

Gunther von Hagens'

BODY WORLDS

The Original Exhibition



FAMILYGUIDE

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PLANNING YOUR VISIT

BEFORE

-  Read the note to parents and frequently asked questions in this family guide.
-  Visit the BODY WORLDS website: www.bodyworlds.com.
-  Discuss the visit with your children and explain what they are going to see and why.

DURING

-  Consult this Family Guide for an overview of the exhibit.
-  Seek out the Museum Hosts for answers to your questions about the exhibition.

AFTER

-  Discuss the experience with your family using some of the discussion questions included in this guide as prompts.
-  Try some of the Post-Visit Activities.
-  Visit some of the websites listed in the additional resources section.

FREQUENTLY ASKED QUESTIONS

What is BODY WORLDS?

The exhibition BODY WORLDS, internationally known as BODY WORLDS: The Original Exhibition of Real Human Bodies, is the first exhibition of its kind to inform the visitor about anatomy, physiology, and health by viewing real human bodies. The specimens on display were preserved through Plastination, the preservation process invented by Dr. Gunther von Hagens in 1977, while he was working as an anatomist at the University of Heidelberg. Since the beginning of the exhibition series in Japan in 1995, 44 million visitors in more than 115 cities in America, Europe, Asia and Africa have seen the world's most successful traveling exhibition.

What does BODY WORLDS show?

Each BODY WORLDS exhibition contains real human specimens, including whole-body plastinates as well as individual organs, organ configurations, and transparent body slices. The spectacular plastinates in the exhibition take the visitor on an exciting journey of discovery under the skin. It provides wide-ranging insight into the anatomy and physiology of the human body. In addition to organ functions, common diseases are described in an easily understood manner by comparing healthy and affected organs. They show the long-term impact of diseases and addictions, such as tobacco or alcohol consumption, and demonstrate the mechanics of artificial knee and hip joints.

How do the various BODY WORLDS exhibitions that are being shown differ from each other?

While all of the BODY WORLDS exhibitions focus on general anatomy revealed through Plastination, each exhibition is currently being shown with dedicated themes—on cardiology and the heart (BODY WORLDS & The Story of the Heart), human development, longevity and aging (BODY WORLDS & The Cycle of Life), the body's capability and vitality (BODY WORLDS Vital), the story of the human body in the 21st century (BODY WORLDS: Pulse), the influence that 'happiness' has on our health (BODY WORLDS: The Happiness Project) and on prescriptions for healthy living (BODY WORLDS RX).

The exhibitions show a multitude of brand new plastinates and offer every visitor—even the ardent BODY WORLDS visitor—a fascinating exhibition experience.

BODY WORLDS & The Story of the Heart reveals—through the lenses of anatomy, cardiology, psychology, and culture—how the heart nourishes, regulates, and maintains life. The heart is the steady engine of our life. Due to this continuous strain, it is also vulnerable to wear and tear and to dysfunctions. Diseases of the cardiovascular system are the leading cause of death today. "The Story of the Heart" also highlights other aspects of this vital organ. In religion, art, literature, and pop culture, the heart is seen as a symbol of love, compassion, happiness, and courage. The exhibition gives visitors a deep insight into the human body, health and disease, and the complicated world of the cardiovascular system.

BODY WORLDS & The Cycle of Life features a special presentation on the human life cycle and aging—from prenatal development and infancy, to childhood and adolescence, to youth, adulthood, and old age. It shows the body living through time—at its most healthy, and as it changes, grows, matures, peaks, and finally fades. The exhibition shows the complexity, resilience, and vulnerability of the human body through anatomical studies of the body in distress, disease, and optimal health. Visitors to “The Cycle of Life” will see the body living through the span of time from the spark of conception to old age, and learn about the latest findings in longevity and aging science.

BODY WORLDS Vital presents a special collection of specimens designed to show visitors the basics for human health and wellness. The exhibition includes whole-body plastinates, a large arrangement of individual organs, organ and arterial configurations, and translucent slices that give a complete picture of how the human body works. Vital tells the fascinating story of how best to fight life-threatening diseases—such as cancer, diabetes, and heart ailments—through healthy choices and lifestyle changes.

