Preterm birth

Most pregnancies last around 40 weeks. Babies born between 37 and 42 completed weeks of pregnancy are called full-term. Babies born before 37 completed weeks of pregnancy are called premature. In the United States, about 12.8 percent of babies (more than half a million a year) are born prematurely (1). The rate of premature birth has increased by 36 percent since the early 1980s (1).

Premature birth is a serious health problem. Premature babies are at increased risk for newborn health complications, such as breathing problems, and even death. Most premature babies require care in a newborn intensive care unit (NICU), which has specialized medical staff and equipment that can deal with the multiple problems faced by premature infants.

Premature babies also face an increased risk of lasting disabilities, such as mental retardation, learning and behavioral problems, cerebral palsy, lung problems and vision and hearing loss. Two recent studies suggest that premature babies may be at increased risk of symptoms associated with autism (social, behavioral and speech problems) (2, 3). Studies also suggest that babies born very prematurely may be at increased risk of certain adult health problems, such as diabetes, high blood pressure and heart disease (4).

When are most premature babies born?
More than 70 percent of premature babies are born between 34 and 36 weeks gestation (1). These are called late-preterm births. Late-preterm babies account for most of the increase in the premature birth rate in this country. A 2008 study found that cesarean sections (c-sections) account for nearly all of the increase in U.S. singleton premature births, and this group had the largest increase in c-section deliveries (5).

About 12 percent of premature babies are born between 32 and 33 weeks gestation, about 10 percent between 28 and 31 weeks, and about 6 percent at less than 28 weeks gestation (1).

All premature babies are at risk for health problems, but the earlier a baby is born, the greater the risk for serious complications. Babies born before about 32 weeks gestation usually are very small, and their organs are less developed than those of babies born later. Fortunately, advances in obstetrics and neonatology (the branch of pediatrics that deals with newborns) have improved the chances of survival for even the smallest babies.

What causes premature birth?
Most premature births are caused by spontaneous preterm labor, either by itself or following spontaneous premature rupture of the membranes (PROM). With PROM, the sac inside the uterus that holds the baby breaks too soon. Preterm labor is labor that begins before 37 completed weeks of pregnancy. The causes of preterm labor and PROM are not fully understood.

The latest research suggests that many cases are triggered by the body’s natural response to certain infections, including those involving amniotic fluid and fetal membranes. However, in about half of all cases of premature birth, providers cannot determine why a woman delivered prematurely.

About 25 percent of premature births are caused by early induction of labor or c-section due to pregnancy complications or health problems in the mother or the fetus (6). In many of these cases, early delivery is probably the safest approach for mother and baby.

However, the March of Dimes is concerned that some early deliveries may occur without good medical justification or may be done at the request of the mother. In some cases, this can lead to late-preterm birth, with potential risks to the baby. Women should wait until at least 39 weeks to schedule an induced labor or a c-section, unless there are medical problems that make it necessary to deliver earlier (7, 8).

Which women are at increased risk for premature birth?
Any woman can give birth prematurely, but some women are at greater risk than others. Researchers have identified some risk factors, but providers still can’t predict which women will deliver prematurely.

Three groups of women are at greatest risk for premature birth:

1. Women who have had a previous premature birth
2. Women who are pregnant with twins, triplets or more
3. Women with certain uterine or cervical abnormalities

Certain lifestyle factors may put a woman at greater risk for preterm labor. These include:
• Late or no prenatal care
• **Smoking**
• **Drinking alcohol**
• **Using illegal drugs**
• Exposure to the medication DES
• **Domestic violence** (including physical, sexual or emotional abuse)
• Lack of social support
• Extremely high levels of stress
• Long working hours with long periods of standing

Certain medical conditions during pregnancy also may increase the likelihood that a woman will have preterm labor. These include:

• Infections (including urinary tract, vaginal, sexually transmitted and other infections)
• **High blood pressure**
• **Diabetes**
• Clotting disorders (thrombophilia)
• Being underweight before pregnancy
• **Obesity**
• Short time period between pregnancies [One study found that an interval of less than 18 months between birth and the beginning of the next pregnancy increased the risk of preterm labor, though the greatest risk was with intervals shorter than 6 months (9). A woman should discuss with her provider the best pregnancy spacing for her.]
• Being pregnant with a single fetus after in vitro fertilization
• **Birth defects** in the baby (10)
• Bleeding from the vagina

Certain demographic factors also increase the risk:

• Non-Hispanic black race
• Younger than age 17, or older than age 35
• Low socioeconomic status

Even if a woman has one or more of these risk factors, it does not mean that she will have preterm labor. However, all women should learn the signs of preterm labor and what to do if they have any of them.

