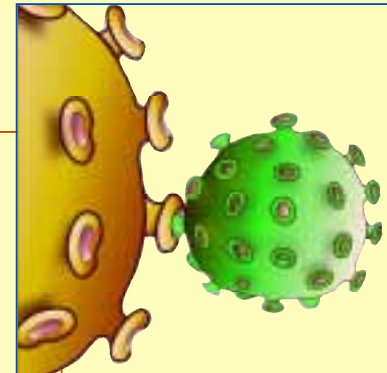




What is the Immune System?



When was the last time you fell ill and recovered though you took no medicines?

INFORMATION

1. All human beings are born with an immune system, made up mainly of white blood cells, to protect the body from disease.
2. Some people have stronger immune systems than others. During a lifetime, a person's immune system may be stronger or weaker at different times.

Objective: To create an understanding that the human body has a natural defense system.

GUIDELINES

1. **Ask:** When was the last time you fell ill but recovered though you took no medicines? Ask for examples of illnesses such as malaria, typhoid, and measles. Allow participants to share real life experiences.
2. **Ask:** What does the body have which helps it to recover from sickness without medicines? Write the answers on a flip chart sheet. Typical answers include:
 - Faith
 - Immune system
 - Defense system
 - Antibodies
 - White blood cells
 - Superstitious practices

If the term immune system or defense system does not come up, add it to the list after asking participants if they have heard of such a thing. Explain that the **immune**

system is the name given to the body's natural defense system.

3. **Discuss** the role of faith and prayer versus medicines, by asking:
 - Can faith alone, without drugs, cure a disease?
 - Will a faithless person take longer to be cured than one who has faith?
 - A newborn infant has no faith yet. Will it take her longer to heal with medicines because of this?
 - Will medicines take longer to heal an unconscious person?
4. **Ask:** Where is the immune system found? Let participants share views. Answers may include blood, brain, and white blood cells. Note them on a flip chart sheet.
5. **Explain** that all human beings are born with an immune system, made up mainly of white blood cells, to protect the body from disease. Some people have stronger immune systems than others. During a lifetime, a person's immune system may be stronger or weaker at different times.

How does a country like Kenya protect itself from its external enemies?

DG 3

What is the Immune System?

Objective: To help participants realize that detection, sounding the alarm and attacking are three important functions of a defense system.

GUIDELINES

1. **Ask** participants to name the activities by which a country like Kenya defends its borders from invasion by an external enemy. Note answers on a flip chart sheet. The final list should include detecting the enemy, communication (signals), sounding the alarm, and attacking the enemy.
2. On a separate flip chart sheet, make three columns and **write the three shortlisted activities in the leftmost column:** 1. Detecting the enemy; 2. Sounding the alarm; and 3. Attacking the enemy.
3. **Ask:** Whose job is it within the armed forces to perform these functions? The following answers should emerge: Patrol regiments (detecting the enemy); Signal corps (sounding the alarm); and soldiers

(attacking). **Write these in the middle column of the flip chart.**

4. **Explain** that the immune system in the human body also has its counterparts for detecting the enemy, sounding the alarm and attacking the enemy. **Ask** participants to name the cells that perform these tasks. Note their suggestions on a separate flip chart sheet.
5. **Explain** that the functions of detecting the enemy and sounding the alarm are performed by a white blood cell known as the **Helper T4 Cell**. Other names for this cell are **T4 Cell, T4 Lymphocyte, CD4 cell** and **Helper T Cell**.
6. Explain that **antibodies** attack the invading germs.
7. In the right-most column, **write 'Helper T4 Cell'** against '**Detecting the enemy**' and '**Sounding the alarm**'. Write '**Antibodies**' against '**Attacking**'.

INFORMATION

1. Invading germs are detected by the **Helper T4 Cell**. This cell is may also be called **T4 Cell, T4 Lymphocyte, CD4 Cell, CD4 Lymphocyte, or Helper T Cell**.
2. The function of attacking and defeating germs is carried out by **antibodies**.

ANTIBODIES



Specific antibodies exist to fight each germ that enters the body.