BODY WORLDS: Pulse shows the science and splendor of the human body, and deconstructs its form and function through the trailblazing science of Plastination invented by anatomist, Dr. Gunther von Hagens. It presents the body in health and distress, its vulnerabilities and potential, and many of the challenges the human body faces as it navigates the 21st Century. BODY WORLDS: Pulse is a convergence of aesthetic anatomy, the latest findings in health and

wellness, immersive multimedia, and narrative storytelling threaded with deep metaphors. It shows the possibility of living mindfully, with meaning and vitality, by refracting the story of life and self-actualization, through the donors, who have committed to educating future generations.

BODY WORLDS: The Happiness Project marks an entirely new chapter in the already impressive range of BODY WORLDS exhibitions. A permanent exhibition exploring what happiness is and the science behind it. “The Happiness Project” tells the story of our bodies and the influence that the emotional phenomenon of ‘happiness’ has on our health. Over 200 anatomical specimens of real human bodies reveal the complexity, resilience and vulnerability of the body. Visitors learn for example that people who are happy, live longer than people who are unhappy.

BODY WORLDS RX offers prescriptions for healthy living and focuses on the most prevalent contemporary diseases, that afflict children and adults alike, their causes and effects. BODY WORLDS RX is an informative and entertaining presentation of the latest research on top health issues and shall inspire visitors to embrace preventive healthcare. From organs, to muscles, to the nervous system, and to skeletal structures, visitors will have an unprecedented look inside the intricate systems of the most sophisticated mechanism in the world, the human body.

All BODY WORLDS exhibitions generally present different plastinates, which is most evident in the whole-body plastinates which each vary in pose and display.

Are there animals in the BODY WORLDS exhibitions, as well?

Most BODY WORLDS exhibitions have a few animal specimens on display. Due to the great popularity of the animal plastinates, Dr. Gunther von Hagens and Dr. Angelina Whalley were encouraged to create the new exhibition BODY WORLDS of Animals which also tours the world under the name ANIMAL INSIDE OUT. The display features the most popular species in the animal kingdom. Better than any textbook, this fascinating exhibition shows the complex, amazing biology of the natural world's most remarkable creatures and their nervous system, bones, muscles, and organs. ANIMAL INSIDE OUT also allows a peek under the elephant's skin. Its trunk with a network of 40,000 muscles is an incredibly unique feature that has many different uses. And who would have known that a giraffe uses its 20-inch-long bluish tongue like a hand? ANIMAL INSIDE OUT's educational approach is particularly suitable for young visitors. For more information: www.AnimalInsideOut.com.

What is the goal of the exhibition?

BODY WORLDS aims to educate the public about the inner workings of the human body and shows the effects of poor health, good health, and lifestyle choices. It is also presented in the hopes that it will motivate visitors to learn more about the science of anatomy and physiology.

Who should see BODY WORLDS?

Anyone interested in learning what makes us human. Adults of all ages and children will find the exhibits fascinating. Given the nature of the BODY WORLDS exhibits, it is up to parents, guardians, or school staff to decide whether BODY WORLDS is appropriate for the children in their care.

Where will BODY WORLDS be on display next?

There are about ten BODY WORLDS exhibitions including ANIMAL INSIDE OUT, which have been displayed in America, Europe, Asia and Africa. Additional BODY WORLDS exhibitions are planned. If you would like to know in what cities the exhibitions will be on display next, please go to our official web site, www.bodyworlds.com, where you will find an overview of future exhibition venues. If you are interested in additional information about BODY WORLDS current exhibitions and more, you may join our Facebook community.

Why is it important for the public to see these exhibitions?

The organizers of BODY WORLDS believe that when people understand more about how the body works and how it can break down, they are more likely to choose healthy lifestyles. They also hope it will inspire visitors to learn more about the life sciences. Knowledge about what the human body looks like and how it functions is basic life science information that should be available to everyone.

Would I be able to learn just as much from books or models of the human anatomy?

