Human development is an amazing and wonderful thing. This is even truer during the time before birth. Tiny cells come together and, over about a nine-month period, develop into a baby who is able to live outside the womb, even making his/her needs known to his parents. Let’s spend some time learning how this critical and fascinating development takes place.
What Happens Before Birth? – Prenatal Development
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The period before birth is called the “prenatal” period. “Pre”, of course, meaning “before” and “natal” has to do with birth.
What role do genetics play in prenatal development? This 15-minute video discusses how to prevent birth defects.

What is heredity?
How does heredity determine the characteristics a person will have?
What are some inherited genetic defects, and how do they occur?
What is a chromosomal error?

Genetic Influences
Lecture for PSY 1100: Lifespan Development. This video covers Chapter 02: Beginnings, Part 1: Genetic Influences.
http://youtu.be/7FWPqPrwsCk
Chromosomes are the part of the cell that store and transmit our genetic information. Chromosomes are made up of DNA and a gene is a segment of that DNA along the chromosome.
Special cells, called gametes join to form a new cell, the zygote.
Then the DNA gets to work, replicating cells with identical DNA (genetic information). These cells will continue to multiply, eventually creating the new person, with unique DNA of his/her own.
Let’s watch a short video about prenatal development.

What is prenatal development?

Prenatal Development
Prenatal Development video (Time 16:52) Start at time 9:49, so actual viewing time is approximately 7 minutes
http://www.youtube.com/watch?v=mOVtp9cdQVM
Women are fertile about once every 28 days, in the middle of the menstrual cycle. An egg (ovum) is discharged from one of the ovaries and is drawn into the fallopian tube, where fertilization takes place. Fertilization is produced by a sperm joining with the ovum. It’s important to note that sperm can live up to six days. Hormones are released by the woman to prepare the lining of the uterus to receive the fertilized ovum. If pregnancy does not occur, the lining is discarded about two weeks later during menstruation.
After fertilization takes place, the zygote travels out of the fallopian tube and attaches to the wall of the uterus. New cells are added. Sometime between the seventh and ninth days, the cells burrow deep into the uterine lining (implantation). This allows the cells to be nourished by the mother’s blood. This is a very uncertain period and many zygotes do not survive. Many prenatal abnormalities are eliminated during this time. However, by the end of the second week, the placenta starts to develop. The placenta allows food and oxygen to reach the developing embryo and waste products to be carried away. An umbilical cord connects the baby to the placenta. When the period of the zygote ends, the developing baby has found food and shelter. At this point, a woman does not even know she is pregnant!
Stages of Prenatal Development

• Period of the embryo
  – Implantation to eight weeks
  – Most rapid prenatal changes take place
  – All parts of the body are forming

In this six week period, it is called the period of the embryo. It is when the most rapid prenatal changes occur. All the body parts are forming, so the embryo is especially vulnerable to things that could interfere with healthy development. However, having such a short time for this decreases the chances for problems.

The nervous system begins to develop very quickly. The spinal cord is formed and, by 3 ½ weeks, the brain has formed. While the nervous system is forming, the heart begins to pump blood and muscles and the digestive tract start to appear. By the end of the first month, the embryo, only ¼ of an inch long, consist of millions of cells performing specific functions. By the second month, the eyes, nose, ears, jaw, and neck form. Internal organs become distinct. The embryo at this stage responds to touch and can move.
In the first trimester, the organs, muscles, and nervous system continue to develop. The brain signals the fetus and it can bend its arms, form a fist, and even suck its thumb. External genitals form. The heartbeat can now be heard through a stethoscope.
During this trimester, a coating called the vernix, covers the skin and protects the baby. White, downy hair called lanugo also appears. Brain growth means that the fetus can now be stimulated by sounds and, if a light is inserted in the uterus for testing, the fetus may try to shield its eyes, meaning that the sense of sight is emerging. The fetus still has immature lungs and cannot yet survive birth.
The age of viability is when a baby can first survive a premature birth. It occurs during the third trimester, sometime between the 22nd and 26th weeks. However, a baby born this early generally needs oxygen in order to breathe, as the lungs are some of the last organs to mature. This trimester also brings an increase in brain growth, activity, and response to outside stimulation. During this time, the fetus will gain more than five pounds and grow as many as seven inches.
Does food matter while a woman is pregnant? What do we need to know about nutrition?

