



Cerebral MRI on fetuses submitted to repeated cocaine administration during the gestation: an ovine model

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Titre Cerebral MRI on fetuses submitted to repeated cocaine administration during the gestation: an ovine model

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Résumé en
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The aim of this study was to determine the role of Magnetic Resonance Imaging (MRI) in investigating fetal cerebral lesions induced by long term exposure to cocaine during sheep pregnancy. Cerebral Magnetic Resonance Imaging was performed on two groups of fetuses at 125 days of gestation (normal gestation: 145 days). The control group consisted of eight fetuses of four pregnant ewes. The study group consisted of eight fetuses of four pregnant ewes receiving daily 140 mg/kg injection of cocaine from day 60 until delivery. The following MR sequences were applied: T1-weighted FLASH, and T2-weighted Fast-Spin-Echo. Cerebral images were evaluated semi quantitatively using the following criteria: Heterogeneity, contrast between grey and white matter, contours irregularity, hyposignal, lateral ventricle sizes. The brightness distribution and homogeneity of the images were analysed by means of edge pair distributions using a new computerized method originally designed for ultrasound images analysis developed by Ultrasight inc (USA). (1) Flash T1: Heterogenic areas and irregular contours were more frequent in cocaine exposed fetuses. The contrast between grey and white matter was more important in the cocaine group. Hyposignal was found only in the cocaine group. Enlarged lateral ventricle occurred more frequently in the cocaine group. (2) Spin echo T2: The contrast between grey and white matter was higher and the contours of the brain more irregular in the cocaine group. Heterogeneity and hyposignal were also more frequent in this group but the difference with the control group was not significant. The computerized analysis of the contrast density on the cerebral images showed that 88% of the areas exceeding the reference level concerned the cocaine group, while only 14% of the areas exceeding the reference level concerned the control group. Long term exposure to cocaine induces cerebral tissue modifications, in favor of an advanced maturation and the development of hypoxic lesions. The histology of the brains confirmed in the cocaine group, the existence of hypoxic lesions with gliosis, perivascular edema and hemorrhages, and neuronal death.

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