The use of authentic specimens allows a thorough examination and study of disease, physiology, and anatomy that you cannot find in models, textbooks, or photos. In addition, the exhibition allows visitors to understand that each and every body has its own unique features, even on the inside. The experience in cities around the world has clearly demonstrated that real specimens fascinate exhibit visitors in a way that models cannot.

What is Plastination?

Plastination is a unique process invented by Dr. Gunther von Hagens in 1977 to preserve specimens for medical education. The process replaces bodily fluids and fat in specimens with fluid plastics that harden after so-called vacuum-forced impregnation. After the bodies are shaped into lifelike poses, they are hardened with gas, heat, or light. The plastinates show how our bodies move in everyday life, as well as during athletic activities. For more information about Plastination, go to www.bodyworlds.com.

Where did the specimens on display come from? Will we know who the plastinates are or how they died?

The BODY WORLDS exhibitions rely on the generosity of body donors; individuals who requested that, upon their death, their bodies could be used for educational purposes in the exhibition. All the whole-

body plastinates and the majority of the specimens are from these body donors; only some organs, fetuses and specific specimens that show unusual conditions come from old anatomical collections and morphological institutes. As agreed upon by the body donors, their identities and causes of death are not disclosed. The exhibition focuses on the nature of our bodies, not on telling personal information. Currently there are more than 16,000 donors registered in the body donation program of the Institute for Plastination. For more information please visit the body donation section of www.bodyworlds.com.

BODY WORLDS exhibitions are based on an established body donation program through which the body donors specifically request that their bodies could be used in a public exhibition after their deaths.

Why are the plastinates posed the way they are?

The poses of the plastinates have been carefully thought out and serve educational aims. Each plastinate is posed to show different anatomical features. For instance, the athletic poses illustrate the use of muscle systems while playing sports. The poses are chosen to highlight specific anatomical features and allow the visitor to compare the plastinate to his or her own body.

Will I be able to touch any of the plastinates?

While you will be able to get very close to the plastinates, as a rule, visitors are not allowed to touch them.

Is this exhibition appropriate for children?

44 million people, including young children, have viewed the BODY WORLDS exhibitions around the world. If you are considering bringing children or school groups to BODY WORLDS, visit our online resources section to find out how to use the exhibition as a learning experience.

Is there an audio tour?

Some exhibitions offer audio guides for an additional fee. The audio tours are designed for the layman. They are available in English and other languages. There are no personally guided tours through the exhibit, at this time.

Have the ethical questions about this exhibition been discussed?

Before the North American premiere of BODY WORLDS, a wide committee of theologians, ethicists, academics, and medical experts thoroughly discussed the ethical questions. Guided by the California Science Center in Los Angeles, they wrote an Ethics Review of the origins of bodies in BODY WORLDS. It can be downloaded from our website www.bodyworlds.com.

What educational materials are provided?

Teachers will wish to prepare both their students and their adult supervisors carefully for their BODY WORLDS experience. Educator materials are available upon request and for download on the website www.bodyworlds.com. BODY WORLDS offers preview opportunities so that teachers can see the exhibition free of charge before bringing their classes to it.

How long can you stay inside the exhibit?

You can stay as long as you like, within the opening hours. We recommend allowing yourself about one to two hours. The length of time will vary on how long each visitor wishes to examine each specimen and read the information. An audio tour will add to your time in the exhibits. Reentry to the exhibition is not allowed, once you exit.

Can you take photographs or film in the exhibitions?

Professional photography and filming in the exhibition is limited to registered members of the media, for editorial purposes only. Some locations allow photography with small hand-held devices for personal, non-commercial use. Please check with the location you are visiting to confirm that photography is allowed. Out of respect to other visitors and the body donors, photography may be restricted at anytime.



Q&A WITH KIDS

Children Visiting BODY WORLDS—Interview with Dr. Gunther von Hagens' Creator of BODY WORLDS & Inventor of Plastination

Were you ever scared to work with dead bodies?

