GOD IS A SERVANT

Healthy food and the immune system

Term 3

Year 7

Year 7 Protector

Food and nutrition 1 Place the letters A-Z down the side of a page. For each letter, name a fruit or vegetable that exists in the world.	**Food and nutrition 2** Give 10 different uses for: a coconut.
Food and nutrition 3 All takeaway food outlets should be demolished. Give 5 justifications to this proposal.	**Food and nutrition 4** Name 3 ways of peeling a carrot without using a peeler.
Food and nutrition 5 Name 5 things that an egg and sunglasses have in common.	**Food and nutrition 6** Create an original, healthy and delicious recipe using the following core ingredient: Citrus fruit

Henri Dunant (Founder of the Red Cross)

Jean Henri Dunant was born in Geneva, Switzerland on 8th May, 1828. His parents were Christians and very active in social work. They helped orphans, prisoners and many other unfortunate people. Following in his parents footsteps, Henri Dunant started his social work when he was young by joining an organization that helped the poor.

On 24th June, 1859 Dunant arrived in Solferino, North Italy to visit the emperor. At that time Solferino was in the middle of a bad war. The Italian and French soldiers were fighting the Austrian soldiers. About 40,000 people were injured, dying and dead. Dunant wanted to do something to help the dying. He gathered together local people who could help to provide assistance for the injured and sick soldiers. Mainly women and girls offered their help. Dunant, with his own money, made temporary hospitals and bought needed materials.

Back in Geneva, Dunant decided to form an international organization to help injured soldiers in war. In 1863, Henri Dunant along with four Geneva citizens formed the International Committee of the Red Cross.

In 1901, the first Nobel Peace Prize was awarded to Dunant as the founder of Red Cross. One of the officials gave a commentary about Dunant: “There is no man who more deserves this honour, for it was you, forty years ago, who set on foot the international organization for the relief of the wounded on the battlefield. Without you, the Red Cross, the supreme humanitarian achievement of the nineteenth century would probably have never been undertaken.”

Dunant died in 1910. According to his wish, he donated the prize money and his funds to the Red Cross.

Nowadays, the Red Cross has already spread all over the world. Red Cross works especially in gathering blood and distributing it to everyone who needs it. Without Henry Dunant, there would not be the Red Cross organization. Without the Red Cross, there might be still a million injured people who would not have been helped. This organization not only supplies much assistance for many people, but also invites us to participate together in helping another. All healthy adults can help the Red Cross by choosing to donate some of their blood.

1. Where was Henri Dunant born?
2. Where is this country?
3. What did he see when he went to Italy?
4. What did he do to help?
5. How many people formed the original Red Cross organization?
6. What does the Red Cross do today?
7. How can grown-up people help the Red Cross today?

Louis Pasteur

Louis Pasteur was a French biologist and chemist. He is best known for his research into the cause and prevention of various diseases, as well as finding vaccines for anthrax and rabies.
He was born in Dole, France in 1822.

He taught at a school in Dijon and in 1848 became professor of chemistry at Strasbourg University.
He married the daughter of the university's principal, in 1849. They had 5 children, although 3 died at an early age and these losses were partly responsible for Pasteur becoming a scientist.

Louis Pasteur realized that tiny organisms, known as germs, carry bacteria and cause disease. This became known as the 'germ theory'. He helped the silk industry, by realizing that microbes were destroying silkworms. He invented the process of pasteurization, which is widely used today for milk and beer. The rapid heating process, which kills harmful germs, still bears his name.

Joseph Lister

The man who cleaned the surgeon's knife

If you were to break your leg today, you would expect to recover after treatment. But up until the late 1800s, if a man broke his leg, he was quite likely to die … not of the broken leg, but of the infection that was allowed to enter the body if the skin was broken by the broken bone. You see, until the late 1800s no one realised that festering sores that developed on wounds were caused by bacteria.

It was Louis Pasteur, a Frenchman, who made a discovery in the 1860s. He discovered that the fermentation of wine and the souring of milk were caused by microscopic plants which he called bacteria. He did some experiments and found that the bacteria could be killed by heating the liquids and then rapidly cooling them.

All milk sold to us these days has been pasteurised. That is, it has been heated to a temperature high enough to kill the bacteria that would turn it sour quickly. Then it has been cooled rapidly to kill any bacteria that may have survived the heat.

