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백서에서 신생아기 과영양에 의한 성인기 과체중, 고혈압 및 신손상

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Overweight, Hypertension and Renal Dysfunction in Adulthood of Neonatally Overfed Rats

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Accelerated growth in early infancy has been associated with later cardiovascular and metabolic diseases. We recently showed that postnatal overnutrition led to hyperleptinemia, overweight and the acquired reset of key intrarenal hormone systems in the juvenile male rats. In this study, we investigated the influence of overnutrition during the neonatal period on the renal pathophysiological changes in adult rats. Three or 10 male pups per mother were assigned to either the small litter (SL) or normal litter (NL) control groups during the first 21 days of life. The effects of early postnatal nutrition excess on body weight, blood pressure, blood glucose, and renal changes were determined in 3 and 6 month old rats. Pups in the SL group weighed more than controls between 7 days and 6 months of age ($p<0.05$). In the SL group, serum creatinine levels were higher in 3- and 6 month-old rats ($p<0.05$) and at 6 months of age, systolic, diastolic and mean blood pressure levels were higher than those of the controls ($p<0.05$). The number of ED-1 positive macrophages and glomerulosclerosis index also increased in the SL group at 3 and 6 months ($p<0.05$). Additionally, cortical apoptotic cells increased in the SL group at 6 months ($p<0.05$). Immunoblotting and immunohistochemistry showed that matrix metalloproteinase (MMP)-9 protein expressions decreased and tissue inhibitor of MMP-1, tumor necrosis factor-α, osteopontin and adiponectin expressions increased in the SL group at 3 months ($p<0.05$). However, at 6 months, MMP-9 expression was elevated, and osteopontin expression remained elevated in the SL group ($p<0.05$). Our data suggests that postnatal overfeeding leads to lasting overweight, hypertension and renal dysfunction and places a greater burden on the kidney.

Key Words: 과영양, 비만, 신손상
Nutrition, Obesity, Renal Dysfunction