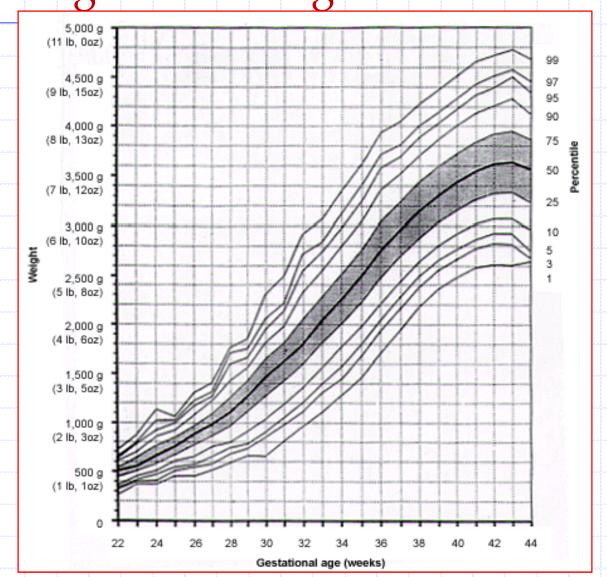# Fetal Growth abnormalities [Macrosomia and Intrauterine Growth Restriction(IUGR)]

Prof. Moustafa A. Abdel-lah

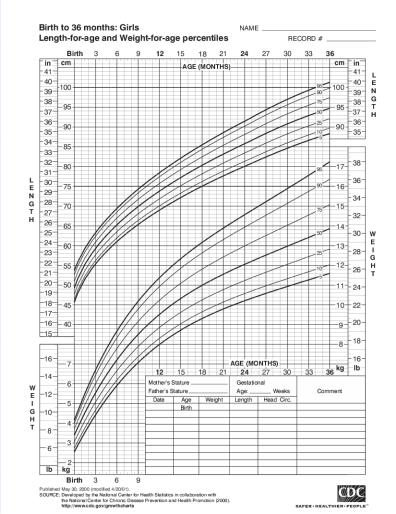**Sohag University, 2020**

Growth percentiles for fetal weight versus gestational age
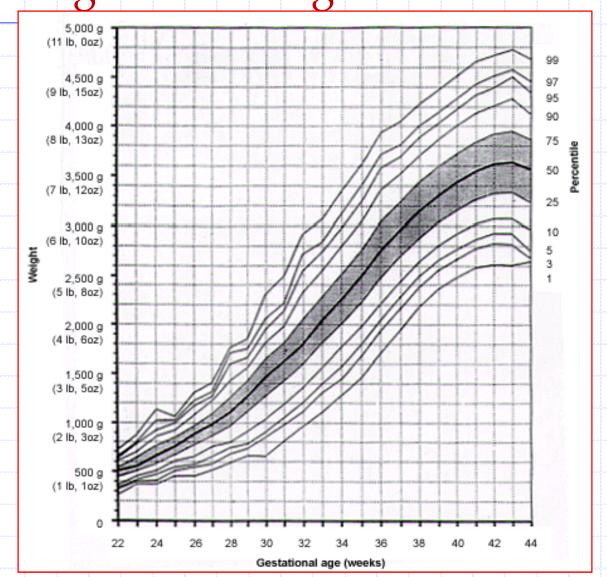
Macrosomia

Definition:

➤ fetal birth weight > 90th percentile for the gestational age.. or

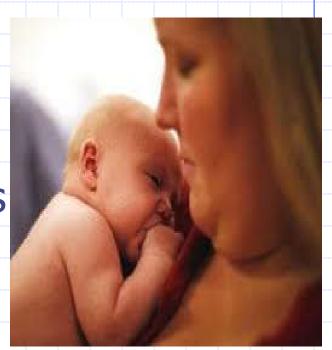➤ A fetal weight of more than 4.5 kg at term

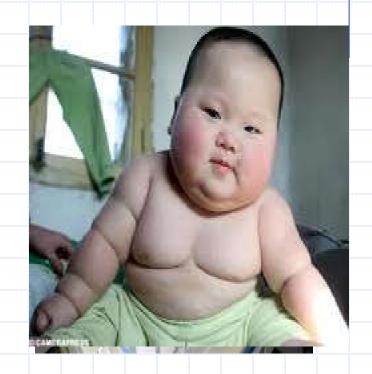# Growth percentiles for fetal weight versus gestational age

Causes

- Genetic or constitutional: obese women tend to give birth to macrosomic babies

- Diabetes and prediabetes.