HELPER T4 CELLS

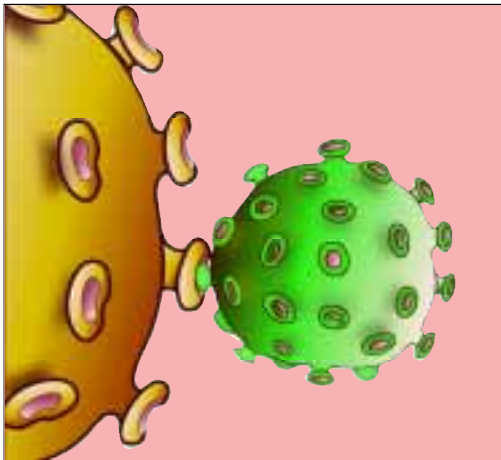


The Watchmen. They detect germs and sound the alarm.

Cells don't have eyes. So how does a Helper T4 Cell 'recognize' an invading germ?

INFORMATION

1. Each disease-causing germ has unique chemical markings — like 'bumps' — on its surface.
2. Helper T4 Cells have 'receptors' designed to match the chemical markings on the surface of germs.
3. For each different type of germ, there exists a different 'brigade' of Helper T4 Cells whose receptors match that germ's chemical markings.



Objective: To help participants understand how the body recognizes different types of germs.

GUIDELINES

1. **Ask:** How does a Helper T4 Cell, which doesn't have eyes, 'see' an invading germ? Allow participants to express their views. If any participant mentions CD4 receptors, note it on the flip chart sheet, but do not go into any further details yet.
2. **Demonstration:** Ask a volunteer roughly your own height to step forward. Explain that you will represent the Helper T4 Cell, while he or she represents the germ.
3. **Explain** that all germs have certain chemicals on their surfaces. Instruct the volunteer to make two fists and stick them out, one at hip level, and one near the stomach. Tell participants that these represent chemical markings on the germ's surface.
4. Form your hands into open cups in exactly the same positions where the germ player has made fists. **Explain** that the Helper T4 Cell has 'receptors' matching the chemicals on a particular germ's surface, like a key and a lock.
5. **Role play** how the Helper T4 Cell identifies the germ: with eyes closed, and hands in the positions describe at the hips and near the stomach, the Helper T4 Cell and the germ will bump into each other at random until the Helper T4's open fists close around the germ's closed fists.
6. **Explain** that each germ has its own unique chemical markings. For each kind of germ, there exists a kind of Helper T4 Cell with matching receptors. For example, there exists a 'brigade' of Helper T4 Cells whose receptors match the surface markings of, say, malaria, while another would be designed to detect say, TB, or the common cold, or typhoid, and so on.

When a new germ enters the body for the first time, are there already Helper T4 Cells designed to detect it?

3
DG

Objective: To create an understanding of how the body reacts to new infections.

GUIDELINES

1. **Challenge** participants' understanding by asking them if the human body is fully equipped with Helper T4 Cells to detect every kind of disease. Sample questions:

- If I have had typhoid, then my body will have typhoid antibodies and Helper T4 Cells designed to detect and fight typhoid in future. What happens when a germ enters the body for the first time? Will the body have Helper T4 Cells and antibodies to detect and fight it?
- When HIV enters a person's body, are there already Helper T4 Cells with receptors that fit the chemical markings on HIV's surface?
- Can a newborn baby's Helper T4 Cells detect any germs? Which germs will a newborn baby be able to detect and fight?

Allow participants to express their views.

2. **Explain** that when a new germ, such as HIV, infects a person, it takes some time for that person's body to recognize that it is facing a new enemy, and produce

Helper T4 Cells and antibodies to detect and fight that particular germ.

3. **Explain** that antibodies are manufactured in 'factories' known as the **lymph glands**, and that Helper T4 Cells are manufactured in the **thymus glands**.

4. **Ask:** Where are lymph glands found? After a discussion, explain that lymph glands are found all over the body, including the **neck, armpits** and **groin**. During sickness, the reason why these parts sometimes swell up and ache a little is because the lymph glands 'factories' are busy producing antibodies.

5. **Explain** that a newborn baby temporarily inherits all his or her mother's antibodies and Helper T4 Cells. These will protect the baby until his or her own immune system develops.

6. If the mother is HIV positive, the child will have her HIV antibodies in all cases. In only 1 out of 15 cases will HIV itself also be present.

INFORMATION

1. When a new germ infects a person, the human body reacts by creating a new 'brigade' of Helper T4 Cells for detecting that germ, and antibodies for fighting it.

2. Helper T4 Cells are produced in the thymus glands.

3. Antibodies are produced in the lymph glands, which are found all over the body.

What is the Immune System?