Joseph Lister, an Englishman, had always been interested in the human body. In fact, he was interested in everything that had life. He was born in 1827 so lived around the same

time as Louis Pasteur. At school his friends thought he was a bit strange because he took such an interest in the bodies of dead animals, like mice and birds, which he dissected and studied. He also collected skeletons of animals to study. One of his favourites was the complete skeleton of a cat! He gave lectures on the human body to his school friends and read all he could about the work of doctors and hospitals.

It was not surprising then, that when he left school, he went on to university to train to be a surgeon.

In those days you had to be very brave to have an operation. A pain-killing gas called chloroform was starting to be used but not in all hospitals, and the hospitals were not as clean as they are today. Surgeons did not have special clean gowns as they have today. They wore their hospital coats over and over again without washing them. One famous surgeon is said to have used the same coat for 20 years. Because of the dirty conditions, and bad surgical practices, nearly half the patients who went for an operation died – some from the operation itself, but many from blood poisoning, or gangrene. Both of these are caused by infection entering the wound.

Joseph Lister was a caring Christian man, and was disturbed by the number of people dying from operations. His first job was at the Glasgow Hospital, Scotland. He was determined to save the lives of his patients and he had begun to realise that Pasteur's discovery of bacteria could be the cause of infection. Finding a way to kill bacteria would be a key to solving the problems.

First of all, he insisted that the hospital ward should be thoroughly scrubbed out regularly and kept as clean as possible with soap and water. But the hospital staff did not want to clean.

"Don't we have enough work to do without having to get down on our hands and knees to scrub floors?" they complained.

The hospital money managers also complained.

"The bills for soap are now three times more! Surely it isn't necessary to be THAT clean. Couldn't we cut our expenses by scrubbing less often?" they said.

But, although so many were against him, Joseph Lister kept working at raising the standard of cleanliness in his hospital ward.

He also insisted that doctors and nurses who assisted at his surgical operation should scrub their hands before the operation. To the doctors and nurses who attended to

people's wounds he said, "I require you to scrub your hands thoroughly before you begin to treat each patient."

"A waste of time and money," they grumbled behind his back."

But after a while they began to see that Lister was right. They saw a great improvement in the health of the patients, and far fewer cases of infection.

Lister believed that he had made a good start, but wanted to go further. He continued to follow the work of Louis Pasteur who was working on a way to kill bacteria. Lister experimented with Carbolic Acid which could burn the skin of used at full strength so made a weak solution that could be sprayed on the walls of the operating theatre and the surgical instruments, to kill the germs. The same weak solution was applied to the actual wounds. The result was an immediate improvement in the number of infected wounds after surgery.

Having learned that Lister's methods were successful, some doctors in Europe and America started doing the same. Some however did not follow the requirements for complete cleanliness so did not have success. It was difficult to persuade doctors and hospital staff to change, but Lister was patient and persevering.

Lister's next position was in a London hospital. Here his methods were not at first accepted but Lister persisted. Gradually doctors in London accepted Lister's methods and by 1879, nearly 20 years after making changes in Glasgow Scotland, the whole of Europe saw that cleanliness and the use of antiseptic was necessary.

Since that time, there have been many other antiseptics produced, containing bacteria-killing substances, but we can thank Joseph Lister for the discovery of the use of antiseptics. And Joseph Lister, as a Christian, would give the glory to God.

He said, "I always try to do my very best for my patients, and give the glory to our Heavenly Father. If doctors are able to feel the love of God in their work, truly the practice of surgery is a wonderful profession."

Activities

1. What is meant by the word "pasteurised"?
2. "The bills for soap are now three times more." Who said this and why?
3. What was Lister's greatest Christian character quality?
4. On a map, find the places where Lister worked.
5. Explain the meaning of the title of this biography.

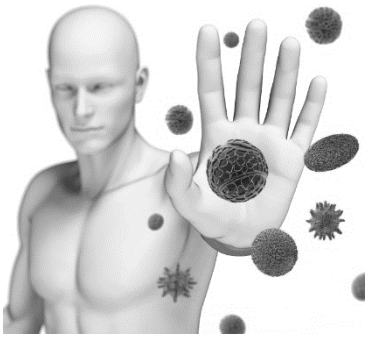
Béchamp discovers how the immune system works

Pronounced “Bay- shomp”

In 1861, a French scientist, Louis Pasteur discovered the theory that germs cause disease. Because of this, and the medical profession began to use disinfectants to kill germs.

