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Diabetes and pregnancy



**General Medicine Obstetrics and Gynecology
Seminary 2017 – 2018 – Autumn Semester**

Physiological changes during pregnancy

- **insulin resistance**
- **↓ glucose tolerance ↑ gestation**
- **largely due to the placental anti-insulin hormones
(human placental lactogen, cortisol, glucagon)**
- **↓ the renal treshold for glucose**

Hypothesis

**developing fetal tissue → maternal metabolism
→ fetal tissue damage → longtime/lasting
effect postnatally**

- neuron
- adipose cell
- muscle cell
- pancreatic β cell

History

- **insulin discovery (1921- Banting a Best)**
- **spontaneous conception very rare**
- **50% maternal mortality (keto-acidosis)**
- **50% fetal mortality**

Diabetes in pregnancy - classification

- **pre-existing diabetes**

 - type I – insulin-dependent (IDDM) (10%)

 - type II – non-insulin dependent (NIDDM) (90%)

- **gestational diabetes**

 - pre-existing

 - gestational diabetes (GDM)

Pre-existing diabetes

- **human insulin therapy**
- **away regimen (plasma glucose level, HbA1c)**
- **renal functions (urea, creat.clearance, proteinuria)**
- **diabetic retinopathy (two-fold ↑ risk progression)**
- ***Candida* infection, skin infection**
- **metabolismus (hypoglykemie x ketoacidosis)**

Gestational diabetes (GDM)

- induced by maternal changes in carbohydrate metabolism and insulin sensitivity
- usually asymptomatic
- develops in second trimester
- no increase in the congenital abnormality rate
- increased risk of pre-eclampsia
- incidence Europe 3-5%

(EAPM, Working Group on Diabetes end Pregnancy, 2006)

↑ **USA 7%** *(The Nation's Health, Oct.2008)*

Screening for GDM - recommendation

low risk

- negative previous history
- < 25 years old
- BMI < 25
- negative obstetrics history

Screening test = oGTT (24 - 28 gestational week)

Screening for GDM - recommendation

**high risk
(oGTT at once, repeat 24-28 gestational week)**

- **obesity**
- **corticotherapy**
- **positive previous history of DM (family, ...)**

Recommendation ČGPS (*Czech Republic*)

- **screening all pregnant women !!**
- **glucose 75g (100g USA)**
- **blood glucose level on an empty stomach < 5.6**
120 min < 7.7

controversy – oGTT ...standard 5,5 – 10.0 – 8.5

Maternal risk

- **congenital abnormalities ..1/33 fetuses** (*Currie D., The Nation's Health Oct 2008*)
- **abortion**
- **preterm delivery**
- **preeclampsia (hypertension, nephropathy – 30% risk)**
- **infection (urinary tract, skin, *Candida* infection)**
- **↑ CS rate (↑ mortality, morbidity)**
- **adverse pregnancy outcome**
- **↑ risk of developing NIDDM within 10-15 years (30-60%)**

Fetal risk

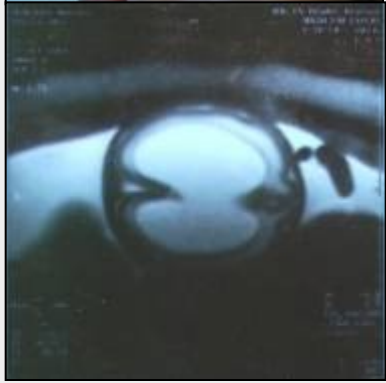
- **↑ two-four fold risk of perinatal morbidity/mortality**
- **stillbirth (III. trimester, 36 gestational week)**
- **macrosomia (4000, resp.4500g)**
- **adverse pregnancy outcome**
- **fetal hyperinsulinaemia → chronic hypoxia**
- **organomegaly, placentamegaly**
- **postnatal morbidity**

Congenital abnormalities

diabetic embryopathy *(because of bad compensation of DM)*

- heart defects *(8-10 week)*
- NTD (neural tube diseases) *(4 week)*
- cleft lip
- gastrointestinal tract
- urinary tract
- limbs defects (caudal regression) *(16-18 day)*

Diabetic embryopathy



Diabetic fetopathy

- complex problem
- maternal hyperglycaemia
 - ↑ hyperinsulinemia
 - ↑ insulin-like growth factor
 - ↑ leptin
 - ↑ glycogen
 - ↑ lipogenesis
 - ↑ proteosynthesis **fetal macrosomia !!**

Diabetic fetopathy

- **typical features** - macrosomia
 - fat and plethoric
 - cushingoid face
- **large birth weight**
- **organomegaly**
 - heart, lungs, liver, thymus, spleen, adrenal gland
- **brain, kidney are normal**
- **placentomegaly**

Diabetic fetopathy

diabetic macrosomia

(> 4000g, resp.> 90.centil resp. > 2SD)