- Post-date (postmaturity).

- Multiparity: Each baby is about 100 gm larger than the previous.

- Hydrops foetalis.
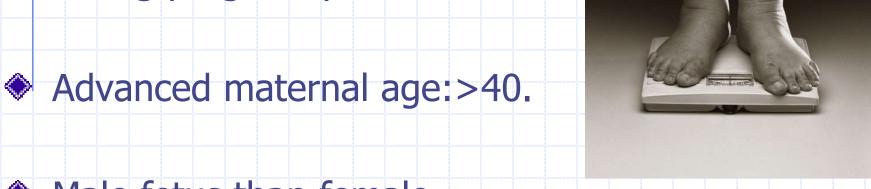
Macrosomia and diabetes

- ◆ ¼ th of insulin dependent mothers have Macrosomic infants

- ◆ Excess growth happens in the 3rd trimester.

- ◆ Gestational DM mothers have same incidence of Macrosomic infants as other diabetics

Risk factors for macrosomia

- Excessive maternal weight gain during pregnancy.

- Advanced maternal age:>40.

- Male fetus than female.

- Previous macrosomic infant.

Diagnosis

◆ Clinical Picture: can give a rough idea.

Ultrasonography: can calculate the fetal weight

Hazards

- Prolonged pregnancy
- Feto-pelvic disproportion
- Obstructed labour.
- Shoulder dystocia.
- Meconium aspiration syndrome.
- Birth injuries (Nerve and bone) injuries.
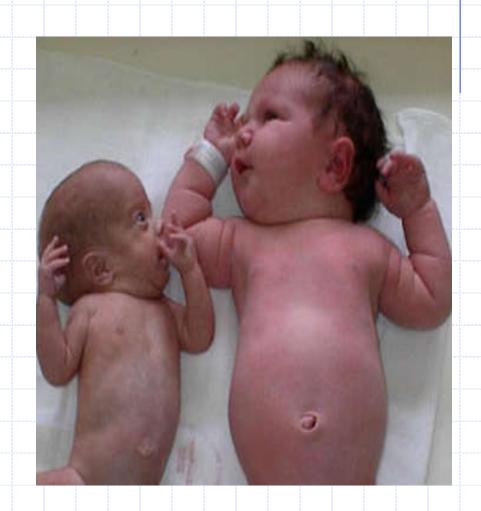
Management

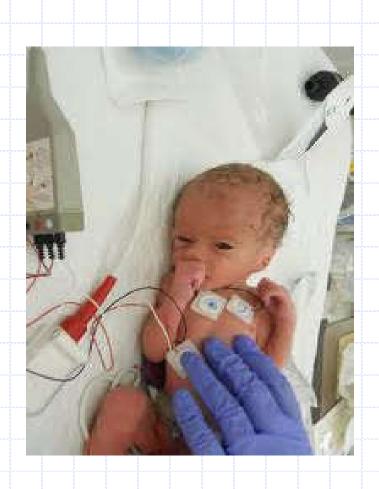◆ Proper antenatal care: to prevent macrosomia and diagnose it before labour commences.

◆ Cesarean section: is the safest for both mother and fetus.

Intrauterine Growth Restriction
IUGR

Definition !

IUGR is defined as a fetus that has an **estimated weight** that is **< the 10ᵗʰ percentile** for it's gestational age for a **pathologic cause**

At term, the cutoff birth weight for IUGR is **2,500 g** (5 lb, 8 oz)

Correlation of birth weight percentile to perinatal morbdity and mortalility For IUGR fetuses

Is small for gestational age (SGA) the same as IUGR?

