

[Newborn Care Manual: Contents](#)

## ASSESSING AN INFANT'S GESTATIONAL AGE AT BIRTH

### 17-1 WHAT IS GESTATIONAL AGE?

Gestational age (or the duration of pregnancy) is measured in weeks from the first day of the mother's last normal menstrual period to the day of delivery.

### 17-2 WHAT IS THE AVERAGE GESTATIONAL AGE?

The average gestational age is 40 weeks (280 days). Not all women with normal pregnancies deliver at exactly 40 weeks however. A range of 37 weeks (259 days) to 42 weeks (294 days) is accepted as normal. Infants with a normal gestational age are called TERM infants. Most infants are born at term and these infants have the lowest risk of problems in the newborn period.

### MOST INFANTS ARE BORN BETWEEN 37 AND 42 WEEKS OF GESTATION

### 17-3 WHEN IS THE DURATION OF PREGNANCY TOO SHORT OR TOO LONG?

1. Infants that are born before 37 weeks are called PRETERM infants. About 5% of all infants are born preterm in an affluent community and often more than 20% in a poor community. Preterm infants have a high risk of neonatal problems. Therefore, any pregnancy ending before 37 weeks is regarded as too short.
2. Infants with a gestational age of 42 weeks or more are called POST TERM infants. About 5% of infants are born post term. As these infants also have an increased risk of neonatal problems, a pregnancy of 42 weeks or more is regarded as too long.

*\*\*\* The words "premature" and "postmature" are no longer used as they are confusing and difficult to define.*

### 17-4 HOW DO YOU ASSESS THE GESTATIONAL AGE OF AN INFANT?

1. If possible the gestational age should be determined before delivery from the mother's menstrual history and clinical examination in early pregnancy. An ultrasound examination before 20 weeks is also an accurate method of determining the gestational age.
2. If the duration of pregnancy is unknown or uncertain, the gestational age can be roughly estimated by simply observing the infant's appearance and behaviour. This is an inaccurate method, however, unless the examiner is very experienced.
3. Instead, a scoring test can be used to assess more accurately the infant's gestational age. The Ballard method of scoring an infant's gestational age is based on both the infant's physical appearance and behavior.

The Ballard method of scoring gestational age is described in skills workshop 17 of this PEP manual.

*\*\*\* Other scoring systems such as the Finnstrom and the Dubowitz methods can also be used to assess the gestational age of infants. A modification of the Ballard method is available to give a more accurate assessment of gestational age in infants less than 32 weeks. Wasted and growth restricted infants tend to underscore.*

### 17-5 WHAT ARE THE COMMON COMPLICATIONS OF A PRETERM INFANT?

These infants have immature organs because they are born too soon. They are also small and fragile and can, therefore, be easily damaged at delivery.

The common neonatal complications in infants born preterm are:

1. Birth asphyxia.
2. Hypothermia.
3. Hypoglycaemia.

4. Hyaline membrane disease.
5. Recurrent apnoea.
6. Poor feeding.
7. Jaundice.
8. Infection.
9. Anaemia.
10. Intraventricular haemorrhage.
11. Patent ductus arteriosus.
12. Separation from parents.

Preterm infants are therefore at HIGH RISK of many complications after birth and need special care. Many preterm infants die as a result of these complications.

**PRETERM INFANTS ARE BORN BEFORE 37 WEEKS AND HAVE AN INCREASED RISK OF PROBLEMS IN THE NEWBORN PERIOD DUE TO THEIR ORGAN IMMATURITY**

**17-6 WHAT ARE THE COMMON COMPLICATIONS OF A POST TERM INFANT?**

1. These infants usually are large, due to the prolonged period of intra-uterine growth and, therefore, may experience birth trauma due to cephalopelvic disproportion, e.g. fractured clavicle or Erb's palsy.
2. Commonly the placenta is unable to provide the large fetus with enough energy and oxygen during the last extra weeks of pregnancy. Therefore, there is an increased risk of fetal distress during labour and also soft tissue wasting with hypoglycaemia soon after birth.

**POST TERM INFANTS OFTEN SUFFER TRAUMA, HYPOXIA AND HYPOGLYCAEMIA**

**ASSESSING AN INFANT'S SIZE AT BIRTH**

**17-7 HOW DO YOU DETERMINE AN INFANT'S SIZE AFTER DELIVERY?**

The size of a newborn infant is usually determined by weighing the infant after birth. While weight is often the only measurement of size that is determined after birth, it is also useful to measure the infant's head circumference.