Pierre Béchamp (16 October 1816 – 15 April 1908) was also a French scientist. He discovered that not all germs are bad. He said that the reason we get sick from germs is because people’s bodies, when they are unhealthy, can invite the germs in and cause sickness.

Béchamp said that we shouldn’t be afraid of these germs and try to “kill” them with drugs. Instead, we should learn how to keep our bodies healthy so that the harmful germs cannot enter, or if they happen to, our healthy immune system sends its army out to kill the invaders.



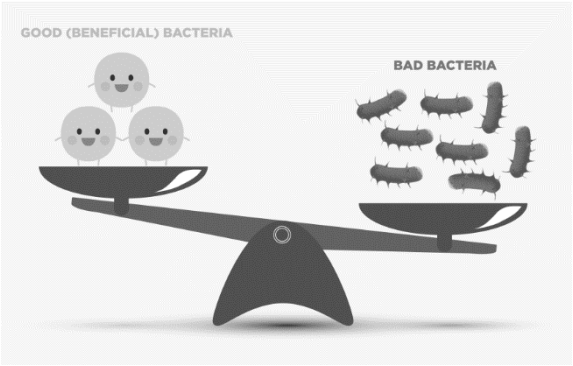
What is an immune system and how does it fight the invaders?

The immune system helps to protect us against diseases. Tiny invaders such as viruses, bacteria, and parasites may be looking for a place to live in. But the immune system is on the lookout for these and says “no, you can’t enter. This body is too healthy and you will not survive!”

If any invaders do get in, the immune system is made up of specialized organs and cells, that all work together to destroy these invaders. Some of the main organs in the immune system are the spleen, lymph nodes, thymus, and bone marrow. The gut is also an important part of the immune system.

Draw a picture of the human body, draw and mark these organs.

Germs (viruses, and bacteria), are in you and on you all the time, every day! A healthy balance of beneficial bacteria, and body that is healthy on the inside, keeps the unhealthy stuff out. There needs to be the right balance.



If you wipe out everything by using antibacterial soaps all the time or using antibiotics for every little cold, then you aren’t just destroying the bad bacteria, you’re wiping out all the beneficial balance too, leaving you even more open to new diseases in the long run.

Unlike Louis Pasteur, who said that we must kill <u>all</u> germs to prevent disease, Béchamp understood that we to stay healthy, we need to turn our body into a happy, healthy place where sickness cannot live. We do this by eating foods that make us healthy, drinking water and not sugary drinks, getting plenty of exercise and the right amount of sleep.

Your immune system protects you from illness and disease. It knows when there is something inside your body that should not be there.

All the cells in your body have a way to tell the immune system, “I belong here. I’m not going to do any harm.” And so the immune system leaves those cells alone. Think about the cells in your body wearing name tags that say “self”.

Anything with a “self” name tag is a good guy. But things like bacteria, viruses, and parasites wear name tags that say “nonself”. When the immune system sees a “nonself” name tag, it jumps into action and attacks those foreign invaders.

There are many different kinds of immune cells helping to keep you from getting sick. There are white blood cell, called B cells and T cells, whose job it is to gobble up and digest the invaders. They are always swimming around in your blood stream, always on the look-out for invaders. And when they see one, GULP!

Once a B cell or T cell attacks an invader, they create cells to “remember” it. Those “memory cells” stay in your blood and if they see that same invader again, they quickly recognize it so your immune system can act faster at killing it.

The “B” in B cells stands for bone marrow, which is where B cells, and all immune cells are made. The “T” in T cells stands for thymus. The thymus is an immune organ found in the middle of your chest, near your heart. Its job is to produce T cells.

You have your own little army of cells inside you, always fighting to keep you healthy. And you can be a part of that army too! By getting plenty of sleep at night, exercise and eating nutritious foods, you’ll help keep your immune system strong and ready to fight.

The 8 laws of health will build a strong and healthy immune system. Remember…

NEW START stands for … **N**utrients, **E**xercise, **W**ater, **S**unlight, **T**oxin-free (don’t put into your body things that harm you), **A**ir, **R**est, **T**hink happy thoughts and **T**rust in God

The immune system 1
What is immunity?

Student activities

Immunity means that you are protected against something. There are different kinds of immunity. This topic is about how different parts of our bodies work together to keep us from getting sick. Immunity to some diseases is passed on from our mothers before we are born. Immunization (having your 'shots') helps our body's immune defence system protect us from diseases.