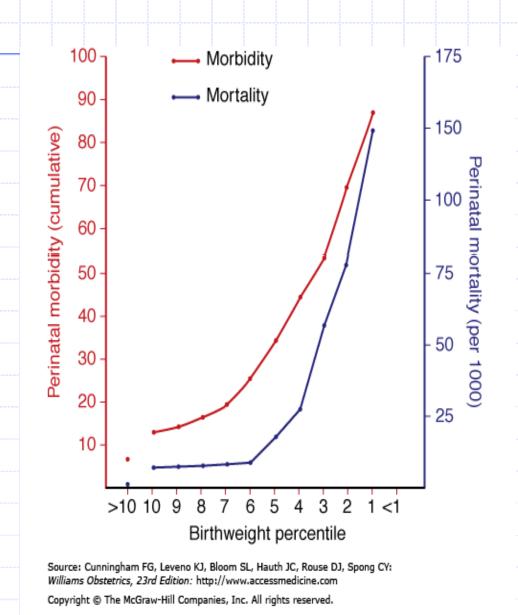- **IUGR is used synonymously with small for gestational age (SGA) but implies a pathologic condition.**

- **EFW at or below 10th percentile is used to identify fetuses at risk**

- **However a certain number of fetuses at or below the 10th percentile just may be constitutionally small and not growthly restricted**

- **Only about 1/3 of all infants weighing less than 2500 grams at birth have IUGR**

IUGR VS SGA

◆ **IUGR**: fetus with birth weight <10th percentile for gestational age due to pathologic process.

◆ *SGA: fetus with birth weight <10th percentile for gestational age in the absence of pathologic process*
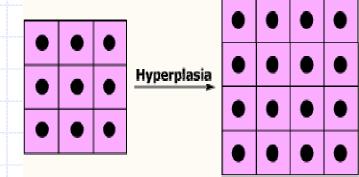
Types of IUGR

◆ *Symmetrical* **IUGR**:

◆ *Asymmetrical* **IUGR**

1. Symmetrical growth restriction

Hyperplasia
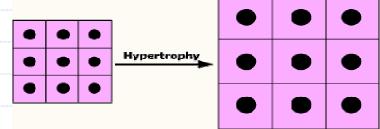
- **20 % of IUGR Infants**

- **proportional decrease in all organs**

- **HC/AC ratio is normal**

- **Occurs in early pregnancy : Cellular hypoplasia**

- **Causes: Intrinsic factors**
  - ✓ **Chromosomal abnormalities**
  - ✓ **Congenital anomalies**
  - ✓ **Intrauterine infection**
- **Prognosis: Increased risk for long term neurodevelopmental dysfunction**

2.Asymmetrical growth restriction

- **80% of IUGR Infants**

- **Increase HC/AC ratio** : decrease in abdominal size

- **Brain sparing effects**

- Occurs in **late pregnancy** : **cellular hypertrophy**
- **Causes: extrinsic factors** : **Uteroplacental insufficiency**
  - **Maternal vascular disease: hypertension**
  - **Multiple gestations**
  - **Placental disease**

- **Prognosis:** Risk for perinatal hypoxia, neonatal hypoglycemia With Good prognosis

3. Combined type

- Asymmetrical ⟷ symmetrical
- Symmetrical ⟷ asymmetrical

More morbidities and mortalities
More long term effects

Ponderal Index

◆ Ultrasound criteria for diagnosis of fetal malnutrition;

◆ Gestation age independent;

◆ Way of characterizing the relationship of height to mass for an individual.

◆ $PI = 1000 \quad x \quad \sqrt{\dfrac{Mass \quad (kgs)}{Height \ (cms)}}$

◆ Typical values are 20 to 25.

◆ PI is normal in symmetric IUGR.

◆ PI is low in asymmetric IUGR.

Etiology- Overlapping

Maternal

Fetal

Placental

Cause

Fetal causes (intrinsic factors)

Maternal causes Plcental causes (extrinsic factors)

Symmetrical IUGR

Asymmetrical IUGR

Symmetric IUGR	Asmmetric IUGR
Small symmetrically.	Head is larger than abdomen.
Ponderal index is normal.	Ponderal index is low.
Normal head-abdomen ratio.	High head-abdomen ratio.
Genetic, infections.	Placental vascular insufficiency.
Complicated neonatal course.	Benign neonatal course if complications are treated adequately.

