

INGESTION OF AMNIOTIC FLUID BEFORE BIRTH: DOES IT IMPROVE INTESTINAL FUNCTION?

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The structure and function of the gastrointestinal tract (GIT) matures rapidly in the period immediately before and after birth, but inadequate intestinal maturation often lead to digestive problems during this critical period. Oral milk intake is known to induce a marked GIT maturation in newborns. It is not clear whether oral intake of amniotic fluid by fetuses has a corresponding role before birth. Amniotic fluid contains both protein (1%) and a large number of growth factors and hormones. In addition, this fetal fluid possesses positive immunological properties. If amniotic fluid is important for intestinal growth and function before birth, amniotic fluid may be used to improve digestive function under certain intestinal disease conditions just after birth. Hence, we investigated the growth and functional development of the GIT in control fetal pigs throughout the last 20% of gestation (term = 115 d), and at 91% gestation in fetal pigs prevented from swallowing amniotic fluid by experimental esophageal ligation from 80-91% gestation (n=10). After killing, the GIT was collected from all fetal and newborn pigs, and the activity of digestive enzymes and absorption of nutrients were measured *in vitro*. The results showed that during the last 20% of gestation, marked increases occurred in body weight (+200%) and relative weight (g/kg body weight) of the small intestine (+80%). GIT function also matured rapidly during this time as assessed by significant increases in the tissue-specific activities of some digestive enzymes (1.5-10 fold) and intestinal nutrient uptakes (3-fold for glucose). Ligated fetuses showed significantly reduced body weight (-20%) and an even greater reduction of intestinal weight (-43%, $P < 0.05$), compared with sham-operated fetuses. This was not associated with notable changes in the tissue-specific activity (units per gram wet tissue) of 10 GIT enzymes measured (chymosin, amylase, trypsin, chymotrypsin, 3 disaccharidases, 3 peptidases) or in the absorption of 5 different nutrients (glucose, leucine, lysine, proline, glycine-sarcosine). We conclude that the oral intake of amniotic fluid by the fetus is important for body growth, and especially for the growth of the small intestine. However, the enzymatic development of the GIT does not depend on oral nutrients before birth. Nevertheless, it appears that amniotic fluid is important for intestinal development in the fetus, and therefore amniotic fluid should be tested as a dietary regimen for newborn farm animals suffering from intestinal disease.