Can the human body produce antibodies to fight a new disease even before being infected by it?

INFORMATION

1. During immunization, a weakened form of a germ is introduced into the human body. The germ will be incapable of causing disease, but will stimulate the immune system to develop antibodies against that germ.
2. There are no effective vaccines against HIV in the world today. However, many promising vaccine trials are under way.

Objective: To help participants understand how immunization works.

GUIDELINES

1. **Ask:** Does the human body produce antibodies against a germ only after getting infected? Is there some way that the body can produce antibodies against a disease even before getting infected by it? Note down participants' suggestions on a flip chart sheet.
2. **Explain** that in **immunization**, the body is artificially stimulated to produce antibodies against a germ well before infection happens.

This is done by introducing a weakened form of the germ into the body. This germ is incapable of causing disease but gives the immune system an opportunity to identify the new germ and prepare antibodies against it.

3. **Demonstrate:** Ask for a volunteer from the group, and introduce him as a thief who might one day rob your house. Pin the thief's hands behind him, and cover his eyes. In this helpless position, present him to the participants, saying, "Take a good look at this thief. He is helpless to rob you, but now that you've taken a good look at his face, you will recognize him and fight him the next time he tries to enter your house."

The Majengo Trials: Hope for Kenya?

The Majengo HIV study began in 1985 when 60 percent of the commercial sex workers in Majengo, a Nairobi slum, tested HIV positive. Five years later, the research team identified a group of prostitutes who remained negative despite having as many as 30 clients per day. That knowledge is now being used to design an experimental vaccine to combat sub-type A of HIV, the most common strain in East Africa. The project is being implemented by the Kenya AIDS Vaccine Initiative (KAVI), working with the US-based International AIDS Vaccine Initiative (IAVI), and researchers from the University of Nairobi, and Oxford University in England.

While ordinary vaccines are designed to stimulate antibodies to disease, this vaccine aims to induce the production of Killer T-cells, which scientists believe are the key to these women's immunity.

Human trials of the vaccine began in Oxford UK in August 2000, while the Kenya trials were to have begun in early 2001. However, the project has been plagued by disputes among the partners and delays in implementation. "The situation now is rather confused," said a senior medic of the University of Nairobi. "KAVI seems to have lost the momentum. . . the vaccine development programme's Nairobi operations seem to be in limbo."

4. **Ask** participants if there is a vaccine against HIV. Allow participants to share views. Explain that there is currently no effective vaccine against HIV, though there are several promising vaccine trials going on all over the world. Some may have questions about the Majengo vaccine trials. Share information from the box (*The Majengo Trials: Hope for Kenya?*) alongside.

What does HIV do when it enters the body?

DG 3

Objective: To explain the process of HIV infection.

GUIDELINES

1. **Ask** participants to recall what HIV does when it infects a human being. (**Answer:** It enters the Helper T4 Cell, and leaves a copy of its chemical manual, with instructions on making HIV, in the cell's DNA library.)
2. **Explain** that you will now describe that process in greater detail. **First**, HIV attaches itself to CD4 receptors on the surface of the Helper T4 Cell. **Second**, it punctures the surface of the Helper T4 Cell and enters the cell. **Third**, its outer coat of protein dissolves, leaving a string of chemical instructions on how to manufacture HIV. **Fourth**, such a chemical string is known as RNA, or Ribonucleic Acid. Imagine RNA to be like DNA as it would look in a mirror.
3. HIV's RNA, converted to DNA, now inserts itself within the Helper T4 Cell's DNA library.
4. **Explain:** To understand this, imagine a public library into which someone has added a dangerous book, such as *How to make a Nuclear Bomb*. The book is harmless until the day someone borrows it and begins following the instructions. The result will be a deadly nuclear bomb.

Similarly, as long as most of the HIV manuals are lying 'unopened' within the Helper T4 Cells, the person is only HIV positive but does not have AIDS.

Over the years, more and more Helper T4 Cells open the 'manual' and start following its instructions. They become 'factories' manufacturing billions of HIV, which flood into the blood, invading and sabotaging other Helper T4 Cells. The person begins developing AIDS.
5. **Ask** participants to recall the relative sizes of HIV and a White Blood Cell. (**Answer:** HIV = 100 nm; White Blood Cell = 80,000 nm).

