which 34 aborted and 26 had a favourable evolution. Serial determinations of urinary total oestrogens (fluorimetry according to Brown), pregnandiol (gas chromatography), HCG (inhibition of hemagglutination) and plasma progesterone (protein binding competition), oestradiol, HCG and HPL (radioimmunoassay) were performed. 1124 samples were assayed and related to normal values previously established in the laboratory. Correlation of results with clinical outcome was established for each of these hormones. For each hormone assayed, the percentage of infraliminary values corresponding to abortions was quoted and, similarly the percentage of values within the normal range corresponding to abortions was also established. Concerning the incidence of abortion when abnormal levels were noticed, we were able to conclude that 90% of these levels belonged to pre-abortion group as far as plasma HCG was concerned. The results are 87% for urinary HCG and plasma oestradiol 86% for plasma progesterone, 84% for urinary pregnandiol, 74% for plasma HPL (after the 12th week) and 68% for urinary oestrogens. When levels are within the normal range the probability that they belong to the abortion group is 22% for plasma progesterone, 28% for plasma HPL after 12th week, 30% for plasma HCG and 39% for plasma oestradiol and 41% for urinary and oestrogens. The conclusion of this study is that when abnormal levels of urinary or plasma HCG, plasma progesterone or oestradiol, and urinary pregnandiol are observed the probability of abortion is high. But when plasma progesterone levels are within the normal range probability of abortions is very low; correlation between normal values of other hormones and evolution of pregnancy is far less clear. This work emphasizes the value of plasma progesterone assay in monitoring threatened abortion as a factor of prediction of clinical outcome.

62. Changes in plasma dehydroepiandrosterone before and during pregnancy and in labour, A. E. SCHINDLER*, T. WALK* and E. NIESCHLAG†. *Universitätsfrauenklinik, Tübingen and †II. Med.-Univ. Klinik, Düsseldorf, Germany

Dehydroepiandrosterone sulfate (DS) is secreted by the maternal and fetal adrenal and represents the direct precursor of placental estradiol production and the indirect precursor of placental estriol biosynthesis. Since the measurement of this steroid has been used in recent years for placental function tests, the purpose of this investigation was to measure the changes of free dehydroepiandrosterone (D) and DS before and during pregnancy and in labour. D was measured by radioimmunoassay (Nieschlag *et al.: Steroids* 19 (1972) 669) and DS was measured by gas-liquid chromatography (Walk *et al.:* Archs. Gynäk. **214** (1973) 318). D determinations were made in 26 non-pregnant women, in 96 women during pregnancy and in 37 women at the beginning and at the end of labour. DS measurements were carried out in 42 non pregnant volunteers, 157 women at various stages of pregnancy and in 30 women at the start and at the end of labour.

D was significantly higher in pregnant than in non-pregnant women (0·73 vs 0·57 μg/100 ml, $P < 0{\cdot}002$), but there was no correlation between the stage of pregnancy and the D concentration. In labour the D concentration increased from 0·97 to 1·42 μg/100 ml ($P < 0{\cdot}001$). 69 μg/100 ml DS was found in plasma from non-pregnant women and a decrease to 37 μg/100 ml during pregnancy was measured ($P < 0{\cdot}05$). However, during labour, a significant increase was determined (from 40 to 75 μg/100 ml, $P < 0{\cdot}001$). These findings indicate a rapid and increased utilization of maternal DS by the placenta which does not affect the free D levels. In labour, however, the increase of D and DS in the maternal circulation seems to be related to increased ACTH secretion. Influences of an altered utero-placental blood flow, changes in placental enzyme activity and transfer of D and DS from the fetal circulation could be additional factors.

63. Modification of urinary steroid levels after administration of DHEA-sulphate to pregnant women presenting different kinds of intrauterine growth retardation, G. AGOSTONI, E. KOVARICH, A. GARAGIOLA, D. COLOMBO and F. POLVANI, Università di Milano, II Clinica Ostetrica Ginecologica, Italy