*\*\*\* Sometimes the crown-heel length is also measured at birth. However, length is difficult to measure accurately and, therefore, is usually not recorded routinely.*

The measurement of weight and head circumference is described in skills workshop 17 of this PEP manual.

**17-8 WHY SHOULD YOU DETERMINE AN INFANT'S BIRTH WEIGHT?**

After delivery all infants should be weighed naked because:

1. Weight is commonly used to determine an infant's size at birth as it is both easy and accurate to measure.
2. Infants with an abnormally low or abnormally high birth weight have an increased risk of neonatal problems. Measuring birth weight is a simple method of identifying high risk infants.
3. Birth weight is important in assessing subsequent weight gain or loss during the first week of life.

**ALL INFANTS MUST BE WEIGHED AT BIRTH BECAUSE BIRTH WEIGHT CAN BE USED TO DIVIDE INFANTS INTO HIGH RISK AND LOW RISK CATEGORIES**

**17-9 HOW DO YOU GROUP INFANTS BY THEIR BIRTH WEIGHT?**

Infants can be divided into groups by their birth weight. This is particularly useful if the gestational age is not known. Most infants weigh between 2500 g and 4000 g at birth. These infants are usually healthy and require only routine care. Infants weighing less than 2500 g and infants weighing 4000 g or more have an abnormal birth weight and are at an increased risk of neonatal problems. They therefore may require special care.

Infants weighing less than 2500 g are called LOW BIRTH WEIGHT (LBW) infants.

**LOW BIRTH WEIGHT INFANTS WEIGH LESS THAN 2500 G. THEY OFTEN HAVE CLINICAL PROBLEMS IN THE NEWBORN PERIOD AND, THEREFORE, MAY NEED EXTRA CARE**

**GROUPING INFANTS BY THEIR WEIGHT FOR GESTATIONAL AGE****17-10 HOW CAN YOU GROUP INFANTS BY THEIR WEIGHT FOR GESTATIONAL AGE?**

Weight for gestational age can also be used to group newborn infants into low risk and high risk categories.

It is, therefore, possible to group infants into low risk and high risk categories by their:

1. Gestational age alone.
2. Weight alone.
3. Weight for gestational age (weight and gestational age together).

Each method is useful as it tells you something different about an infant.

**17-11 HOW DO YOU DETERMINE WEIGHT FOR GESTATIONAL AGE?**

Once you have weighed an infant and assessed the gestational age, this information can be plotted on a weight for gestational age chart.

Gestational age is plotted in weeks along the bottom of the chart and is divided into preterm, term and post term categories. Birth weight in grams is plotted on the left hand margin of the chart. Note that the birth weight steadily increases with gestational age.

On the chart are 2 lines called the 10th and 90th CENTILES. Infants with a normal birth weight for their gestational age fall between the 10th and 90th centiles. As their weight is appropriate for their gestational age they are referred to as APPROPRIATE FOR GESTATIONAL AGE INFANTS (AGA infants). These infants have grown normally during pregnancy.

Infants with a birth weight for their gestational age that falls above the 90th centile are called OVERWEIGHT FOR GESTATIONAL AGE INFANTS. These infants have grown faster than normal during pregnancy and weigh more than expected.