INFORMATION

1. When HIV infects a person's body, it enters the Helper T4 Cell.
2. Once inside the Helper T4 Cell, HIV's outer protein shell dissolves, leaving a chemical strand called RNA.
3. RNA stands for Ribonucleic Acid. It is a kind of 'manual' containing coded instructions for manufacturing HIV.
4. This chemical manual inserts itself into the DNA library of the Helper T4 Cell.

What is the
Immune
System?

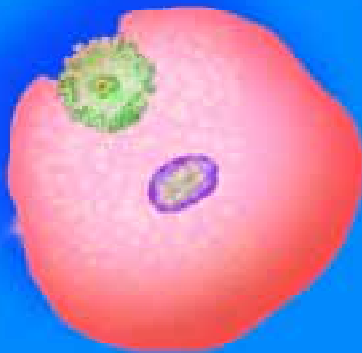
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How HIV causes infection

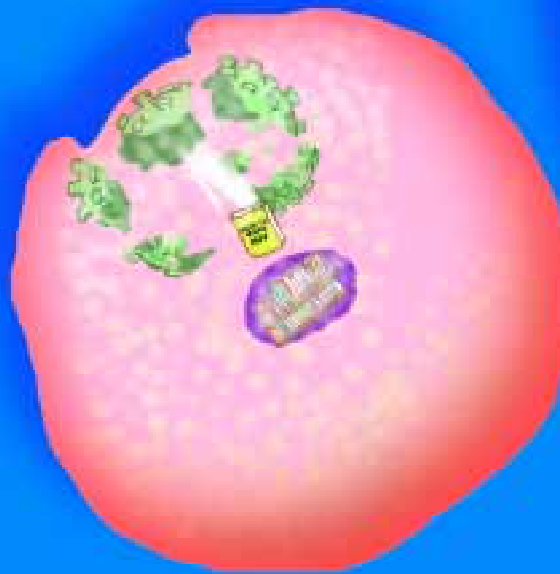
1 HIV attaches itself to the CD4 receptors of the Helper T4 Cell.



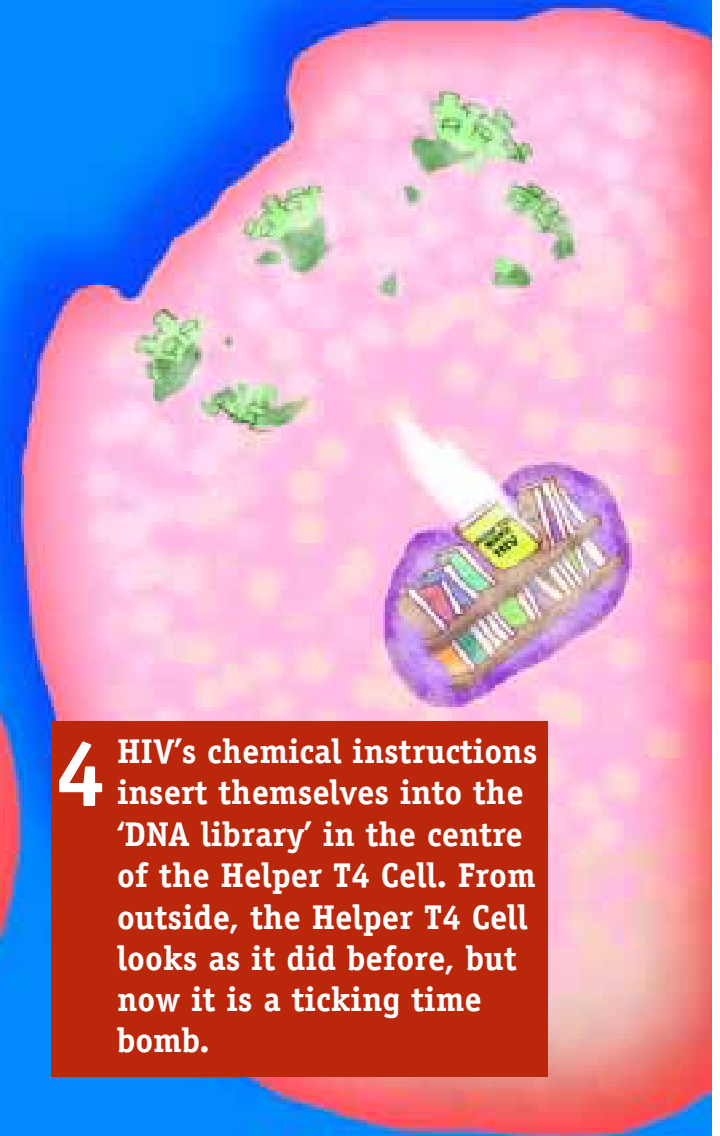
2 HIV punctures the Helper T4 Cell and enters it.