Twenty cases of retarded fetal growth, diagnosed during pregnancy by ultrasonic technique and confirmed by birth weight (which was more than 2 standard deviations below the mean for gestational age), had one administration of 30 mg DHEA-sulphate intravenously in order to verify if the variation in urinary steroids excretion of small-for-date foetuses would be similar, independently from their different etiological origin. Urine was collected every 2 h, from 8 a.m. to 8 p.m., DHEA-sulphate was administered at noon. Urinary steroid levels determination was made by gas-chromatographic method on high resolution glass capillary column (modified from Roa, 1971). Using this technique a single analysis was sufficient to measure all steroids normally involved in placental metabolic pathways of DHEA-sulphate. Results showed that, though selected foetuses made up a homogeneous group from a quantitative point of view, the steroid response to DHEA-sulfate was not uniform. If the trial was interpreted as placental function test (Lauritzen, 1967), two groups with different metabolic behaviour could be pointed out, the first with normal, the second with unsettled replying ability. Metabolic behaviour resulting from the test could be related to etiological and pathogenetic characteristics of each case. Lauritzen Ch.: *Acta endocr. Copenh.* Suppl. **119** (1967) 188. Roa A. and Sommerville I. F.: *J. Obstet. Gynaec. Br. Commwlth.* 78 (1971) 1096.

64. Hormonal dynamics during different model conditions of foetoplacental distress in midpregnancy, J. STASTNY, H. de WATTEVILLE, V. WEISS, P. VASSILAKOS and R. WYSS, Clinique universitaire de Gynécologie et d'Obstétrique, Genève, Switzerland

The aim of the study was to demonstrate the predictive value of plasma hormone assays used as foetoplacental function tests, in terms of the earliest possible detection of a significant concentration decrease following an experimental foetoplacental compromise. Normal volunteers undergoing legal pregnancy interruption between the 14th and 24th week were investigated. Hormonal dynamics of HPL, unconjugated progesterone (P) oestradiol-17β (E_2) and oestriol (E_3) was studied in the following model situations: In *saline induced abortions* (n = 10) foetal death occurred between the 35th and 105th min following the exchange of amniotic fluid by the hypertonic NaCl solution (10%). The time from instillation to a significant decrease of maternal plasma level was 1 h for HPL and 4 h for P. In *mid-pregnancy interruptions by hysterotomy* with subsequent sterilization (n = 10 + 3) an elastic tourniquet, routinely fastened around the isthmus to avoid bleeding, was used to reduce the uterine blood flow during 25 min (hypoxia), thereafter released for 25 min (restitution), after which uterotomy with subsequent evacuation of the conceptus was performed (disappearance). The degree of

hypoxia was tested by FHR recording. In maternal *peripheral blood,* HCG remained unchanged until evacuation. HPL, P, E_2 and E_3 showed a uniform fall during hypoxia with subsequent restitution. In the *uterine vein* (UV) HPL, P, E_2 and E_3 rose during the tourniquet period, demonstrating probably an accumulation by the reduced outflow from the site of hormonal production. Following the tourniquet release UV levels showed a fall to pretourniquet values at the time of peripheral restitution, demonstrating restituted synthesis. In the *amniotic fluid,* no significant concentration changes occurred during hypoxia. An increase of HPL, P, E_2 and especially E_3 was found at the end of the restitution period.

65. Saturated metabolites of progesterone in maternal and fetal plasma at delivery, H. MICKAN* and J. ZANDER, *(DFG Mi 109/5), I. Frauenklinik und Hebammenschule der Universität D-8000 München 2, Maistrasse 11, Germany.

The metabolic reduction of progesterone at positions C-3 and C-5 has been demonstrated *in vitro* by perfusion and incubation of different human tissues. In order to determine quantitatively the epimeric pregnanolones in small plasma samples a sensitive method was developed using gas-liquid chromatography (g.l.c.). In brief, plasma is extracted with ethanol–diethylether. Extracts are purified by thin-layer chromatography, "free" and "sulfate" fractions are separated, the hexadecafluoronanoyl derivative is formed and determined by g.l.c. and electron capture detection. The sensitivity of the method is 1 ng steroid per sample, accuracy 102 ± 21% (S.D.), precision 17–26% (CV). Fifteen sets of plasma samples (maternal vein, umbilical vein and arteries) were obtained at termination of pregnancy by cesarean section. Recovery of added radioactive labelled tracers was 48·2 ± 8% (S.D.). In fetal and maternal plasma the metabolites were present mainly as sulfoconjugates up to 1·8 μg/ml. The free steroids were sometimes undetectable especially in fetal plasma (range 0–170ng/ml). 3α-hydroxy-5α-pregnan-20-one and 3β-hydroxy-5α-pregnan-20-one were found in similar concentrations in fetal arteries, vein and maternal vein. Only for 3α-sulfoxy-5β-pregnan-20-one a definite arteriovenous difference was demonstrated with higher concentrations in arterial plasma of the fetus.

