THE EFFECTS OF THE DIFFERENT HIGH PROTEIN DIETS ON CARDIOVASCULAR SYSTEM AND UREMIC SYNDROME CHARACTERISTICS IN RATS WITH NEPHRECTOMY

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OBJECTIVES

Diets containing animal and vegetable proteins have different effects on the course of renal failure (RF). Among the plant proteins of greatest interest are soy proteins because they contain all the essential amino acids. For these reasons, we attempted to study the effects of high-protein diets (HPD), containing soy or egg proteins on the cardiovascular system and the characteristics of uremia in male Wistar rats with 5/6 nephrectomy (NE)

METHODS

Three groups of experimental animals were studied: (1) NE rats kept out on standard ration (20% animal protein; n=12); (2) NE rats received HPD1 (50% egg protein; n=9) and (3) NE rats received HPD2 (50% soy protein; n=9). Animals were taken out of the experiment two mo after NE or sham operation. Blood pressure (BP, mm Hg) was measured in awaked rats by tail cuff method. Heart beat rate (HBR, beats/min) recorded automatically on the tail. In blood serum concentrations of urea (Ur, mmol/l), total cholesterol (TC, mmol/l), inorganic phosphorus (Pi, mmol/l) and alkaline phosphatase (AP, U/l) were determined. Left ventricular mass index (LVMI, mg/g) was calculated as the ratio: ventricular mass/body mass. Data are presented as mean±SE. Unpaired Student t-test was used. NFκBp65 mRNA expression in myocardium was investigated using RT-PCR. GAPDH was used for normalization. Relative expression levels (REL) between groups were calculated using the 2-delta Ct protocol. A two-fold change was considered to be significant.

RESULTS

Two mo after NE there were no statistically significant difference between groups (1) and (2) by levels of Ur (16.2±0.36 and 16.7±0.75, respectively), Pi (2.59±0.09 and 3.10±0.1, respectively), TC (1.60±0.12 and 1.64±0.08, respectively), AP (494.3±39.5 and 590.0±51.1, respectively), BP (150±5 and 160±10, respectively) and HBR (407.0±17.0 and 415.0±15.0, respectively; p=NS in all cases). LVMI in rats received HPD1 (3.36±0.09) were significantly more than in animals kept out on standard diet (2.94±0.12; $p<0.05$). On the contrary in group (3) the values of Ur (10.7±0.56, $p<0.001$), Pi (1.96±0.02, $p<0.05$), TC (1.11±0.08, $p<0.005$), BP (120.5±5, $p<0.001$) and HBR (354±14) were significantly lower than in group (1). Also LVMI in rats received HPD2 (2.64±0.11) was less than in animals the consumed a standard ration, but this difference did not achieve statistical significance ($p<0.1$). Similar in group (3) in comparison with group (2) Ur ($p<0.001$), Pi ($p<0.001$), TC ($p<0,001$), AP (404.8±35.5, $p<0.01$), BP ($p<0.005$), HBR ($p<0.01$) and LVMI ($p<0.001$) were significantly lower. The relative index of NFκBp65 gene expression in myocardium was minimal in group (3) (REL - 1.34) and significantly lower indices of comparison groups. In other hand, relative indices of group (2) (REL - 7.46) and group (1) (REL - 5.01) did not differ significantly among themselves.