Fetal causes

❖**Infection**

- **CMV, Rubella, Toxoplasma gondii – severe IUGR**
- **Syphilis, Tuberculosis, Malaria, listeriosis**
- **Herpes simplex, chicken pox**

❖**Chromosomal abnormality**

- **Trisomy 18,13 –severe IUGR**
- **Trisomy 21**
- **Turner syndrome (45,XO), Klinefelter syndrome (47,XXY)**

❖**Congenital anomalies**

- **Congenital Heart diseases**
- **Anencephaly**

Placental causes

- Placental infarction
- Placental abruption
- Chorioangioma
- Placenta previa , circumvallate placenta
- Marginal or velamentous insertion of umbilical cord

Diagnosis

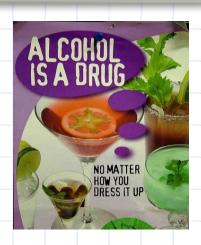- Clinical assessment

- Ultrasonic measurement

- Doppler velocity

History for risk factor

– Teen age

– High altitude

– Socioeconomic factor

– Smoking , Alcohol , Drugs

– Previous IUGR pregnancy history

– previous IUGR in family

ALCOHOL IS A DRUG

NO MATTER HOW YOU DRESS IT UP

Signs:

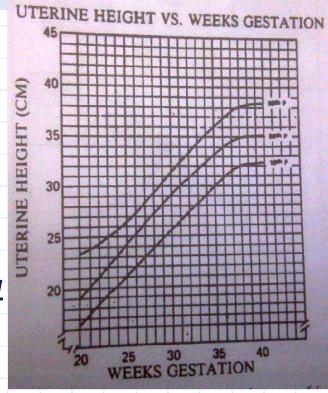Seldom elicited before 28 weeks of gestation:

- Failure of fetus and uterus to grow at the normal rate over a 4 week period;
- Uterine fundal height should be at least 2cm less than expected for the length of gestation;
- Poor maternal weight gain;
- Diminished fetal movements.

Physical examination

UTERINE HEIGHT VS. WEEKS GESTATION

Uterine fundal height

✓ Uterine fundus → Pubic symphysis

✓ Simple, Safe, Inexpensive for **_screening_**

✓ **Between 18 and 30 weeks,**

✓ the uterine fundal height in centimeters coincides with weeks of gestation.

✓ If the measurement is more than 2 to 3 cm from the expected height or < 1o[th] percentile from normal curve, inappropriate fetal growth may be suspected

Errors in Fundal Height Estimation:

- Inter-observer variations
- Obese patients
- Transverse lie
- Multiple gestation
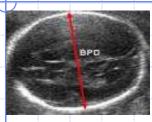- Polyhydramnios / Oligohydram
- Uterine fibroids

Ultrasonic measurement

◆ Initial U/S at 16 to 20 weeks to establish gestational age and identify anomalies and repeated at 32 to 34 weeks to evaluate fetal growth

Ultrasonography Biometry

The measurements most commonly used to measure and follow fetal growth are:

Biparietal Diameter

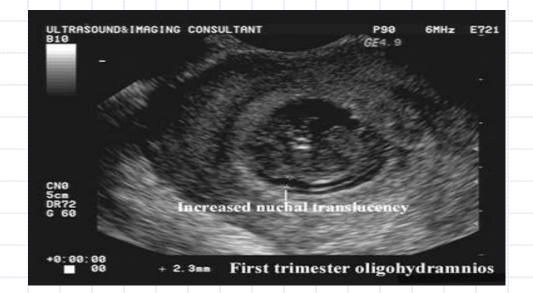## Head Circumference

Femur Length

Abdominal Circumference

Ratio :- Head circumference to the abdominal circumference (HC/AC)

Amniotic Fluid Index

- Mild IUGR – Normal amniotic fluid

- Severe IUGR – Oligohydramnios (AFI is $\leq$ 5)
                    Incidence 40%

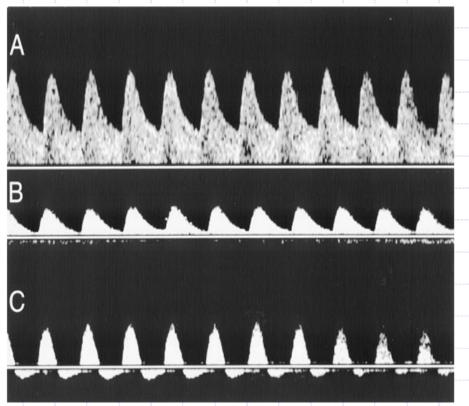- On ultrasonography - a pocket of fluid < 1cm is diagnosed as oligohydramnios.

The amniotic fluid index is obtained by summing the largest cord-free vertical pocket in each of the four quadrants of an equally divided uterus.