**What medical complications are common in premature babies?**

There are a number of complications that are more likely in premature than full-term babies:

**Respiratory distress syndrome (RDS):** About 23,000 babies a year (most of whom were born before the 34th week of pregnancy) suffer from this breathing problem (11). Babies with RDS lack a protein called surfactant that keeps small air sacs in the lungs from collapsing.

Treatment with surfactant helps affected babies breathe more easily. Since treatment with surfactant was introduced in 1990, deaths from RDS have been reduced by about half (12).

A provider may suspect a baby has RDS if she is struggling to breathe. A lung X-ray and blood tests often confirm the diagnosis.

Along with surfactant treatment, babies with RDS may need additional oxygen and mechanical breathing assistance to keep their lungs expanded. They may need the support of a ventilator or they may receive treatment called continuous
positive airway pressure (CPAP). CPAP delivers pressurized air to the baby’s lungs through small tubes in the baby’s nose or through a tube that has been inserted into his windpipe. CPAP helps a baby breathe, but it does not breathe for him. The sickest babies may need the help of a ventilator to breathe for them while their lungs mature.

**Apnea:** Premature babies sometimes stop breathing for 20 seconds or more. This interruption in breathing is called apnea, and it may be accompanied by a slow heart rate. Premature babies are constantly monitored for apnea. If the baby stops breathing, a nurse stimulates the baby to start breathing by patting him or touching the soles of his feet.

**Intraventricular hemorrhage (IVH):** Bleeding in the brain occurs in some premature babies. Those born before about 32 weeks of pregnancy are at highest risk. The bleeds usually occur in the first 3 days of life and generally are diagnosed with an ultrasound.

Most brain bleeds are mild and resolve themselves with no or few lasting problems. More severe bleeds can affect the substance of the brain or cause the fluid-filled structures (ventricles) in the brain to expand rapidly. These severe bleeds can cause pressure on the brain that can lead to brain damage (such as cerebral palsy and learning and behavioral problems). When fluid persists in the ventricles, neurosurgeons may insert a tube into the brain to drain the fluid and reduce the risk of brain damage.

**Patent ductus arteriosis (PDA):** PDA is a heart problem that is common in premature babies. Before birth, a large artery called the ductus arteriosus lets blood bypass the lungs because the fetus gets its oxygen through the placenta. The ductus arteriosus normally closes soon after birth so that blood can travel to the lungs and pick up oxygen.

When the ductus arteriosus does not close properly, it can lead to heart failure. PDA can be diagnosed with a specialized form of ultrasound (echocardiography) or other imaging tests. Babies with PDA are treated with a drug that helps close the ductus arteriosus, although surgery may be necessary if the drug does not work.

**Necrotizing enterocolitis (NEC):** Some premature babies develop this potentially dangerous intestinal problem 2 to 3 weeks after birth. It can lead to feeding difficulties, abdominal swelling and other complications. NEC can be diagnosed with blood tests and imaging tests, such as X-rays. Affected babies are treated with antibiotics and fed intravenously (through a vein) while the intestine heals. In some cases, surgery is necessary to remove damaged sections of the intestine.

**Retinopathy of prematurity (ROP):** ROP is an abnormal growth of blood vessels in the eye that can lead to vision loss. It occurs mainly in babies born before 32 weeks of pregnancy. ROP is diagnosed during an examination by an ophthalmologist (eye doctor) several weeks after birth.

Most cases are mild and heal themselves with little or no vision loss. In more severe cases, the ophthalmologist may treat the abnormal vessels with a laser or with cryotherapy (freezing) to protect the retina and preserve vision.

**Jaundice:** Premature babies are more likely than full-term babies to develop jaundice because their livers are too immature to remove a waste product called bilirubin from the blood. Babies with jaundice have a yellowish color to their skin and eyes. Jaundice often is mild and usually is not harmful. However, if the bilirubin level gets too high, it can cause brain damage.

Blood tests show when bilirubin levels are too high, so providers can treat the baby with special lights (phototherapy) that help the body eliminate bilirubin, thus preventing brain damage. Occasionally, if bilirubin levels rise very high, a baby may need a special type of blood transfusion.

**Anemia:** Premature infants often are anemic, which means they do not have enough red blood cells. Normally, the baby stores iron during the later months of pregnancy and uses it late in pregnancy and after birth to make red blood cells. Infants born too soon may not have had enough time to store iron.

