs glucose on iron status was studied in rats. Female rats were fed for 4 wk diets containing either fructose or glucose (709.4 g monosaccharide/kg). Fructose vs glucose lowered iron concentrations in liver, kidney, and heart, but did not alter absolute iron contents.

Index Entries: Fructose; iron status; rat.

INTRODUCTION

The influence of dietary fructose on iron stores in the liver is not clear. Fructose vs glucose either lowered (1, 2) or raised (1) the amount of iron in liver of rats. Fructose vs starch in the diet either lowered (2) or did not influence (3) the absolute amount of iron in liver. In the present experiment with rats, the effect of dietary fructose on iron concentrations in various tissues was investigated.

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MATERIALS AND METHODS

We used female Wistar (Cpb:WU) rats, aged about 7 wk. All rats went through a pre-experimental period of 2 wk during which they received *ad libitum* a purified diet and demineralized water. The diet composition was as follows (g/kg): casein, 151; glucose, 709.4; corn oil, 25; coconut fat, 25; cellulose, 30; CaCO$_3$, 12.4; NaH$_2$PO$_4$.2H$_2$O, 15.1; MgCO$_3$, 1.4; KCl, 1.0; KHCO$_3$, 7.7; mineral premix, 10; vitamin premix, 12. The composition of the mineral and vitamin premix has been published elsewhere (4). The dietary concentration of added iron was 35 mg/kg.

At the end of the pre-experimental period (d 0 of the experiment), the rats were divided into 2 groups of 12 animals each, so that body weight distributions within the groups were similar. Each group was randomly assigned to either the glucose diet described above or to an identical diet except that the glucose component was replaced by fructose. The purified diets, which were in powdered form, were stored at 4°C until feeding. Food and demineralized water were provided *ad libitum*. Housing conditions have been described (4). Feed intake and body weights were recorded. The experiment lasted 28 d.

At the end of the experiment, the rats were anesthetized by exposure to diethyl ether. Blood was taken by orbital puncture and the anesthetized rats were immediately killed by decapitation. Heart, kidneys, liver, spleen, and tibia were excised, weighed, and frozen at -20°C.

In whole, heparinized blood, hemoglobin, and hematocrit were measured using a Sysmex K1000 (Automated Hematology Analyzer, Toa Medical Electronics Co. Ltd, Kobe, Japan). Plasma iron, total iron binding capacity, and transferrin saturation were determined using a commercial kit (Iron FZ Test, Roche, Roche diagnostics, Basel, Switzerland) and a COBAS-BIO auto-analyzer (Hoffman-La Roche BV, Mijdrecht, The Netherlands). Heart, kidneys, spleen, and tibia were dried overnight (105°C), weighed, and ashed (500°C, 17 h). The ash was dissolved in 1 mL of 6M HCl and 4 mL of demineralized water. Iron in liver was measured after wet ashing with 14M nitric acid. Appropriate dilutions were made for determination of iron by atomic absorption spectrometry (Varian AA-475; Varian Techtron, Springvale, Australia).

RESULTS AND DISCUSSION

Feed intake was significantly lower in rats fed the fructose diet, but final body weight did not differ between the two groups (Table 1).