Healthy Nutrition during Pregnancy
Eating for two? Mills-Peninsula dietitian Carolyn McCune shares the dos and don'ts of healthy eating during pregnancy and a delicious and nutritious quick dessert recipe (Time 4:43). http://www.youtube.com/watch?v=oq5slPdDm5U
Good prenatal nutrition is vital to the health of a baby. It’s important to remember that, prior to birth; a baby is totally dependent on his/her mother for nutrition. There is no other way for the baby to eat. That means that Mom has to take great care to ensure that her baby is getting the food that he/she needs to be born well and healthy, with a solid start in life.
If mothers do not take care to provide a nutritious environment for their unborn child, serious life-long damage to the baby can be the result. A mother who is malnourished (and whose baby is malnourished) can cause serious damage to the central nervous system. The baby’s brain weight can be lower than normal, keeping the child from reaching his/her full potential. Malnutrition can even cause distorted organ structure in organs such as the liver, kidney, and pancreas. These damage structures can affect the baby and have long-term consequences.
Malnutrition can also suppress the development of the immune system, causing newborns to have respiratory problems.
Prenatal Malnutrition

– Can cause babies to be irritable, with a high pitched cry similar to drug-addicted newborns
– Can cause babies to be unresponsive to stimulation

If all of those aren’t good enough reasons to be very aware of nutrition during pregnancy, babies who are malnourished prenatally, often are born irritable. They also have a very high-pitched cry, similar to that of drug-addicted newborns. This type of cry is very distressing to the adults who have to care for the infant. These babies are often unresponsive to stimulation, causing them to learn less quickly than other children.
As these babies age, they often have low intelligence test scores and can have serious learning problems. What a pregnant woman eats (or does not eat) can cause lifelong consequences for her child!
Eating a well-balanced, healthful diet can go a long way towards helping an unborn baby receive the nutrition that he/she needs. As important as it is to not do unhealthful things, such as smoking and drinking, it is equally important to make certain that all nutrients are consumed on a daily basis. It is important to eat foods in the right amounts. It’s important not to consume too many empty calories (such as candy and soft drinks) so that most of the calories that enter the body provide nutrients for both the mother and the baby.
What to Do?

• Vitamin-mineral enrichment is necessary
  – Folic acid helps prevent – abnormalities of neural tube; premature birth
  – Calcium helps prevent – maternal high blood pressure; premature birth
  – Iodized salt prevents – cretinism (stunted growth and mental retardation)

In addition to nutritious foods prepared in a healthful way, pregnant women should follow medical advice for dietary supplements. Dietary supplements such as vitamin and mineral tablets should be taken as directed by her physician. All prescribed supplements should be taken, but none should be taken without medical advice. In large amounts, some dietary supplements can be toxic.

What are the nutritional requirements of the expectant mother during pregnancy?
We know good food is important. What about reducing stress in your life?

What health care professionals are available to care for the needs of pregnant women?
What are some of the topics expectant parents might want to discuss with the health care provider?

Healthy Women Healthy Families: Prenatal Health
Growing a healthy baby is one of the most important jobs of your life. Prenatal Health examines proper diet and nutrition to best ensure that you and your baby get all the vitamins, minerals and calories needed for a healthy pregnancy.
http://youtu.be/XkC1UoR6LpY
Medical care throughout pregnancy is very important. Mothers who do not have adequate medical care in the first stages of pregnancy are three times more likely to give birth to a baby with low birth weight. They are five times more likely to have a baby who dies immediately or shortly after birth.

Why don’t women go to the doctor early in their pregnancies? There are many reasons including:
- financial hardships
- difficulty finding a doctor
- lack of transportation
- unwillingness to accept the pregnancy
- bad health habits which they don’t wish to disclose to a doctor or nurse

Adolescents tend to be even less able or willing to seek early medical care during pregnancy. More than 40% of adolescents receive inadequate prenatal care (Berk, p. 120).

