increased to 494 μM/g/min and that with both NE and L/P was 656 μM/g/min, suggesting diminished glycolysis and enhanced gluconeogenesis in the neonatal liver. Glucose production remained unchanged at the pH of 6.5, however a considerable decrease followed after either anoxia of 1 and 3 hours' duration or acidosis at pH of 6.0.

## 238. Purine Nucleotide Metabolism in Perinatal Period

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The metabolic changes in purine nucleotide during the perinatal period were investigated in fetal and neonatal rat liver. Inosine 5′-monophosphate dehydrogenase (IMPD) activity as the key enzyme for purine nucleotide biosynthesis and xanthine oxidase (XO) activity as the key enzyme for catabolism were measured by radioisotopic and high performance liquid chromatographic method, respectively.

IMPD showed high specific activity in early fetal age and decreased gradually through the perinatal period. On the other hand, XO showed markedly low activity in fetal liver and increased toward the and of gestation. These findings indicate that biosynthesis of purine nucleotide dominate in fetal period and that the catabolic process is induced rather in late gestational age.

To clarify the regulatory mechanism, further investigations were performed on the intrauterine growth retarded rats prepared by maternal 3 days starvation or by intramuscular administration of dexamethasone (0.6 mg/kg/day, for 5 days). In the dexamethasone group, IMPD in fetal liver showed lower activity while XO revealed higher activity than in control group.

In contrast, no significant changes were observed in the starvation group. These results suggested that corticosteroid may promote the metabolic changes in fetal liver as well as the fetal lung maturity.

## 239. Lipid Peroxidation and Vitamin E in the Pregnant Rat and Newborn

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The vitamin E effects in perinatal period are known to improve the placental blood cerculation, protect from superoxide and increase oxygen supply to fetus. The purpose of the present investigation was to confirm the effects of vitamin E on the perinatal and postnatal rat.

The concentration of vitamin E in the pregnant rat taken vitamin E free diet was one fifth level of normal diet pregnant rat. Fetal level was also shown same tendency as the maternal level.

Lipoperoxides concentration in the maternal blood was 3 times higher than that of non-pregnant, and that of vitamin E free diet pregnant rat was extensively higher than that of normal diet pregnant rat.

Lipoperoxides concentration in the fetal blood was one third of maternal level, and that in the fetal and placental tissues of vitamin E free rat was higher than that of normal rat. Serum lipoperoxides concentration in the newborn rat increased gradually after birth, but in the case of vitamin E free diet newborn the increase was rapid and great. The same tendency was shown in the liver and lung tissues. In the fetal tissues, antioxidant substances, i.e. Soperoxide dismutase, catalase, glutathione peroxidase and vitamin E were significantly low and increased rapidly after birth. Specially among them, Vitamin E contained maternal milk protect newborn from the danger of lipid peroxidation.

## 240. The Distribution of VIP in Rat Fetus and Immunocytochemical Localization of VIP in Rat and Human Placenta

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Purpose: Experiments were performed to characterize the distributions of VIP in brain, lung and intestine of rat fetus and to study the localizations of VIP in rat and human placenta.

Methods: IUGR rats were prepared by the method of Wigglesworth. Brain lung, intestine and placenta were removed from fetus at 17, 19, 20th and 21st gestational days and 19 hours after delivery. We extracted VIP from these organs using 0.5-N acetic acid and measured by RIA. Rat and human placenta were fixed by vascular perfusion of Zamboni solution and were processed by the peroxidase-antiperoxidase or avidin-biotin peroxidase complex method to stain

VIP.

Results: 1) There were not same tendencies among the gestational changes of VIP concentrations in brain, lung, intestine and placenta. 2) At 21st days of gestation VIP concentration of intestine was four times as much as in the brain and six times in the lung. 3) VIP concentrations of intestine, brain and placenta in IUGR rats were higher than in control rats. 4) The immunocytochemical study demonstrated the presence of immunoreactive VIP in trophoblastic cells of rat placenta and in decidual and trophoblastic cells of human placenta.

## 241. Effect of Hypoinsulinemia to Fetal Growth

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Acute fetal hypoinsulinemia was produced in rat fetus by injecting streptozotocin (STZ) to rat fetal abdomen in one horn of utero, making the fetus in other horn control, in order to study the effect of insulin to fetal growth. It was found that the plasma insulin concentration of rat fetus treated by STZ was significantly low and its plasma glucose concentration was relatively high compared with control. The rat fetus treated by STZ had low birth weight and its liver weight was significantly low although its brain weight was normal as well as control. It was recognized that serum transaminase activity (GOT and GPT) of the rat fetus treated by STZ was normal. The uptake of $^{14}$C-leucine, administrated to the fetal abdomen, to the fetal liver protein was also studied. The radioactivity in the rat fetal liver protein by treated by STZ was significantly low compared with control. This model provides an opportunity to study the effect of insulin to fetal growth different from point of view of hyperinsulinemia.

## 242. Polyamine Metabolism and DNA Biosynthesis in Fetal Growth —Investigations in Primary Cultured Rat Hepatocytes—

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Polyamines have close relationship with rapid growth phenomena and we have been investigated the relationship between polyamine biosynthesis and fetal growth. This time, we examined the hormonal regulation of polyamine and ornithine decarboxylase (ODC), which is the rate limiting enzyme of polyamine biosynthesis, in primary cultured rat hepatocytes.

The action of estrone, estradiol, progesterone, teststerone, human chorionic gonadotropin, cortisol, dexamethasone, insulin, glucagon, epinephrine, epidermal growth factor (EGF) and somatomedin C were tested. Among them, only insulin, EGF and dexamethasone increased ODC activity, and the combination effect of insulin and dexamethasone was additive, while insulin and EGF was synergestic. The rate of ODC induction was higher in adult hepatocytes, however, the reaction was earlier in fetal hepatocytes. Furthermore, these hormones increased putrescine in adult hepatocytes and putrescine and spermidine in fetal hepatocytes. These observations appeared to reflect the differentiation of hormone receptor with development.

Concerning to the DNA biosynthesis, fetal hepatocytes shows higher uptake of H-thymidine in DNA than adult hepatocytes.

## 243. Effect of Taurocyamine on Taurine Concentrations in the Fetal and Maternal Organs of the Pregnant Rats

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Effect of taurocyamine on levels of taurine in the pregnant rat and fetus was studied. Pregnant rats maintained on 1% taurocyamine in the drinking water from day 11 to day 21 of pregnancy showed a marked decrease in the taurine content of various tissues. Thus, on day 21 of pregnancy, the taurine content of the fetal liver decreased to 37% of control, that of the fetal brain to 87%, the placenta to 32% and the maternal rat liver to 33%. Taurocyamine administration increased urinary excretion of taurine. No effect on weight gain or food and water consumption of the taurocyamine treated pregnant rat was observed during experimental period. But the fetal body weights of the taurocyamine treated rats were signifi-