

# Abstract

Nutrition. 2009 Jan;25(1):78-84.

## Effects of biotin deficiency on embryonic development in mice.

Watanabe T, Nagai Y, Taniguchi A, Ebara S, Kimura S, Fukui T.

Department of Dietary Environment Analysis, School of Human Science and Environment, Himeji Institute of Technology, University of Hyogo, Himeji, Japan.

**OBJECTIVE:** The purpose of this investigation was to determine the effects of biotin deficiency on maternal metabolism and embryonic development in pregnant mouse dams.

**METHODS:** The pregnant mice were randomly assigned to one of three dietary groups and given a biotin-deficient diet, biotin-supplemented diet, or biotin-control diet during gestation. On days of gestation (dgs) 0, 4, 8, 12, and 16, organic acids including 3-hydroxyisovaleric acid in urine were discovered by high-performance liquid chromatography, and the biotin level in the serum and urine was determined by a bioassay. On dg 18, fetuses were examined for morphologic development.

**RESULTS:** In the biotin-deficient group, biotin excretion in urine decreased on dg 4 and was subsequently below the lower limit, whereas the urinary concentration of 3-hydroxyisovaleric acid increased after dg 12. In contrast, the biotin concentration in urine significantly increased on dgs 4, 8 and 12 in the biotin-supplemented group, but decreased on dg 16 in the biotin-supplemented and biotin-control groups. The urinary excretion of pyruvic acid in the biotin-deficient group was significantly higher than that in the biotin-supplemented group throughout the entire gestation. These concentrations in urine significantly increased on dg 16 compared with dg 0. The inhibition of embryonic development and external malformations such as cleft palate (100%), micrognathia (100%), and micromelia (91.4%) were also detected in biotin-deficient fetuses.

**CONCLUSION:** These findings indicated that, as the requirement of biotin increases during gestation and/or embryonic development, a large amount of biotin is necessary for maintaining normal reproductive performance during the late stage of gestation.

PMID: 18752930