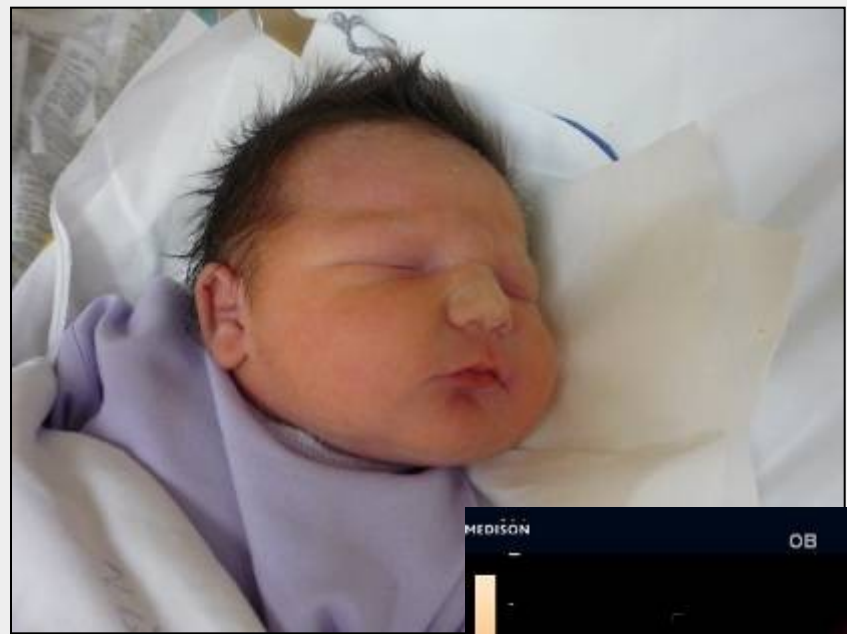
- birth injury
 - shoulder dystocia
 - fractures (clavicle, long bones)
 - brachial plexus injury (paresis)

- postnatal morbidity

Diabetic fetopathy



Diabetic fetopathy



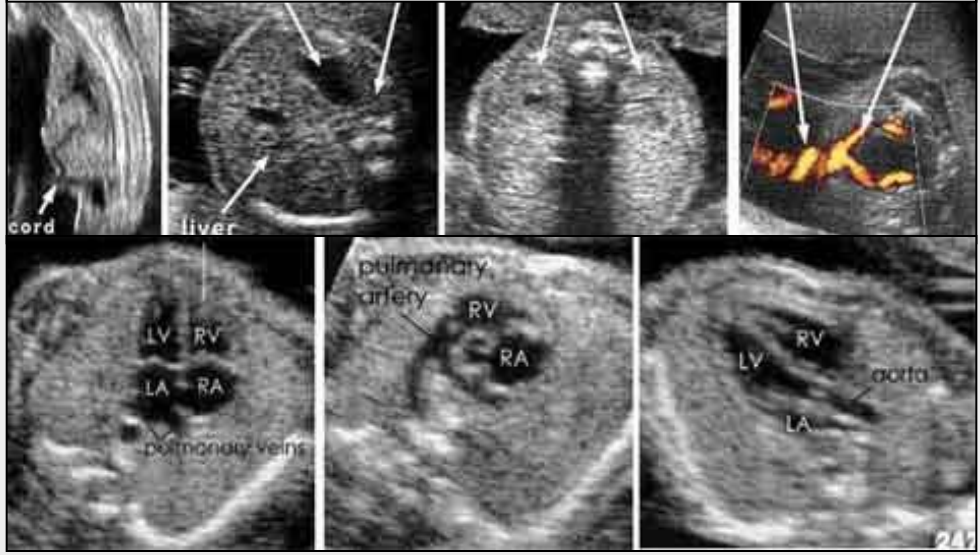
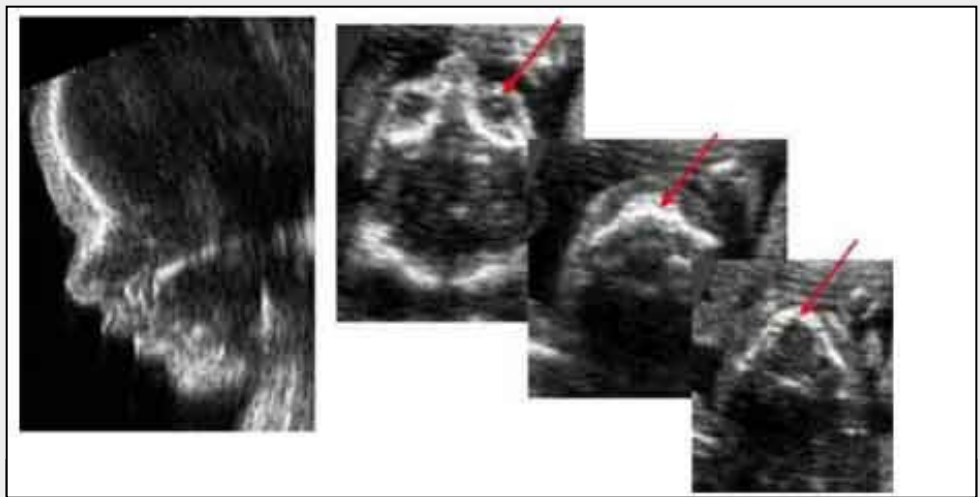
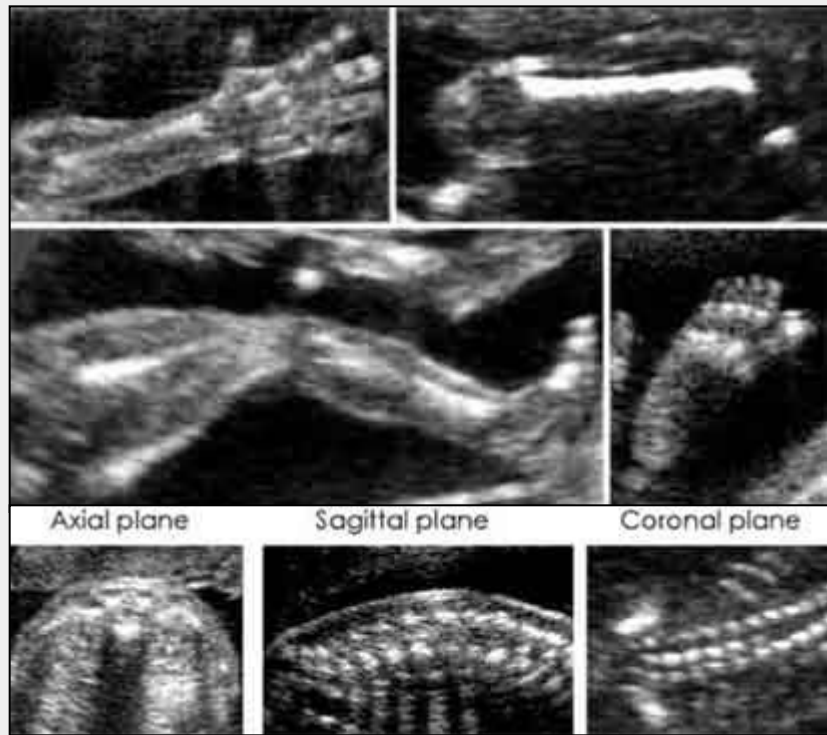
Follow up during pregnancy