Abnormal umbilical artery Doppler velocimetry

- characterized by absent or reversed end-diastolic flow

- associated with fetal growth restriction

A. Normal velocimetry pattern with an S/D ratio of <30.

B. The diastolic velocity approaching zero reflects increased placental vascular resistance.

C. During diastole, arterial flow is reversed (negative S/D ratio), which is an ominous sign that may precede fetal demise
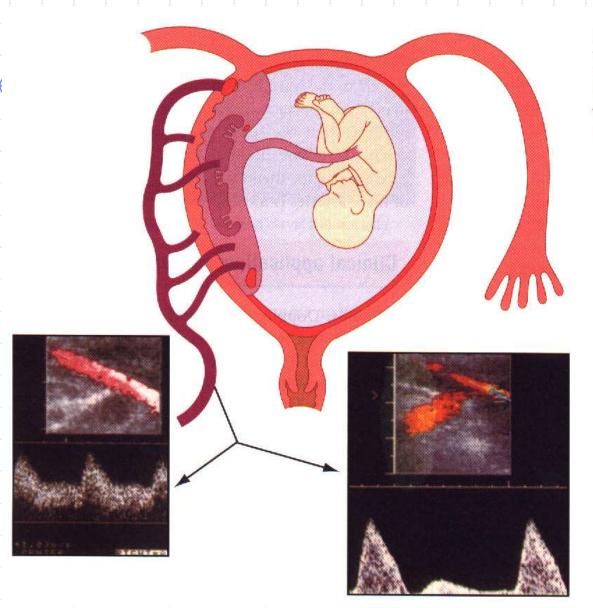
Figure 7.7 Left: a low resistance wave form from the uterine artery; note the abundance of diastolic flow. Right: a high resistance waveform from the uterine artery; note the notches and reduced diastolic flow.

An IUGR infant is at risk for

Hypothermia?

decreased subcutaneous fat, increased surface- volume ratio, decreased heat production

Hypoglycemia?

decreased glycogen stores/ glycogenolysis/ gluconeogenesis

increased metabolic rate

Or

deficient catecholamine release

Hypocalcemia?

Associated with perinatal stress, asphyxia, prematurity

Management

◆ **Prepregnancy**: to prevent it by identifying risk factors and treat as necessary (e.g. improve nutrition intake, stop smoking or alcohol, ASA in APA syndrome, and Heparin in thrombophilias)

◆ **Antepartum**: identify risk factors that can be changed. Fetal surveillance by ultrasound (BPP) and fetal heart monitoring (Non-Stress Test). To decide on timing and mode of delivery.

Growth restriction *near term*

❖ Prompt delivery

❖ Recommend delivery at 34 weeks or beyond if there is clinically significant oligohydramnios

Growth restriction *remote from term*

❖ No specific treatment

❖ If diagnosed in prior to 34 weeks, and amnionic fluid volume and fetal surveillance are normal

➔ *"Observation is recommended*

± screening for toxoplasmosis,herpes,rubella,CMV and others "

➔ *Specific treatment(causes of IUGR) and supportive care*

❖ If severe IUGR or bad obstetric conditions

➔ Terminate pregnancy should be considered

IUGR- Outcome

◆ Neurodevelopment

- etiology and adverse event dependent
- lower intelligence, learning/ behavioral disorders, neurologic handicaps
- symmetric, chromosomal disorders, congenital infections--- poorer outcome
- school performance influenced by social class

Maternal causes

- **Maternal malnutrition**
- **Poor maternal weight gain**
- **Severe anemia**
- **Chronic hypoxemia**
- **Cardiovascular disease**
- **Drugs and teratogens**
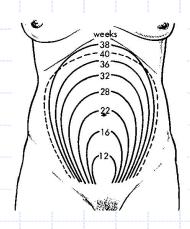- **Multiple pregnancy**
- **Antiphospholipid antibodies syndrome**

She followed up regularly and had an uncomplicated 1ˢᵗ trimester…..

- At 18 weeks fundal height measured 17 cm
- At 22 weeks fundal height measured 20 cm
- At 24 weeks fundal height measured 21 cm

At this point I am worried about IUGR with this sluggish growth.

Although we do not use fundal height to diagnose IUGR, it can be a clue to a developing problem.

- A fundal height that lags by more than 3 cm or is increasing in disparity with the gestational age may signal IUGR.
- A lag of 4 cm or more certainly suggests growth restriction.
- The size of the uterus should be assessed at each prenatal visit.

Thank you