3 HIV sheds its outer coat of protein. What remains is a strand of chemical, called RNA, which is like a manual with coded instructions on how to produce HIV.



4 HIV's chemical instructions insert themselves into the 'DNA library' in the centre of the Helper T4 Cell. From outside, the Helper T4 Cell looks as it did before, but now it is a ticking time bomb.



The Immune Game



DG 3

Objective: To understand the process of HIV infection through a role playing simulation.

GUIDELINES

This simulation consists of 6 steps:

1. Setting up
2. Selecting the players
3. Rehearsing the players
4. Enacting the infection process
5. Freezing and reviewing the action
6. Discussion and questions

Setting up

1. **Explain** the following:

- The room in which the session is being held represents a small blood vessel within the vaginal walls. Make sure everyone understands what a blood vessel is.
- The environment outside the room represents the vagina.
- Discuss how the vaginal wall is affected by the friction of sexual intercourse: there will be cuts and abrasions. Will they all be visible? No. The smallest

cut can be as small as a few nanometres.

- How big must a cut be for HIV to get through? Participants will recall the size of HIV (100 nanometers). **Point out** that a cut as small as 101 nanometers is sufficient to let in HIV.
- Choose an open door in the room, and define it as a small cut in the vaginal wall. When the door is closed, the vaginal wall is intact. When the door is open, it means that there is a cut, and HIV can enter the body.

Selecting the players

2. **Ask** for volunteers to play the roles of HIV, HIV Antibodies, Lymph Glands, and Helper T4 Cells. There should be a minimum of four to six volunteers for each role.

3. **Hand out** the name placards, and instruct players to wear them around their necks.

Rehearsing the players

4. **Develop** unique and interesting movements for each role.

- **Helper T4 Cells:** These cells should move briskly all over the place, with their hands on their

MATERIALS NEEDED

1. Placards size 6" x 6" as shown below (4 to 6 sets of each needed).

HIV

HIV Antibody

Lymph Gland

Helper T4 Cell

What is the Immune System?

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foreheads like visors, as though searching for outsiders. Occasionally, one of them should open the door and go outside, representing the fact that Helper T4 Cells are not found only in the blood, but all over the body, including the surface (skin, eyes, nose, etcetera).

- Whenever a Helper T4 Cell is able to clearly read the HIV placard on a player, it should raise an alarm by shouting, "Hatari!! Hatari!!" as loudly as possible.
- Once a Helper T4 Cell is caught by HIV, it will lose the ability to shout, "Hatari!"
- **HIV:** HIV will wait outside the door which represents a cut in the vaginal wall. Whenever the door opens, indicating that a cut has been caused in the vaginal wall, a single HIV should charge in at high speed. HIV should move quickly from point to point, like thieves. They should move in short bursts, freezing from time to time and looking around.
- HIV should sneak up on Helper T4 Cells, and attempt to **catch their shoulders from behind**.
- **Lymph Glands:** These players should stand in a row towards the back of the hall. Standing behind each Lymph Gland should be a number of HIV Antibodies. Each time the Lymph Gland hears the shout "Hatari!", it should release 1 HIV Antibody into the room.
- **HIV Antibody:** HIV Antibodies will march with energy, speed and power, like soldiers. Their objective is to find HIVs. As soon as an HIV

Antibody finds an HIV, it **should grip its hands, thus paralyzing it**.

Enacting the infection process

5. Rehearse the different players in their movements in groups once or twice. When you feel they are somewhat comfortable, conduct a full-scale enactment featuring all the players together. The facilitator's position will be near the door, opening and shutting it quickly from time to time, to let an HIV enter into the action, or letting out a Helper T4 Cell. When a Helper T4 Cell goes out, it will return with an HIV on its back.
6. Repeat the enactment a couple of times, asking for greater energy and enthusiasm until everyone is well engaged. At a suitable point, shout **"Freeze!"** and ask everyone to freeze where they are.