- **cardiotocography**
- **ultrasound**
- **selfmonitoring blood glucose level**
- **insulin pump**
- **neonatal intensive care unite**

Ultrasound

- **estimated date of pregnancy (delivery)**
- **UZ anomaly scan: I.trimestr (11-14 week)**
II.trimestr (18-23 week)
fetal echocardiography
- **fetal growth (AC, 3-6 weeks)**
- **dynamic fetal observation Doppler, biophysical score)**

Ultrasound



Obstetric management

- **estimating maternal complications** (high blood pressure, preeclampsia, nephropathy,...)
- **estimating risk of preterm delivery**
(betamimetic drugs !!, corticosteroids!!)
- **timing of delivery (controversial)**
early elective delivery x RDS
- **mode of delivery (controversial)**
spontaneous x CS

Medical management

- goal – achieve maternal near normoglycaemia
- diet, regimen (individual counselling-modification)
 - calories (low-sugar, low-fat, high-fibre)
 - diet structure
(35-40%carbonhydrate, 20-25%proteins, 35-40%fat)
 - 6-7 times daily
- home blood glucose monitoring (daily, weekly)
- lifestyle, physical activity
- pharmacotherapy (insulin)... **fetal/maternal**

complications prevention

Goal therapy

time	glycaemia (mmol/l)
fasting	5,6
1 h postprandial	7,2 - 7,8
2 h postprandial	6,6

Pharmacotherapy

- **diet**
- **insulin** (human, analogs)
short-acting, intermediate-acting

Newborn

neonatal morbidity prevention

- early cord clamping (polycythaemia)
- avoid warm losse ! (34 C – incubator)
- fetal monitoring (24h after delivery)
- infusion therapy
- glucose level monitoring
- neonatologist investigation (congenital anomalies)
- early feed (breast-feeding 4-6h after delivery)

Newborn

neonatal morbidity symptoms

- polycythaemia
- RDS (respiratory distress syndrom)
- hypoglycaemia
- hypocalcemia, hypomagnesemia, jaundice

Postpartal care

pre-existing DM

- insulin therapy return to pre-pregnancy levels
- breast-feeding support

GDM

- individual counselling (age, risk, glycaemia)
- dietary regimen, lifestyle (on demand)
- 6-12 weeks after delivery oGTT ...30-50% risk NIDDM

Conclusion

- increasing number of diabetic pregnant
- high-quality **physician care**
(pre-pregnancy counselling, education, selfmonitoring)
- high-quality **obstetric care** (feto-maternal specialist)
- perinatal, neonatal intensive care units

close specialist collaboration