

The effects of experimental gestational hypertension on maternal blood pressure and fluid intake and pre-weanling hypothalamic neuronal activity

Arguelles J.

Perillan C.

Beltz T.G.

Xue B.

Badaue-Passos D.

Jr.

Vega J.A.

Johnson A.K.

To examine the fetal programming effects of maternal hypertension, natriophilia and hyperreninemia [experimentally induced in rats by partial inter-renal aortic ligature (PAL) prior to mating] fos immunoreactivity was studied in 6-day-old offspring of PAL and control mothers. The purposes of the present set of experiments were twofold. The first was to characterize the effects of PAL on the mother's arterial blood pressure and intake of salt (1.8% NaCl solution) and water over the course of gestation. Second, was to study the pattern of neuronal activation in key brain areas of 6-day-old offspring treated with the dipsogen isoproterenol that were from PAL and control mothers.

Beta-adrenergic receptor agonist-treated pups allowed the determination whether there were neuroanatomical correlates within the neural substrates controlling thirst and the enhanced water intake evidenced by the isoproterenol treated pups of PAL mothers. Hydromineral ingestive behavior along with blood pressure and heart rate of PAL (M-PAL) and control (M-sPAL) dams throughout gestation was studied. Higher salt and water intakes along with blood pressures and heart rates were found during gestation and lactation in the M-PAL group. Maternal PAL evoked significantly increased isoproterenol-elicited Fos staining in brain regions (e.g. subfornical organ, organum vasculosum of the lamina terminalis, supraoptic nucleus, hypothalamic paraventricular nucleus and median preoptic nucleus) of 6-day-old pups, which is the age of animals shown enhanced thirst

responses in PAL offspring. These results indicate that PAL is compatible with pregnancy, producing a sustained increase in blood pressure and heart rate, along with increased water and salt intake. The present study demonstrates that the neural substrates involved in cardiovascular homeostasis and fluid balance in adult rats are responsive in six-day-old rats, and can be altered by fetal programming. © 2017 Elsevier Ltd

c-Fos

Gestation

Hypertension

Isoproterenol

Ontogeny

Renin-angiotensin-aldosterone system

Thirst

abdominal aorta

adult

animal experiment

animal model

arterial pressure

Article

controlled study

experimental hypertension

female

fluid intake

heart rate

hypothalamic paraventricular nucleus

maternal hypertension

mating

medial preoptic area

nonhuman

organum vasculosum of the lamina terminalis

rat

salt intake

subfornical organ

supraoptic nucleus

telemetry

animal

animal behavior

blood pressure

body weight gain

cytology

disease model

drinking

fetus development

growth, development and aging

hypothalamus

immunohistochemistry

indwelling catheter

lactation

male

maternal hypertension

nerve cell

newborn

pathophysiology

physiology

Sprague Dawley rat

thirst

Animals

Animals, Newborn

Behavior, Animal

Blood Pressure

Catheters, Indwelling

Disease Models, Animal

Drinking

Female

Fetal Development

Heart Rate

Hypertension, Pregnancy-Induced

Hypothalamus

Immunohistochemistry

Lactation

Male

Neurons

Rats, Sprague-Dawley

Telemetry

Thirst

Weight Gain