Dr. von Hagens: When I was about six years old, I was very sick and nearly died. I was in hospital for many months and became very comfortable in that environment of the sick and dying. The doctors and nurses who cared for me became my heroes and I wanted to be like them. Later, when I worked in a hospital as an orderly and then a nurse, (long before I became a doctor), one of my duties was to transport the dead to the morgue. Other workers didn't like this job because it frightened them, but I was never afraid. Being afraid of death is not a good way to live.



Were the people in the exhibit old when they died?

Dr. von Hagens: The people who donated their bodies for Plastination and to educate all of us about health are of various ages. Some were old, but others were young in the prime of their life. Each person is different, not just on the outside but also on the inside. Even after more than 40 years as an anatomist, I have never seen two hearts that look the same.

Where did the idea for BODY WORLDS come from?

Dr. von Hagens: When I used to teach anatomy to students in medical school in the 1970s, I had to use illustrated anatomy atlases and picture books to show the organs and body systems. I tried to use real human organs and specimens, but at that time the specimens were preserved in blocks of plastic so you could not touch them or study the placement of the organs properly. I realized one day that if the plastic was inside the body and not outside it, the specimen would be rigid and easy to grasp, and study and work with. I was only trying to solve a problem; I wanted to educate my students so they would become better doctors, as I don't think doctors should be poking around inside your body and operating on you if they don't know important things about it. But something very unusual began to happen after I began to

plastinate organs and specimens. The janitors and secretaries and office workers at the university began to stop by the lab; they were fascinated by the plastinates. This was when I began to think of anatomy for lay people, which is what BODY WORLDS is. It is very different from anatomy for medical professionals because it has to be interesting and dynamic and not scary to look at.

How long does it take to prepare the bodies for display?

Dr. von Hagens: Plastination takes a very long time. A whole body can take up to 1,500 hours to prepare. The specimen which has to date taken the longest to produce is a plastinated elephant that weighs 3.2 tons and took three years to complete.

What happens to the skin once it is removed from the bodies?

Dr. von Hagens: Each body is an anatomical treasure, human remains must be handled carefully and respectfully. All human remains are cremated and buried.

How do you get people to donate their bodies?

Dr. von Hagens: I have never recruited body donors. People offer their bodies for Plastination for several reasons: they want to leave a legacy for future generations; they don't like the effects of decay and decomposition that take place after death; or they don't like traditional burials.



WHAT IS PLASTINATION?

Preservation by Plastination

Plastination is a method that was developed to preserve the body and to use it for educational purposes. Like most inventions, the basic principle is relatively simple.

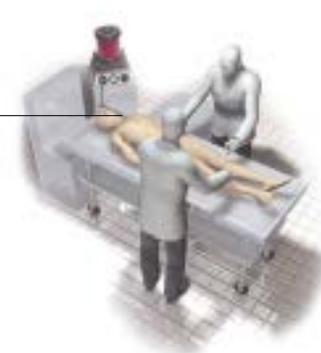


Specimens plastinated with silicone are cured with a special gas.

1. Embalming and Anatomical Dissection

The first step of the process involves halting decay by pumping formalin into the body through the arteries. Formalin kills all bacteria and chemically stops the decay of tissue. Using dissection tools, the skin, fatty and connective tissues are removed in order to prepare the individual anatomical structures.

Formalin solution being injected into the body



Acetone bath

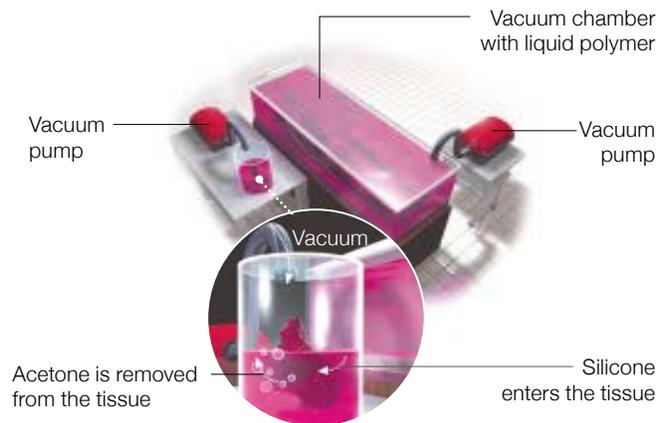
The Plastination process itself is based on two exchange steps:

2. Removal of Body Fat and Water

In the first step, the body water and soluble fats are dissolved from the body by placing it into a solvent bath (e.g., an acetone bath).