These results show that ring A saturated metabolities of progesterone are present in fetal plasma also at concentrations higher than the parent steroid. 3α-hydroxy-5β-pregnan-20-one seems to be eliminated more effectively from the fetal compartment than the 5α-epimers.

66. Effects of surfactant stimulating agents on plasma estriol and progesterone in third trimester pregnancy, E. FRIEDRICH, A. ETZRODT, H. CHANTRAINE and W. SCHWENZEL, Abteilung Gynäkologie und Geburtshilfe der RWTH Aachen, Germany

Medication with betamethasone (BM) in cases of premature labour results in a significant decrease of respiratory distress syndrome (RDS) in the newborn. BM exerts its effect by surfactant stimulation of the fetal lung. Only recently a new compound, "Bromhexine", metabolite VIII, (NA 872), has been shown to have a similar effect as BM. BM however causes a fall of total estrogens in 24 h urine and thus impairs monitoring of fetal well-being. It was the purpose of this study to investigate the effect of NA 872 on plasma estriol and progesterone in comparison to BM.NA 872 was applied by i.v. infusion to 15 patients with premature labour (30–38 weeks of gestation). The initial dose was 500 mg on the first day of medication and 200 mg daily on 4 following days. BM (6 mg BM-sodiumphosphate plus 4·5 mg BM-acetate) was given by intramuscular injection on two subsequent days to 15 patients with premature labour (30–38 weeks of gestation). Unconjugated plasma estriol (E_3) and progesterone (P) were measured by radioimmunoassay and the following results were obtained: BM caused a rapid fall of E_3 concentrations to 47% (mean) and 49% (mean) of pretreatment levels on days 2 and 3 after injection. This was followed by gradually rising E_3 levels on the following days. In contrast, a slight increase of E_3 was observed in patients treated with NA 872. P showed uncharacteristic day to day fluctuations in both treatment groups. These results suggest that NA 872 does not interfere with steroid biosynthesis of the feto-placental unit and thus offers a major advantage compared to BM treatment.

67. Urinary cortisol in normal and anencephalic pregnancy, SATI C. CHATTORAJ, ADRIAN K. TURNER and DAVID CHARLES, Departments of Obstetrics and Gynecology, Boston University School of Medicine, Boston, Mass. 02118 and Memorial University of Newfoundland, St. John's, Newfoundland, Canada

The urinary excretion of free cortisol was measured in 17 normal pregnant women, 9 pregnant women bearing anencephalic fetuses and 10 non-pregnant females in reproductive life. In normal pregnancy, during the last trimester, the urinary excretion of free cortisol (29·71 ± 19·10 μg/24 h) is close to three times than that noted in normal non-pregnant women (11·03 ± 6·42 μg/24 h). In pregnancies associated with an anencephalic fetus, the urinary free cortisol (8·07 ± 5·18 μg/24 h) is significantly lower ($P < 0{\cdot}005$) than that found in normal pregnancy but is within the non-pregnant range. However, the distinction of excretion values among the three groups becomes less apparent when measurements are carried out without purification of urinary extracts by chromatography.

The decreased urinary excretion values of cortisol in the presence of an anencephalic fetus indicates that during normal pregnancy the fetus substantially contributes to the maternal plasma cortisol pool. Furthermore, such a contribution is significant, enough to increase the non-protein bound fraction in the plasma which is reflected by the urinary excretion. Measurements of urinary free cortisol may be a useful index of fetal well-being (Supported by NICHD, Grant No. HD-06799.)

68. Plasma concentrations of aldosterone and progesterone during normal and hypertensive pregnancy, H. H. WEINBERGER, N. J. KRAMER, L. P. PETERSEN, R. CLEARY and P. YOUNG, Indiana University School of Medicine, Indianapolis, Indiana, U.S.A.

During normal pregnancy aldosterone production increases sequentially, similar increases are seen in plasma renin activity. The production of progesterone, a natriuretic agent with potent anti-aldosterone activity is also known to increase during pregnancy, but the relationship between the 2 steroids has not been examined. In pregnancy complicated by hypertension, aldosterone and progesterone excretion have been reported to be suppressed, as has plasma renin activity, in comparison to observations in normotensive pregnant subjects of the same gestational period. The present study was undertaken to examine whether plasma concentrations of these