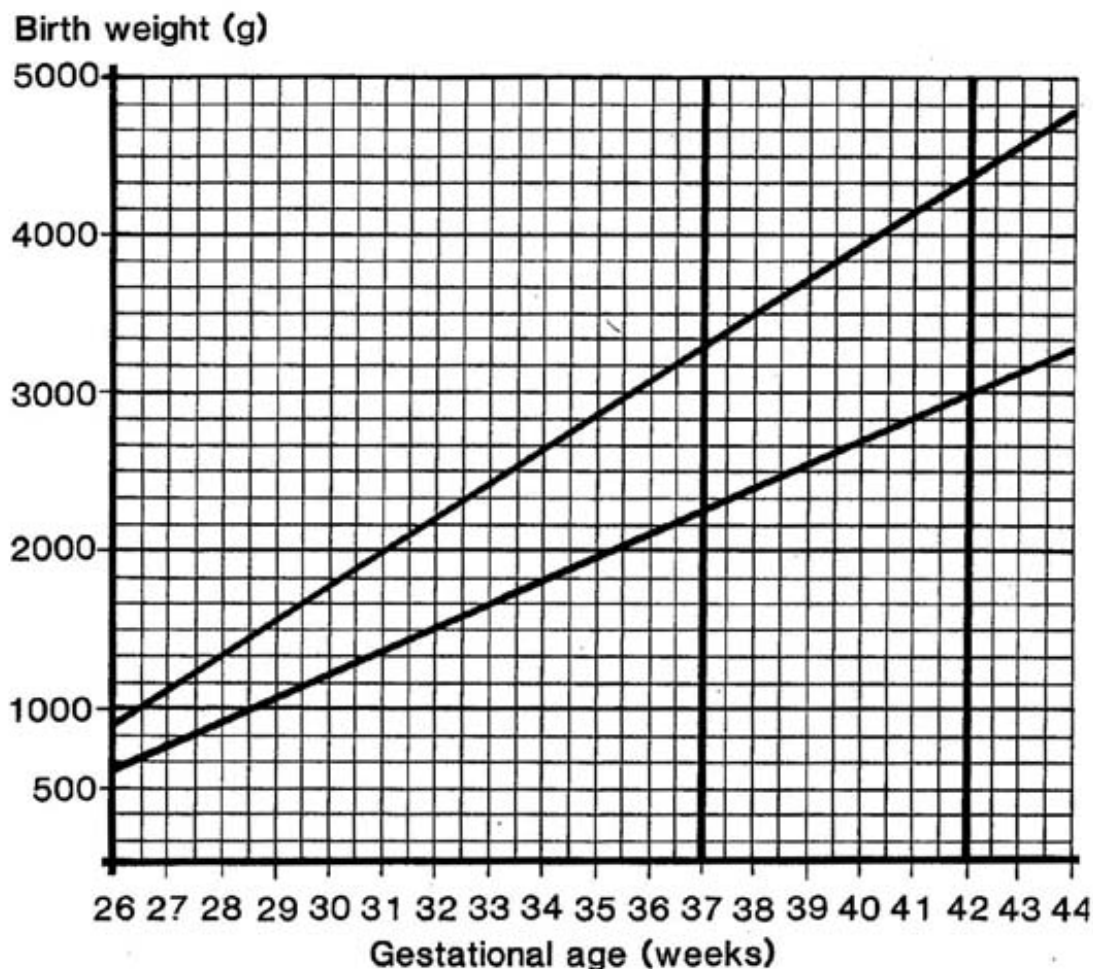
Infants with a birth weight for their gestational age that falls below the 10th centile are called UNDERWEIGHT FOR GESTATIONAL AGE INFANTS. These infants have grown slower than normal during pregnancy and weigh less than expected.

**UNDERWEIGHT FOR GESTATIONAL AGE INFANTS WEIGH LESS THAN EXPECTED AND HAVE A BIRTH WEIGHT WHICH FALLS BELOW THE 10TH CENTILE**

*\*\*\* In a well nourished community 80% of infants will be appropriate for gestational age, 10% overweight and 10% underweight for gestational age. However, in a poor community there may be far more underweight and far fewer overweight for gestational age infants.*

\*\*\* The descriptions "small-for-gestational-age" (SGA) and "large-for-gestational-age" (LGA) are also used. However, overweight and underweight for gestational age are preferable as they specify that weight is being assessed. Many UGA infants have a normal length and head circumference. Therefore, they are not really small but rather wasted.

Figure 17-1. Weight for gestational age chart:



The method of plotting weight for gestational is described in skills workshop 17 of this PEP manual.

\*\*\* Many weight for gestational age standards (charts) have been used. They differ depending on the nutritional status of the study population. The international weight for gestational age standard used in this unit is both simple and useful to screen infants. Head circumference and length standards may be used to further classify infants.

You will now understand that a heavy infant may have a high weight at delivery because the infant is either:

1. Post term.
2. Overweight for gestational age.
3. Both post term and overweight for gestational age.

Likewise a low birth weight infant may have a low weight at delivery because the infant is either:

1. Preterm.
2. Underweight for gestational age.
3. Both preterm and underweight for gestational age.

**LOW BIRTH WEIGHT INFANTS ARE NOT ALL BORN PRETERM**

**17-12 WHAT IS THE VALUE OF PLOTTING AN INFANT'S WEIGHT FOR GESTATIONAL AGE?**

The exercise of classifying all newborn infants by their weight for gestational age is extremely useful as infants born overweight for gestational age and infants born underweight for gestational age commonly have problems during the first weeks of life. It is important, therefore, to identify these infants as soon as possible after delivery. Infants that are born at term and are appropriate for their gestational age have the lowest risk of problems in the newborn period and, therefore, usually need routine care only.