Babies with anemia tend to develop feeding problems and grow more slowly. Anemia also can worsen any heart or breathing problems. Anemic infants may be treated with dietary iron supplements (drugs that increase red blood cell production), or they may require blood transfusion.

**Chronic lung disease (also called bronchopulmonary dysplasia or BPD):** Chronic lung disease most commonly affects premature infants who require ongoing treatment with supplemental oxygen. The risk of BPD is increased in babies who still need oxygen when they reach 36 weeks after conception (weeks of pregnancy plus weeks after birth adding up to 36 or more weeks). These babies develop fluid in the lungs, scarring and lung damage, which can be seen on an X-ray.

Affected babies are treated with oxygen and medications that make breathing easier. Sometimes they require support from a ventilator and are weaned slowly from the device. Their lungs usually improve over the first 2 years of life. However, many children with BPD develop chronic lung disease resembling asthma.

**Infections:** Premature babies have immature immune systems that are inefficient at fighting off bacteria, viruses and other organisms that can cause infection. Serious infections commonly seen in premature babies include pneumonia (lung infection), sepsis (blood infection) and meningitis (infection of the membranes surrounding the brain and spinal cord). Babies can contract these infections at birth from their mother, or they may become infected after birth. Infections are treated with antibiotics or antiviral drugs.
What happens when babies are born at less than 28 weeks?

Fewer than 1 percent of babies in this country are born this early, but they have the most complications (1). Most of these babies are born at extremely low birthweight (less than 2 pounds, 3 ounces). Almost all require treatment with oxygen, surfactant and mechanical assistance to help them breathe.

These babies are too immature to suck, swallow and breathe at the same time, so they must be fed through a vein (intravenously) until they develop these skills. They often cannot cry (or you cannot hear them due to the tube in their throat) and they sleep most of the day. These tiny babies have little muscle tone, and most move very little.

Babies born this early look very different than full-term babies. Their skin is wrinkled and reddish-purple in color and is so thin that the blood vessels underneath can be seen. Their face and body are covered in soft hair called lanugo. Because these babies have not had time to put on fat, they appear very thin. Most likely, their eyes are closed, and they have no eyelashes.

These babies are at high risk for one or more of the complications discussed above. However, most babies born after about 26 weeks gestation do survive (about 80 percent at 26 weeks), although they may face an extended stay in the newborn intensive care unit (NICU) (13).

Survival rates can vary greatly depending on factors other than gestational age. Factors that can improve survival rates include higher birthweight, female sex, history of prenatal treatment with corticosteroids (drugs that speed lung development) and singleton birth (not part of a twin or other multiple birth) (14). Unfortunately, about 25 percent of these very premature babies develop serious lasting disabilities, and up to half may have milder problems, such as learning and behavioral problems (15).

What about babies born at 28 to 31 weeks gestation?

These babies look quite similar to babies born earlier, although they are larger (usually between 2 and 4 pounds) and even more likely to survive (about 96 percent) (13). Many require treatment with oxygen, surfactant and assistance to help them breathe. Some of these babies can be fed breastmilk or formula through a tube placed through their nose or mouth into the stomach, although others need to be fed intravenously.

Some of these babies can cry. They can move, although their movements may be jerky. A baby born at this time can grasp a person’s finger. These babies can open their eyes, and they begin to stay awake and alert for short periods.

Babies born at 28 to 31 weeks are at risk for the complications discussed above. When complications occur, however, they may not be as severe as in babies born earlier. Babies born with very low birthweight (less than 3 pounds, 4 ounces) remain at risk for serious disabilities.

What about babies born at 32 to 33 weeks gestation?

About 98 percent of babies born at this time survive (13). Most weigh between 3 and 5 pounds and appear thinner than full-term babies. Many need supplemental oxygen to help them breathe, although some can breathe on their own. Some can breast- or bottle-feed, but those who have breathing difficulties probably need tube-feeding. Babies born at this time are less likely than babies born earlier to develop serious disabilities caused by premature birth, though they remain at increased risk for learning and behavioral problems.

Are babies born at 34 to 36 weeks gestation (late preterm) at risk for medical problems?

Late preterm infants are usually healthier than babies born earlier. More than 99 percent of these babies survive, though they are (16):

- 6 times more likely than full-term infants to die in the first week of life (2.8 per 1,000 vs. 0.5 per 1,000)
- 3 times more likely to die in the first year of life (7.9 per 1,000 vs. 2.4 per 1,000)

Late preterm babies often weigh between 4½ and 6 pounds, and they may appear thinner than full-term babies. These babies remain at higher risk than full-term babies for newborn health problems, including breathing and feeding problems, difficulties regulating body temperature, and jaundice (17). These problems are usually mild. Most of these babies can breast- or bottle-feed, although some (especially those with mild breathing problems) may need tube-feeding for a brief time.

