

Short Communication

Intrauterine Growth Retardation (Malnutrition by Vascular Ligation) Induces Modifications in Fatty Acid Composition of Neurons and Oligodendrocytes

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Abstract: Intrauterine growth retardation (IUGR) induced by ligation of one uterine artery on day 17 of pregnancy in the rat lead to major abnormalities in the fatty acid content of neurons and oligodendrocytes but not in astrocytes. In neurons from IUGR rats, monounsaturated fatty acids were decreased; in the polyunsaturated series, ω -3 fatty acids were increased and ω -6 fatty acids were decreased. In oligodendrocytes, monounsaturated fatty acids were also decreased, but the modifications in polyunsaturated fatty acids were the opposite of those in neurons: ω -3 being decreased and ω -6 increased. Although the animals received a normal diet after birth, the alterations were still present in adulthood. In addition, fatty acid composition of brain cells is a very indicative criterion of brain maturation. **Key Words:** Intrauterine growth retardation—Fatty acids—Neurons—Oligodendrocytes. Morand O. et al. Intrauterine growth retardation (malnutrition by vascular ligation) induces modifications in fatty acid composition of neurons and oligodendrocytes. *J. Neurochem.* 37, 1057-1060 (1981).

Vascular ligation, as well as maternal deprivation, causes intrauterine growth retardation (IUGR) with the general large brain-small liver syndrome due to a higher preservation of the brain compared with the rest of the body (Minkowski et al., 1974). We have previously shown (Bourre et al., 1980) that forebrain weight and total lipids are reduced in IUGR rat. The amount of myelin is reduced by 27, 17, 9, and 6% at 15, 18, 30, and 60 days after birth, respectively. Thus, intrauterine undernutrition followed by normal diet after birth affects myelination, a postnatal event. Prenatal growth retardation impairs, moderately but irreversibly, brain maturation, whereas the composition of myelin during maturation is close to normal (when density profile and lipid amount are considered). Thus, this work was undertaken to determine the effect of IUGR on the fatty acid composition of brain cells and subcellular particles.

MATERIAL AND METHODS

Animals were fed with standard diet biscuits from Extra-Labo (France). IUGR was induced in pregnant Sherman rats by clamping the uterine artery as originally described by Wigglesworth (1964). Female rats of Sherman strain are mated overnight. The uterine vessels are clamped near the lower end of one horn at the 17th day after the mating. Fetuses from this experimental horn, exhibit reduced weight at the end of the gestation. The opposite uterine horn is left untouched as a control. A reduction of weight of more than 30% is considered to be a good criterion of abnormal maturity. Only 6 suckling rats were left with any one mother.

Neurons and astrocytes from the brains of 15- and 60-day-old rats were prepared according to Norton and Poduslo (1971); oligodendrocytes were obtained by a

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Abbreviation used: IUGR, Intrauterine growth retardation.