There are several parts to the immune system:
The skin, tonsils in the throat, adenoids in the ears, sinuses in the nose, the lungs, the bowel, white blood cells and the lymphatic system.

Your body is like a castle. It defends you against germs.

1. What is immunity?
2. List the parts of the immune system.

Immune system 2
The body's immune system

Everybody has an inbuilt immune system which protects it from diseases and germs. This system has a lot of different parts which work together to keep out any harmful germs, and attack and destroy any which manage to get inside your body.

Every day your body is exposed to millions of germs, and you do not get sick from them because of your immune system.

Every time you do get sick because of a germ, your immune system works to get rid of it and then it remembers how to fight the infection if the same germ comes again.

Usually the older you get, the more germs you become immune to.

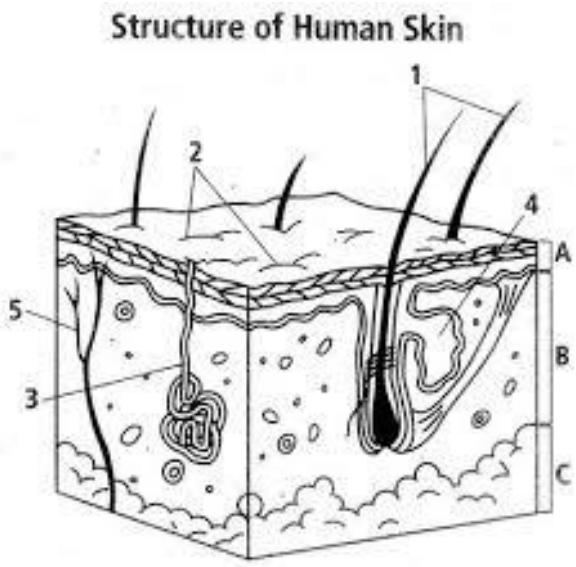
1. What does the immune system do?
2. How does your immune system fight germs?

The immune system 3
The skin

The skin is the first line of defence in your immune system.
You know how you put plastic wrap over leftovers to keep them fresh enough for later? Well, your skin is like a plastic wrap to keep germs from getting into your body.

The epidermis (outside layer of skin) has special cells which warn the body about incoming germs.

Glands in the skin also make substances that can kill some bacteria (anti-bacterial chemicals). This means you don't get infections on your skin unless your skin is damaged, such as by a cut or a graze.



1. Draw the structure of the human skin.
2. How does the skin protect us from germs?

The immune system 4
Nose, mouth, eyes, ears, lungs and bowel

This is what happens when your nose, mouth, eyes, lungs and bowel get attacked by germs or dust:

The mucous membranes which line the mouth, throat, lungs and bowel, act like a barrier to germs, just as the skin does.

Saliva in the mouth and the tears which wash your eyes have special enzymes (chemicals) in them which break down the cell walls of many bacteria and viruses.

The mucous that is made in your nose, throat and lungs traps bacteria, viruses and dust.

Acid in your stomach kills most germs, and starts to digest your food.

What is the functions of the following?

1. Saliva
2. Mucous
3. Stomach acid

The immune system 5
The Lymphatic system

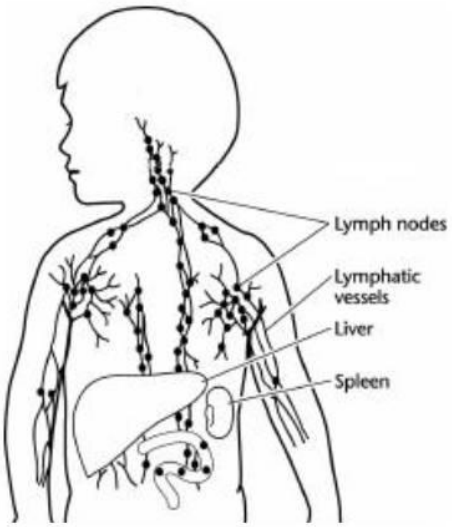
The lymphatic system is made up of:

Lymph: a clear fluid that is very similar to the clear liquid in blood, but it carries only white blood cells, not red blood cells.

The lymph flows through all the parts of the body picking up fluid around cells and carrying it back to large veins near the heart. It also carries white blood cells to the places where they are needed.

