

**Studies on cortisol and prolactin concentrations in umbilical cord
blood, amniotic fluid, maternal blood, and breast milk related to
perinatal factors**

Abstract of the thesis

Doctoral Course of Applied Life Science, Graduate School of Veterinary Medicine and
Life Science, Nippon Veterinary and Life Science University

Yoko Sano
(Supervisor: Minoru Tanaka)

In this study, based on the functions of prolactin and cortisol in their stress response, the correlations between the concentrations of both hormones in umbilical cord blood and amniotic fluids were studied during parturition in humans where fetuses may suffer from a significant level of stress as well as mothers. In addition, the relationships between the prolactin concentrations in mothers' blood and breast milk were studied. This study was reviewed and approved by the ethics committee at Fujinomiya City Hospital. The subjects also signed a consent form after receiving an oral explanation and written documents regarding the study.

First, relationships between delivery modes and cortisol and prolactin concentrations in the umbilical cord blood were examined. The cortisol concentration was significantly higher in the vacuum-assisted delivery than in the spontaneous delivery and positively correlated with the duration of delivery, with higher extent during the second phase of parturition. These findings suggest that fetuses as well as mothers suffer from the stress caused by uterine contraction during delivery. On the other hand, the prolactin concentration showed neither significant correlation with the duration of full delivery nor the second stage of delivery. Since the stress response of prolactin is temporal, individual prolactin levels in cord blood may fluctuate.

Cortisol concentration in amniotic fluid of the vacuum-assisted delivery group was significantly higher than that of the spontaneous delivery group. There was a positive correlation between the concentrations of cortisol in amniotic fluid and the duration of parturition as observed in the umbilical cord blood. The origin of cortisol in the amniotic fluid is considered to be the urine of the fetus, and therefore, the increase of cortisol concentration might reflect the degree of stress that the fetus suffered during delivery. Prolactin concentration in amniotic fluid of the vacuum-assisted delivery group was significantly higher than that of the spontaneous delivery group but no correlations were observed between the prolactin concentration and the duration of parturition. Prolactin in the amniotic fluid is known to be derived from endometrial decidua but its response to stress is not known.

There was a positive correlation between prolactin concentrations in plasma and hindmilk supporting that prolactin in breast milk is mother-blood origin. Recent reports suggest epigenetic effects of breast milk prolactin on the nutritional status and brain function of adult offspring. Therefore, it is important to clarify the maternal factors affecting prolactin concentrations in breast milk.