Reviewing the action

7. Go around the room, and count the number of HIVs and Helper T4 Cells that are still single; the number of HIVs that have caught Helper T4 Cells by the shoulders; and the number of HIV

Antibodies that have successfully immobilized HIVs.

Discussion and questions

8. **Explain** that as in the game, in a real infection there are likely to be the same three conditions in the blood at any point soon after infection:
 1. Some HIVs will have infected some Helper T4 Cells. These cells will continue to look normal from outside, but one day will turn into factories for manufacturing HIV.
 2. Some HIVs will have been immobilized by HIV Antibodies. These HIVs are effectively dead, and cannot infect anything any more.
 3. Most Helper T4 Cells will be uninfected and doing their duties as they should.
 4. Many HIVs will be in the blood, looking for Helper T4 Cells to invade.

How can a person know if he or she is infected with HIV?

DG3

Objective: To create an understanding that HIV infection has no particular symptoms and can only be detected by a test at the right time.

GUIDELINES

1. **Ask:** How can a person know if he or she is infected with HIV? Are there any symptoms specific to HIV infection? If yes, then what are they? Note all suggestions on a flip chart sheet without saying if they are right or wrong. Answers you could expect include: fever, persistent cough, body ache, swelling of glands along neck and armpits, and diarrhea.
2. **Explain** that there are no specific and unique symptoms for HIV infection. It is also not possible to detect HIV infection just by the way a person looks. A swelling of lymph glands along the neck or

armpits indicates that the body is producing antibodies against *some* infection, and does not specifically mean HIV infection has happened. However, some persons briefly develop flu-like symptoms a few days to a few weeks after HIV infection.

3. The only way to detect HIV infection is by doing an HIV test, which should include counseling before and after the test. Most commonly used HIV tests look for HIV antibodies in the blood sample. **It is assumed that in most cases a person who has HIV antibodies will also have HIV.**
4. A person who has practiced high-risk behavior should consider going for an HIV test, whether or not he or she develops flu-like symptoms.

INFORMATION

1. HIV infection cannot be detected by the way a person looks. There are also no symptoms specific and unique to HIV infection.
2. Some people briefly develop some flu-like symptoms a few days to a few weeks after infection by HIV.
3. The only way to detect HIV infection is a proper HIV test, which should include counseling before and after the test.
4. A person who has recently practiced high risk behavior should consider going for an HIV test, whether or not he or she develops flu-like symptoms.

What is the Immune System?

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The most common tests for HIV are based on detecting the presence of HIV antibodies in a blood sample. It is assumed that if HIV antibodies are present, HIV itself must also be present. **Important:** With most people it can take upto 18 weeks before their blood has enough HIV antibodies to be detected by a blood test, even though HIV will be present. Thus a test taken too soon after infection could give a **false negative** result. That is, the test may indicate that the person is not infected even though the virus may be present.



Can a person have HIV antibodies in the blood but no HIV?

INFORMATION

1. A mother's placenta protects the fetus from most toxins and germs by filtering them out. It allows nutrients and antibodies from the mother to pass to the fetus.
2. An HIV positive mother will always pass on her HIV antibodies to her newborn child. However, in only 1 case out of 15 will the HIV pass to the fetus within the uterus.
3. A newborn infant can also get infected by HIV during birth, and after birth through infected breast milk.

Objective: To create an understanding of the process of mother-to-child transmission of HIV.

GUIDELINES

1. **Ask:** Can a person have HIV antibodies but no HIV itself? What sort of person could have the HIV antibody without having HIV? Allow participants to discuss possibilities. (**Answer:** A newborn infant from an HIV positive mother.)
2. **Explain:** A newborn baby from an HIV positive mother will always have the mother's HIV antibodies, but in only 1 case out of 15 will it be infected with the mother's HIV during pregnancy.

The fetus is very well protected while in the mother's uterus, by a membrane called the **placenta**. The placenta allows nutrients and other beneficial substances to pass from the mother to the fetus, but blocks most germs and toxins. Thus, if the mother is HIV positive, the fetus will automatically acquire her HIV antibodies.

In 1 case out of 15, the virus will pass from the mother's blood into the child's blood during pregnancy.

3. The mother's HIV antibodies will last in the child's blood for about 15 months and then disappear as the child's immune system begins producing its own antibodies. If the child has no HIV, then its blood will have no HIV antibodies after this period.
4. A newborn infant can also get infected by HIV during birth, and after birth through infected breast milk.