3. Forced Impregnation

This second exchange process is the central step in Plastination. During forced impregnation a reactive polymer, e.g., silicone rubber, replaces the acetone. To achieve this, the specimen is immersed in a polymer solution and placed in vacuum chamber. The vacuum removes the acetone from the specimen and helps the polymer to penetrate every last cell.



Positioning

4. Positioning

After vacuum impregnation, the body is positioned as desired. Every single anatomical structure is properly aligned and fixed with the help of wires, needles, clamps, and foam blocks.

5. Curing (Hardening)

In the final step, the specimen is hardened. Depending on the polymer used, this is done with gas, light, or heat.

Dissection and Plastination of an entire body requires about 1,500 working hours and normally takes about one year to complete.

Slice Plastination

Slice Plastination is a special form of Plastination.

First, the body is frozen and cut into 1 to 3-inch-thick slices.

Instead of silicone, the body is treated with polyester or epoxy resin during this process.

Courtesy of The Denver Post



WELCOME

A LETTER FROM BODY WORLDS

Dear Parents,

BODY WORLDS is an incredible exhibition offering the unique opportunity to see and understand our own anatomy and health and to gain a new appreciation and respect for what it means to be human. The exhibition features a unique collection of authentic human specimens—including whole bodies, individual organs, and transparent body slices. Plastination is a process that replaces the natural fluids in the body with a type of flexible plastic. This allows the bodies to be fixed into lifelike poses that illustrate how our bodies are structured and how they function when performing everyday activities. The use of plastic for preservation also means that the specimens are odorless and completely dry.

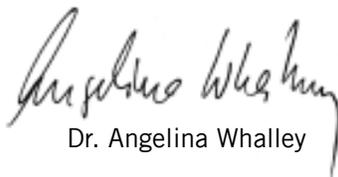
This exhibition shows how the body works when it is healthy and what happens when it breaks down. Students will see how lifestyle choices may affect the body. You can see the effects of smoking on the lungs and how artificial joints in knees and hips fit into a human skeleton.

Important information to know:

BODY WORLDS relies on the generosity of body donors; individuals who, prior to their death, bequeathed their bodies for educational purposes. Before the North American premiere of BODY WORLDS, an independent ethics review was conducted by a distinguished committee of theologians, ethicists, academics and medical luminaries. The plastinated specimens are without skin so that visitors can see the bones, muscles, tendons, nerves, blood vessels and organs. A section of the exhibition highlights prenatal development.

To sum up

Gunther von Hagens' BODY WORLDS is an exceptional exhibition and we believe it will give people a unique opportunity to better understand their own bodies. For further information, we suggest that you consult our website www.bodyworlds.com.



Dr. Angelina Whalley

Conceptual Designer of BODY WORLDS and
President and CEO of the Institute for Plastination



EXHIBITION OVERVIEW

INCLUDING FAMILY FUN FACTS



Gunther von Hagens' BODY WORLDS exhibits use the science of Plastination to let visitors see how human bodies are put together. The exhibit also teaches how different anatomical systems work in the human body. This special student supplement explores several of the systems featured in the exhibit, including the locomotive system, the nervous system, the respiratory system, the cardiovascular system, the digestive system, and embryonic & fetal development.

THE **LOCOMOTIVE** SYSTEM

Makes motion happen

The human body is composed of various organ systems working together in an orderly fashion to form a unified whole and to perform the functions of life.

The body's movements, including both stationary and forward motion, constitute a significant portion of these functions.

Movements are made possible by what is known as the locomotive system which consists of the bones, muscles and joints.



COOL FACT

At birth, humans have 300 bones. As a baby grows, however, many of the smaller bones fuse together so that adults have just 206 bones.

