Effect of prenatal exposure to alcohol on the development of brain vessels in human embryos and fetuses

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Introduction  Human embryos are most susceptible to exogenous effects during the first weeks of development.

Aim  Study the effects of prenatal alcohol intoxication on morphometric measures of developing vessels in the human embryonic and fetal cerebrum.

Methods  Embryos and fetuses (7–12 weeks): 23 obtained from alcoholic women with stage II alcoholism (the experimental group) and 30 from healthy women (the control group). The research involved electron microscopy, computer morphometry, parametric method of variational statistics and Scion software to determine mean vascular cross-sectional area, the relative cross-sectional area of vessels, the number of vessels per unit area, and the perimeter of vessels.

Results  From 10 weeks, vessels in the human brain start to differentiate into arteries and veins. At 12 weeks, capillary basal membranes were already clearly visible. We established a series of characteristics distinguishing brain tissues in the experimental group vs. that in controls: mean vessel cross-sectional areas and vessel perimeters were significantly reduced by 11 weeks vs. controls. The tendency persisted at 12 weeks. Relative vessel cross-sectional area in the experimental group was greater than in controls.

Conclusions  Maternal alcoholization during pregnancy significantly influences the development of the cerebral circulatory system, manifesting mainly in changes in the vascularization of the growing brain.

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