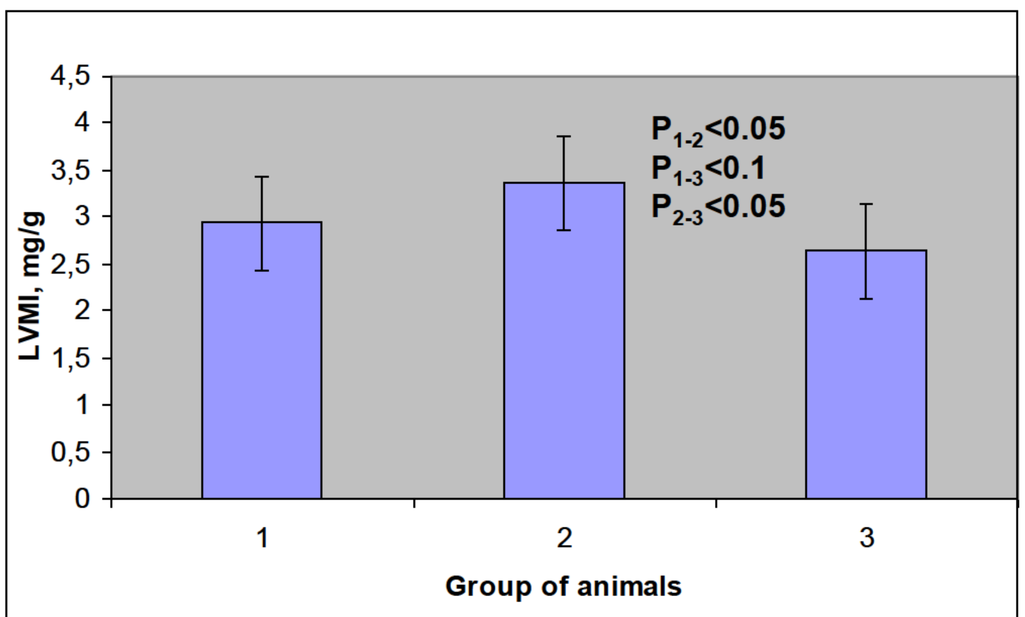

Fig. 1
LVMI in rats received different diets (1 - sandart diet; 2 - animal protein; 3 - soy protein)

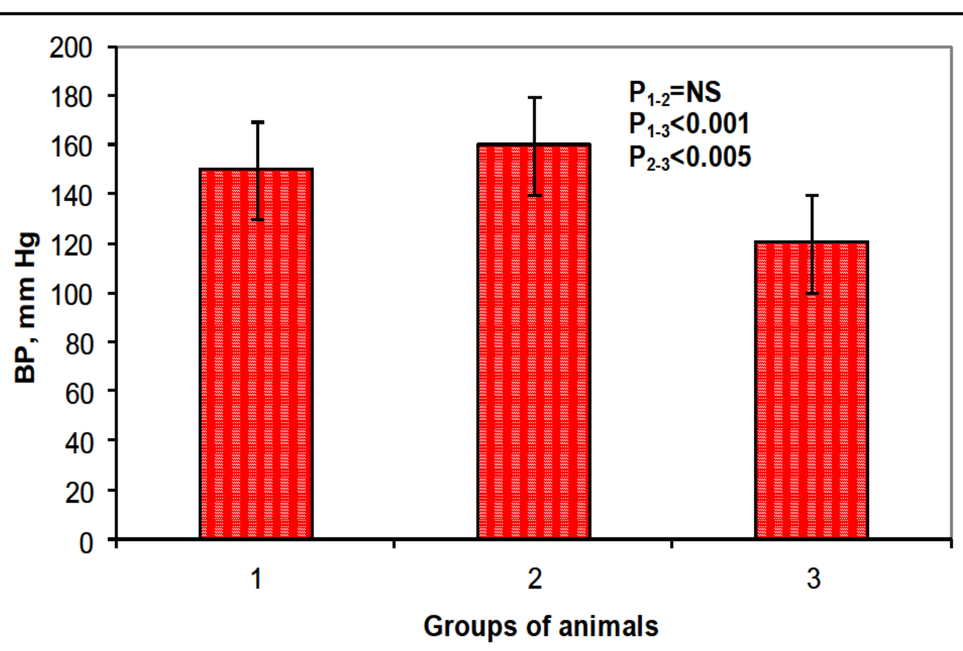

Fig. 2
BP in rats received different diets (1 - standard diet, 2 - animal protein, 3 - soy protein)

CONCLUSIONS

Soy HPD have a less deleterious influence on the cardiovascular system in experimental RF than animal HPD. Possibly this effect of the soy proteins, partly, due to their ability to interfere with the NFκBp65 signaling pathways.

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