CARDIOPROTECTIVE AND METABOLIC EFFECTS OF LOW PROTEIN DIET SUPPLEMENTED WITH KETOANALOGUES OF ESSENTIAL AMINO ACIDS IN RATS OF DIFFERENT GENETIC LINES

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Objectives:

Low protein diets (LPD) serve one of approach to retardation of the decline of kidney function in chronic kidney disease. Some date suggest that LPDs may have not only nephro- but also cardioprotective effect. However, prolonged use of LPD can lead to protein energy wasting. In this regard we attempt to evaluate possible cardoprotective and metabolic effects LPD supplemented with essential amino acids/ketoanalogues (EA/KA) in spontaneously hypertensive rats (SHR) and Wistar rats with nephrectomy (NE).

Methods:

Four groups of the animals with NE were studied. (1) Wistar rats (WSR) received standard ration (20% animal protein; n=10), (2) Wistar rats (WEA/KA) received LPD supplemented EA/KA (n=9). (3) SHR rats (SHRSR) received SR (n=18), (4) SHR rats (SHREA/KA) received LPD supplemented with EA/KA (n=11). LPD included 90% of pearl barley and 10% of EA/KA complex (Ketosteril®, Fresenius Kabi, Germany). Model of renal failure (5/6 NE) was induced by a two-step reduction of the nephron mass with one week interval. Animals were taken out of the experiment, two month after NE. Mean BP was measured in awaked rats by the tail cuff method and heart beat rate (HBR) was tally up. Also, two month after NE concentrations of urea (Ur), creatinine (Cr), inorganic phosphorous (Pi), total cholesterol (TCh) and total protein (TP) in blood serum were determined. The degree of left ventricular hypertrophy was estimated as a ratio: left ventricular mass/body mass (LVH; mg/g). The results are presented as mean $_{(SE)}$. Student's inpaired t-test for date analysis was used.

Table. Parameters studied in different groups of rats

Parameters	Groups of rats			
	(1) WSR, n=10	(2) WEA/KA, n=9	(3) SHRSR, n=18	(4) SHREA/KA, n=11
Ur, mmol/l	$16.0_{(0.16)}$	$7.5_{(0.75);}$ $P_{1-2}<0.001$	$18.71_{(2.05)}$	$9.85_{(0.83);}$ $P_{3-4}<0.00001$
Cr, mmol/l	$0.067_{(0.004)}$	$0.065_{(0.008);}$ P=NS	$0.078_{(0.006)}$	$0.076_{(0.004);}$ P=NS
Pi, mmol/l	$2.59_{(0.09)}$	$2.09_{(0.07);}$ $P_{1-2}<0.0005$	$2.39_{(0.07)}$	$2.32_{(0.07);}$ P=NS
TCh, mmol/l	$1.60_{(0.12)}$	$1.44_{(0.17);}$ P=NS	$1.20_{(0.06)}$	$1.24_{(0.06);}$ P=NS
TP, g/l	$56.5_{(1.3)}$	63.6±0.12; $P_{1-2}<0.0005$	$63.55_{(1.16)}$	$66.64_{(1.12);}$ P=NS
BP, mm Hg	$153.0_{(3.0)}$	$125.0_{(5);}$ $P_{1-2}<0.005$	$206.9_{(2.3)}$	$156.6_{(1.8);}$ $P_{3-4}<0.00001$
HBR, min^{-1}	$407_{(17)}$	$369_{(10.0);}$ P=NS	$414.8_{(7.2)}$	$453.3_{(7.5);}$ $P_{3-4}<0.005$
LVH, mg/g	$2.8_{(0.09)}$	$2.42_{(0.04);}$ $P_{1-2}<0.005$	$3.68_{(0.091)}$	$2.89_{(0.078);}$ $P_{3-4}<0.00001$

Results:

In Wistar rats two month LPD lead to lower values of Ur, Pi, TCh, BP and LVH in comparison with WSR animals (Table). On the contrary in at first level of TP was significantly lower than in the latter (Table). In SHRSR Ur, BP and LVH were significant higher but HBR – lower than SHREA/KA (Table).

Conclusions:

The results confirm that LPD supplemented with EA/KA is an effective tool to the cardioprotection in chronic reduction of the nephron mass. The cardioprotective and antihypertensive effects of this ration appear even with unfavorable hereditary in respect of hypertension. It is important that this type of diet does not lead to negative metabolic consequences

DOI: 10.3252/pso.eu.54ERA.2017
ePosters supported by F. Hoffmann- La Roche Ltd.