**INFANTS THAT ARE BORN AT TERM AND ARE APPROPRIATE FOR GESTATIONAL AGE HAVE THE LOWEST RISK OF PROBLEMS**

An infant's head circumference can also be plotted against gestational age on a head circumference for gestational age chart. The method is the same as that used for plotting weight for gestational age. Head circumferences between the 10th and 90th centiles are regarded as normal for gestational age. A head circumference above the 90th centile is abnormally large while a head circumference below the 10th centile is abnormally small for gestational age. A head circumference below the 10th centile indicates that the infant's brain is small and has not grown normally.

The method of plotting head circumference for gestational age is described in skills workshop 17 of this PEP manual.

**17-13 WHAT ARE THE CAUSES OF AN INFANT BEING BORN OVERWEIGHT FOR GESTATIONAL AGE?**

There are 2 main causes of a fetus growing faster than usual, resulting in an overweight for gestational age infant:

1. A heavy or obese mother.
2. A diabetic mother.

However, in many cases the cause of the infant being overweight for gestational age is not known.

**INFANTS BORN TO DIABETIC WOMEN ARE OFTEN OVERWEIGHT FOR GESTATIONAL AGE**
**17-14 WHAT ARE THE COMPLICATIONS OF OVERWEIGHT FOR GESTATIONAL AGE INFANTS?**

Overweight for gestational age infants are at an increased risk of neonatal problems:

1. They are usually large and obese and, therefore, may experience birth trauma due to cephalopelvic disproportion.
2. Infants that are overweight for gestational age because their mothers are poorly controlled diabetics are at high risk of hypoglycaemia and respiratory distress after delivery. They also commonly have congenital abnormalities.

**17-15 WHAT ARE THE CAUSES OF AN INFANT BEING BORN UNDERWEIGHT FOR GESTATIONAL AGE?**

There are both maternal and fetal causes of slow fetal growth resulting in the birth of an underweight for gestational age infant.

1. MATERNAL CAUSES:

- (i) Low maternal weight.
- (ii) Smoking.
- (iii) Excess alcohol intake.
- (iv) Hypertension.

## 2. FETAL CAUSES:

- (i) Multiple pregnancy.
- (ii) Chromosomal abnormalities, e.g. Down syndrome.
- (iii) Severe congenital abnormalities.
- (iv) Chronic intra-uterine infections, e.g. syphilis.

Maternal hypertension and smoking result in decreased blood flow to the placenta. However, in many cases no obvious cause can be found.

### PREGNANT WOMEN SHOULD NOT SMOKE OR DRINK ALCOHOL

*\*\*\* Note that placental causes are rare. Chronic hypertension, pre-eclampsia (gestational proteinuric hypertension) and smoking are maternal causes as the problem is in the spiral arteries not the placenta.*

#### 17-16 WHAT IS THE CLINICAL APPEARANCE OF AN UNDERWEIGHT FOR GESTATIONAL AGE INFANT?

This will depend on whether the cause of slow fetal growth affected the fetus from early pregnancy or only during the last few weeks of pregnancy:

1. If intra-uterine growth restriction (IUGR) was present for many months, the infant will appear symmetrically small at delivery with a birth weight and head circumference both below the 10th centile. These infants have been growing slowly for a long time.
2. If the fetal growth was only affected during the last weeks of pregnancy, then the infant will be wasted at delivery. These infants appear to have recently lost weight and, therefore, look starved. Only the weight will be below the 10th centile. The head circumference will be above the 10th centile. These infants have only received inadequate nutrition for a few weeks.
3. Some infants will have the features of both intra-uterine growth restriction and wasting. These infants have grown slowly for months during pregnancy followed by weight loss during the last weeks before delivery. Although their weight and head circumference will both be below the 10th centile, weight will fall below head circumference on the chart.

*\*\*\* Note that intra-uterine growth restriction is not the same as underweight for gestational age. Some UGA are wasted but have not suffered IUGR.*

#### 17-17 WHAT ARE THE CLINICAL SIGNS OF WASTING IN A NEWBORN INFANT?

Wasting of the soft tissues, such as muscle and subcutaneous fat, may be recognised in the infant at birth by the following features:

1. Dry, peeling skin.
2. Loose, wrinkled skin and little muscle, especially in the upper legs, giving the appearance that the infant has recently lost weight.