Learn with **BODY WORLDS**

Half of all your bones are in your hands and feet. The average person's muscles do an amount of daily work equivalent to loading 24,000 pounds onto a 14 ft. high shelf.

THE **NERVOUS** SYSTEM

The messenger and the boss

COOL FACT

The nervous system carries messages from the brain to other parts of the body at more than 100 miles per hour.

All bodily functions are monitored and regulated by an extraordinarily precise network of nerve fibers stretching from head to toe.

These fibers originate directly in either the brain or spinal cord and become increasingly fine as they branch out into the peripheral regions of the body.

Neurons and their axons are the building blocks of the nervous system. These cells constitute the body's communication system, generating and transmitting weak electrical signals.

The number and sequence of these signals transfer information from one region of the body to another.

Learn with **BODY WORLDS**

Your brain, many times more complex than the best computer, operates on the amount of electric power that would light a 10-watt bulb. The brain weighs about three pounds—1/50 of the total average adult weight. The brain is an oxygen eater. The brain uses 1/4 of the oxygen you take in.



THE RESPIRATORY SYSTEM

Oxygen in, carbon dioxide out

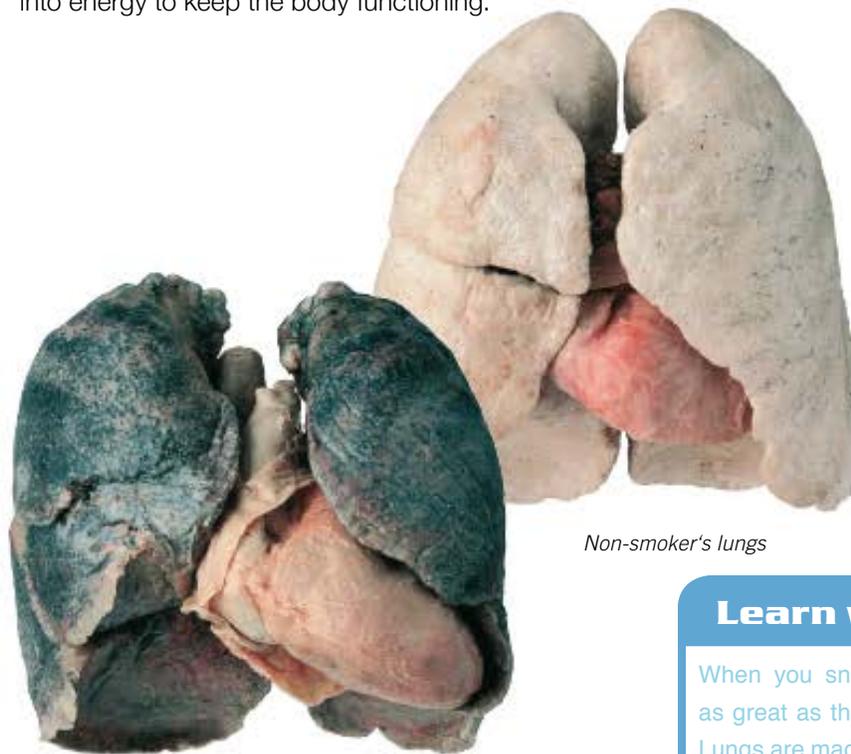
Human life requires a continuous supply of oxygen which we extract from the air.

Without this element, most of the body's cells would not be able to survive more than a few minutes.

Oxygen is indispensable for cell metabolism, a process that transforms nutrients into energy to keep the body functioning.

COOL FACT

Every minute you breathe in one quart of air. When you are doing physical activity this number can increase to 15 gallons of air per minute.



Non-smoker's lungs

Smoker's lungs

Learn with BODY WORLDS

When you sneeze you can produce wind speeds as great as those in a hurricane or even a tornado. Lungs are made up of about 600 million spongy bags called alveoli. The total surface area of the lungs is about the same size as a tennis court. Lungs are the only organ in the body light enough to float on water.