A baby’s brain at 35 weeks weighs only two-thirds of what it will weigh at 40 weeks (17). Because their brain development is not complete, these babies may be at increased risk for learning and behavioral problems (17). Most do not develop serious disabilities resulting from premature birth.

A recent study, however, found that late preterm infants are more than 3 times as likely to develop cerebral palsy and are slightly more likely to have developmental delays than babies born full term (18). Another study found that adults who were born at 34 to 36 weeks gestation may be more likely than those born full-term to have mild disabilities and to earn lower long-term wages (19).

How can a woman reduce her risk for premature birth?

A woman may be able to reduce her risk for premature birth by visiting her health care provider before pregnancy and,
once pregnant, seeking early and regular prenatal care. A **preconception visit** is especially crucial for women with chronic health disorders, such as diabetes and high blood pressure, which sometimes can contribute to premature birth. When a woman receives adequate preconception and prenatal care, providers often can identify and treat pregnancy problems early, helping to reduce the risk for premature birth.

All women of childbearing age should take a multivitamin containing 400 micrograms of **folic acid** every day starting before pregnancy, as part of a healthy diet. A recent study suggests that taking folic acid for at least 1 year before pregnancy may cut the risk of having a premature baby by half (20). Taking folic acid before and during the early weeks of pregnancy also reduces the risk of certain serious birth defects of the brain and spinal cord.

A woman should avoid smoking, drinking alcohol and taking illicit drugs before and during pregnancy. She should try to reach a healthy weight before pregnancy because women who are overweight or underweight are at increased risk for premature birth. She also should gain the recommended amount of weight during pregnancy.

Recommended weight gain during pregnancy is generally 25 to 35 pounds for women who begin pregnancy at a normal weight, 15 to 25 pounds for women who start out overweight, and about 15 pounds for women who are obese. Women who are underweight before pregnancy should gain 28 to 40 pounds.

Treatment with the hormone progesterone may help prevent another premature birth in women who have already had a premature baby. The American College of Obstetricians and Gynecologists (ACOG) recommends that this treatment be offered only to women with a previous spontaneous (not induced) premature birth who are currently pregnant with one fetus (21). Studies show that weekly injections of a form of progesterone (called 17P) reduces the risk for preterm birth by about one-third in these women (22).

Another study found that treatment with vaginal progesterone suppositories greatly reduces the rate of premature birth in women with a short cervix (most of whom had no history of premature birth) (23). A vaginal ultrasound can determine whether a woman has a short cervix. ACOG recommends that providers consider progesterone treatment for these women, but does not recommend screening all women for a short cervix (21).

Studies have not found progesterone treatment helpful in preventing premature birth in twin pregnancies (21). More studies are needed to clarify which high-risk women may benefit from progesterone treatment and which form of progesterone is most effective.

**Can medical problems in premature babies be prevented?**

When a health care provider suspects that a woman may deliver prematurely, he may suggest treatment with corticosteroid drugs. Corticosteroids speed maturation of fetal lungs and significantly reduce the risk of RDS, IVH and infant death (12). The provider gives the pregnant woman two or more shots containing these drugs. Treatment is most effective when administered at least 24 hours before delivery.

The provider also may suggest treatment with medications (called tocolytics) that may postpone labor (often for only a couple of days). Even this short delay can give the provider time to treat the pregnant woman with corticosteroids and arrange for birth in a hospital with a NICU that can give appropriate care to a premature infant, which could make a lifesaving difference for the baby.

A recent study found that treatment with a tocolytic called magnesium sulfate may significantly reduce the risk for cerebral palsy in premature infants (24). More studies are needed to confirm the effectiveness of this treatment.

**Does the March of Dimes support research into the causes of premature birth?**

The March of Dimes supports many grants aimed at improving understanding of the causes of preterm labor, with the goal of learning how to prevent it. For example, **Prematurity Research Initiative grantees** are studying the role genes and heredity play in premature births and how the rate of fetal lung development, infection and other factors may trigger labor. Grantees also are seeking to improve treatment for premature babies, including those with RDS, NEC and ROP.

**The March of Dimes Campaign to Reduce Preterm Birth**

To learn more, visit the [campaign Web site](#).

If your family has a premature baby in a neonatal intensive care unit, read our information for [NICU families](#).