These clinical signs suggest that the fetus has been undernourished during the last weeks of pregnancy and, as a result, has very few energy stores at birth (i.e. glycogen, fat and muscle).

#### 17-18 WHAT ARE THE COMMON COMPLICATIONS OF AN UNDERWEIGHT FOR GESTATIONAL AGE INFANT?

All underweight for gestational age infants, whether they are wasted or not, are at an increased risk during the first weeks of life because they have often received too little food and oxygen during pregnancy. Underweight for gestational age infants, therefore, need special care after delivery.

The common complications of infants born underweight for gestational age are:

1. Birth asphyxia.
2. Organ damage due to lack of oxygen before delivery (hypoxia).
3. Meconium aspiration.
4. Hypothermia.
5. Hypoglycaemia.

If the infant is born underweight for gestational age because of congenital abnormalities, chromosomal abnormalities (e.g. Down syndrome) or chronic intra-uterine infections (e.g. syphilis), then these causes will also result in clinical problems.

### **17-19 ARE ALL WASTED INFANTS EITHER POST TERM OR UNDERWEIGHT FOR GESTATIONAL AGE?**

No. Although many wasted infants are post term or underweight for gestational age, some wasted infants are born at term with a birth weight that is appropriate for their gestational age. These infants have only been starved for a few days before delivery and, therefore, have not lost enough weight to become underweight for gestational age at birth. All wasted infants, even if they are born at term and have a birth weight between the 10th and 90th centiles, are at an increased risk of those problems expected in underweight for gestational age infants, i.e. birth asphyxia, hypoxia, meconium aspiration, hypothermia and hypoglycaemia.

*\*\*\* When a wasted infant with a birth weight that is appropriate for gestational age is plotted on the chart, the infant's weight will be lower than the head circumference, although both measurements still fall between the 10th and 90th centiles.*

**ALL WASTED INFANTS ARE AT AN INCREASED RISK OF PROBLEMS IN THE NEWBORN PERIOD, EVEN IF THEY ARE NOT UNDERWEIGHT FOR GESTATIONAL AGE**

### **17-20 WHICH INFANTS NEED THEIR GESTATIONAL AGE AND WEIGHT ASSESSED AT BIRTH?**

The gestational age should be assessed and the weight measured in all infants at delivery. Many women will know their duration of pregnancy. With experience the gestational age can be roughly estimated by simple observation alone. As the Ballard score takes time to perform, it is not done routinely on all infants. However, the following high risk infants should be scored by the Ballard method if the gestational age is uncertain. In addition their weight should be accurately measured and plotted on the weight for gestational age chart:

1. Infants who are preterm or post term by dates or appearance.
2. Infants with a birth weight below 2500 g or above 4000 g.
3. Wasted infants.
4. Clinically ill infants.

**GESTATIONAL AGE SHOULD BE ACCURATELY DETERMINED IN ALL HIGH RISK INFANTS**

### **17-21 WHY ARE ALL INFANTS NOT THE SAME SIZE AT BIRTH?**

You should realise by now that all newborn infants are not the same size at birth because their gestational age and weight may vary widely and they may or may not be wasted. Similarly all infants do not have the same risk of neonatal problems. By dividing infants into separate groups, using gestational age, weight and wasting, you should be able to predict the sort of problems that a particular infant will develop during the first weeks of life. This is extremely important as many of these problems are preventable with correct management soon after delivery.

At the birth of EVERY infant, the following 3 questions should be asked:

1. What is the gestational age?
2. What is the birth weight?
3. Does the infant have dry, peeling skin and appear starved?

If any of these 3 questions reveals an abnormal result, then you should ask whether the infant's weight for the gestational age falls within the normal range (i.e. between the 10th and 90th centiles)? With this information you will be able to answer the following questions:

1. Is the duration of pregnancy too short or too long?
2. Does the infant have a low birth weight?
3. Is the infant overweight or underweight for gestational age?
4. Is the infant wasted?

Now you should be able to decide whether the infant is at high risk or low risk of problems and what level of care is needed during the first days of life.

## CASE PROBLEMS

### CASE 1

A woman presents in labour at a level 1 clinic. By her dates and abdominal palpation she is 32 weeks pregnant. After a short labour she delivers a male infant weighing 1400 g. The Ballard score confirms the gestational age. The infant's weight falls between the 10th and 90th centiles.

1. **How would you classify this infant by weight alone?**

This is a low birth weight infant as the weight is less than 2500 g.

2. **How would you classify this infant by gestational age alone?**

The infant is preterm because the infant was born before 37 weeks of gestation.