What are some other reasons why don’t women go to the doctor early in their pregnancies?
Good Health Practices

• Pregnant women should
  – See a doctor as soon as they suspect they are pregnant and get regular medical checkups
  – Ask questions of their health care provider
  – Eat a well-balanced diet; take prescribed vitamins
  – Continue to exercise, with medical permission
  – Get adequate rest

It is very important for women to seek medical attention as soon as they SUSPECT that they are pregnant. A majority of the fetal development occurs before most women even know there is a baby on the way. During this time, a woman needs medical care to ensure that everything is developing normally.
Good Health Practices

- Pregnant women should **not**
  - Smoke
  - Drink alcohol in any amount
  - Take any drugs without consulting doctor
  - Go on a diet without medical advice
  - Engage in activities that could expose them to harmful infectious diseases

Pregnant women should not, under any circumstances, smoke or drink alcohol. Alcohol, in even small amounts, can have devastating effects on the unborn baby. Women who are pregnant should not take any drugs that are not prescribed for them by their doctor. Even over-the-counter drugs should be cleared with the doctor before taking them.

Pregnant women should not choose this time to go on a diet. As we discussed, good nutrition is very important for the baby and a 25-30 pound weight gain is desirable to achieve a good birth weight for the baby.

Pregnant women should also exercise caution about being around infectious diseases. Some diseases that are only mildly annoying for healthy adults can be extremely dangerous for a developing fetus. During pregnancy, your baby is protected from many illnesses, like the common cold or a passing stomach bug. But some infections can be harmful to you, your baby, or both. Easy steps, such as hand washing, and avoiding certain foods, can help protect you from some infections. You won’t always know if you have an infection—sometimes you won’t even feel sick. If you think you might have an infection or think you are at risk, see your health care provider. Read more about specific infections that can be harmful during pregnancy, and learn the symptoms and what you can do to keep healthy at http://www.womenshealth.gov/pregnancy/you-are-pregnant/pregnancy-complications.cfm#c.
So, nutrition is important and so is medical care. Are there things in the environment that can affect an unborn child?

Explain how different environmental factors influence prenatal development.

Healthy Preventing Birth Defects - Health Matters
Environmental Factors. University of California TV (Time 29:26)
Learning how best to prepare for a healthy pregnancy and avoid substances and behaviors that may pose a risk to your baby is something every woman of childbearing age needs to know.
http://www.youtube.com/watch?v=qYoNkWM8QxE
Well, the answer is yes. We’ve already discussed some of the things that can impact an unborn child, such as alcohol and drugs. There are other things that can impact prenatal development. We know that certain organs and systems are developing at specific times during the pregnancy and these are the things that can be impacted by teratogens in the environment.
Over the years, researchers have been able to pinpoint when various phases of development happen to the fetus. During these times, teratogens can have devastating effects on a baby. A teratogen is a drug or other substance that is capable of interfering with the development of fetus that may lead to birth defects or developmental malformations.

Some development takes place before a woman knows she is pregnant, so it is very important that women of childbearing age are always aware of the things that could be harmful to a developing child.
Environmental Factors

• Teratogens
  – Any environmental agent that causes damage during the prenatal period
  • Drugs, prescription and non-prescription
  • Illegal drugs
  • Tobacco
  • Alcohol:


Teratogens such as drugs (prescription if taken without medical advice), non-prescription drugs, illegal drugs, tobacco, and alcohol can cause damage to the growing fetus. Let’s look at a publication by the National Institutes of Alcohol Abuse and Alcoholism that talks about alcohol and pregnancy.
Environmental Factors

- Teratogens
  - Any environmental agent that causes damage during the prenatal period
  - Radiation
  - Pollution
  - Disease

Other, less common teratogens can include such things as radiation, pollution, and various diseases. A pregnant woman must be vigilant to avoid such environmental factors.
References and Resources

- Microsoft Clip Art: Used with permission from Microsoft.

Textbook:
References and Resources

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Copyright Statement: National Institute of Alcohol Abuse and Alcoholism

• Brochures and Fact Sheets
  – This section contains easy-to-read material for the public covering a wide range of alcohol-related topics. Publications listed below are online full text and free of charge unless otherwise noted.
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