THE **CARDIOVASCULAR** SYSTEM

The body's great pump

This is an organism's major transport system. Not only does the circulatory system distribute nutrients, oxygen and hormones to individual regions of the body; it also collects metabolic by-products which are then eliminated.

The heart is the engine of this system, and the dense network of blood vessels form the transport routes.

COOL FACT

At every stage of life, your heart is about the size of the fist you make when you close your hand.



Learn with **BODY WORLDS**

If all the vessels of this network were laid end to end, they would extend about 60,000 miles, far enough to circle Earth more than twice. The heart circulates the body's blood more than 1,000 times a day.

THE **DIGESTIVE** SYSTEM

Converting food into energy

COOL FACT

The whole process of digestion takes about 72 hours from end to end.

All of the organs of the human body require an uninterrupted supply of energy if they are to perform their functions properly.

Once they have been processed chemically, the nutrients present in food and absorbed through the digestive tract provide the organism with the energy that it requires.

The organs of the digestive tract break down food both mechanically and chemically in a way that allows the nutrients to pass into the blood, where they can be transported to each individual cell.

Learn with **BODY WORLDS**

Chewing food takes from 5-30 seconds. It takes 3 hours for food to move through the intestine. In your lifetime, your digestive system may handle about 50 tons of food.



Digestive tract

EMBRYONIC & FETAL DEVELOPMENT

FACT

When a pregnant woman consumes alcohol, the alcohol level in the blood of her fetus will be the same as in her own.

Life begins with a single cell, or zygote, after the father's sperm fertilizes the mother's egg.

Roughly 30 hours after fertilization, a microscopic human egg begins to divide into two identical daughter cells. Twins will develop if these two cells separate from each other. Most of the time, however, the complete embryo will remain intact and migrate down the Fallopian tube, settling in the uterus on the sixth day. Pregnancy will last an average of 260 days from that point.

The embryo, suspended in amniotic fluid and surrounded by fetal membranes, is linked to the maternal blood supply via the umbilical cord and placenta. During the first four weeks, the embryo is roughly 0.15 inches long and will grow to 1.2 inches by the end of the eighth week, when it will weigh approximately 0.1 ounce. All of the organs will be in place by the end of this period, after which the developing child is referred to as a fetus. The length and weight of the fetus then begins to increase significantly as it proceeds through further complex stages of development.

Learn with BODY WORLDS

Many factors influence the development of an unborn baby. How do environmental influences affect the child? What circumstances in the life of the mother have a positive or negative effect, or can even harm the baby? How do these influences actually reach the fetus?



Eight-week-old embryo

POST-VISIT **ACTIVITIES** & DISCUSSION **QUESTIONS**

Activities and Discussion

While these activities can be used pre- or post-visit, they are recommended after you have visited the exhibition.

ACTIVITY

Reactions—what effect did the BODY WORLDS exhibition have on you?

Here are some reactions to the plastinates.
Do you agree or disagree?

- Fake
- Complicated
- Scary
- Like they were made of plastic
- Like a model
- Normal
- Lifelike
- Funny
- Like a person
- Like they were trying to say something
- Interesting
- Serious
- Like they were made of meat
- Like a corpse
- Like someone I knew
- Dumb

Add some words of your own:

Explain what struck you the most about the exhibition:

Which features of the plastinates looked most authentic?

How would you describe the behavior of other people looking at the plastinates?

DISCUSSION **QUESTIONS**

Talk about the exhibition with your children.

Allow them to respond and voice their opinions,
and share your opinions with them.

 **What effect did the exhibition have on you?**

 **What did you learn about your own body from seeing this exhibition?**

 **What can you do as an individual and as a family to best take care of your health?**

ADDITIONAL RESOURCES

The Visible Human Project

 http://www.nlm.nih.gov/research/visible/visible_human.html

Take an animated trip through the cross-section of a human body!

The BBC Interactive Body

 http://www.bbc.co.uk/science/humanbody/body/index_interactivebody.shtml

Games and quizzes about the human body.

Kids Health Organization

 <http://kidshealth.org/kid/index.jsp>

Kids can find out about nosebleeds, scabs, puberty, emotions and other cool human body stuff.