3. **How would you classify this infant by weight for gestational age?**

The infant should be classified as appropriate for gestational age because the weight falls within the normal range.

4. **What problems is this infant at high risk of in the first few weeks of life?**

As a preterm, appropriate for gestational age infant, the important risks after delivery are birth asphyxia, hypothermia, hypoglycaemia, hyaline membrane disease, apnoea, poor feeding, jaundice, infection, anaemia, intraventricular haemorrhage, patent ductus arteriosus and separation from the parents. Management must, therefore, be aimed at preventing or treating these problems.

### CASE 2

A female infant weighs 2200 g at birth. The mother is unbooked and does not know the date of her last menstrual period. She smokes 20 cigarettes a day. The infant has loose, wrinkled, dry skin. The infant scores at 42,5 weeks on the Ballard score. When plotted on a weight for gestational age chart, the infant falls below the 10th centile.

1. **What is the explanation for the appearance of this infant's skin?**

The loose, wrinkled, dry skin suggests soft tissue wasting due to an inadequate supply of food to the fetus during the last weeks of pregnancy.

2. **Why was it important to score this infant?**

Because the patient did not know the duration of pregnancy and because the infant weighed less than 2500 g and was wasted.

**3. How would you classify this infant by gestational age alone?**

The scored age of 42,5 weeks indicates that the infant was born post term.

**4. How would you classify this infant by weight for gestational age?**

This infant is underweight for gestational age.

**5. Why is it important to identify this infant as being both underweight for gestational age and wasted?**

Because the diagnosis places the infant at high risk of birth asphyxia, meconium aspiration, hypothermia and hypoglycaemia. The infant may also have organ damage due to the lack of oxygen before delivery (prenatal hypoxia).

**6. Are all post term infants wasted or underweight for gestational age?**

No, but post term infants often are wasted or underweight for gestational age.

**7. What is the probable cause of this infant being underweight for gestational age.**

The mother's heavy smoking.

**CASE 3**

A woman who booked early and attended antenatal clinic regularly delivers an infant at a level 1 clinic. She is 39 weeks by dates and the infant appears to be of normal size. The infant appears normal and feeds well. The birth weight is 3100 g.

**1. Why should this infant be weighed?**

All infants should be weighed routinely after delivery, even if they appear normal and healthy, in order to identify low birth weight infants. An accurate birth weight is also important to determine weight gain or loss during the first days and weeks after birth. There is no need to score this infant as the mother's knows her menstrual dates and the infant appears normal.

**2. How would you classify this infant by its weight and gestational age?**

This is a term, appropriate for gestational age infant and, therefore, is at low risk for problems in the newborn period. As the infant also appears normal and feeds well, the infant should receive routine, primary care at the level 1 clinic.

**3. Are all infants who weigh 3100 g born at term?**

Most will be term infants. However, some may be underweight for gestational age post term infants while others may be overweight for gestational age preterm infants.

**CASE 4**

An obese diabetic patient delivers an infant at 36,5 weeks. The infant appears very fat and weighs 3700 g.

**1. How would you classify this infant?**

Preterm and overweight for gestational age as the infant was born before 37 weeks and must be above the 90th centile with a weight of 3700 g. This should be confirmed by plotting the infant's weight for gestational age on a chart.

**2. What is the probable cause of the infant being overweight for gestational age?**

The mother's diabetes and obesity.

**3. Why should this infant receive more than just primary care?**

Because infants of diabetic women, especially if they are preterm and overweight for gestational age, are at high risk of problems in the first weeks of life.

**CASE 5**

A woman who has hypertension and proteinuria (i.e. pre-eclampsia) for the last month of pregnancy delivers at 38 weeks. The infant appears wasted but has a birth weight between the 10th and 90th centiles. The Apgar scores were low and the infant required resuscitation.

**1. How would you classify this infant?**

Term and appropriate for gestational age.

**2. Why is this infant at high risk of problems during the first weeks of life?**

Because the infant is wasted. Even though this infant is appropriate for gestational age and born at term, the risk of clinical problems is high because of the wasting.

**3. What is the probable cause of the wasting?**

The maternal pre-eclampsia. As a result of decreased placental blood flow, the fetus did not receive enough energy (calories) during the last few weeks of pregnancy and, therefore, became wasted due to weight loss.

**4. What was the probable cause of the birth asphyxia?**

Hypoxia during labour. Wasted infants are at high risk of fetal hypoxia.