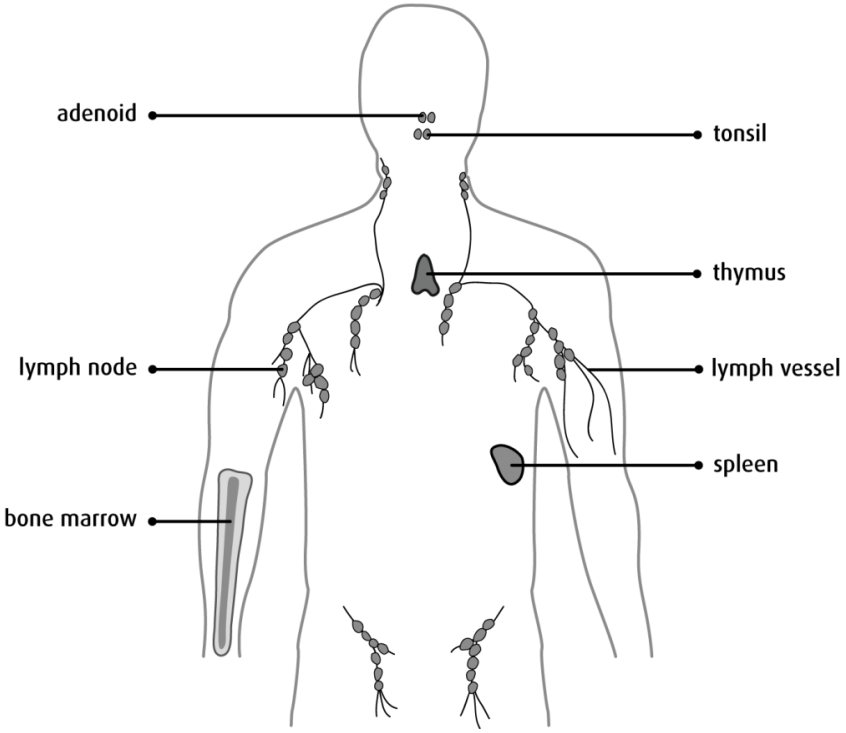
Lymph nodes
Some bacteria or viruses that have entered the body are collected by the lymph and passed on to the lymph nodes where they are filtered out and destroyed. Lymph nodes are sometimes called glands.

Your doctor can often tell if you have an infection by checking out the lymph nodes (glands) in your neck and under your arms to see if they're swollen. If they are, it shows that they are working to get rid of bacteria or viruses.



1. What is the function of lymph?
2. Where are lymph nodes found?
3. How do they help us?

The immune system 6
Diagram of the lymphatic system



The spleen clears out worn out blood cells and fights off infection.
The thymus trains the T cells (one of the white blood cells) to do their job of looking out for germs or things that don't belong in the body, and destroying them.
The bone marrow is where the blood cells are made.
The adenoids keep infection out of your ears.
The tonsils kill germs that may enter the throat.
The lymph vessels carry lymph fluid around the body.

List the functions of the following:
spleen, thymus, bone marrow, adenoids, tonsils. Copy the diagram.

The immune system 7
Facts about blood

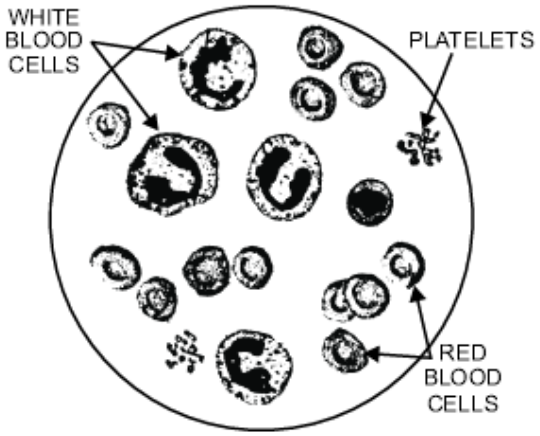
Blood is made up of four parts – plasma, red cells, white cells and platelets. Each part has a special job.

Plasma is a yellow liquid. It helps give you energy and grow.

Red blood cells carry oxygen to your cells.

White blood cells clean the blood and fight germs. When a virus enters your body, white blood cells rush to destroy the virus so you get better.

Platelets help your blood clot. When you cut yourself, a clot forms so the blood stops running. If your blood didn't clot, you could bleed to death.



1. What are the four parts of blood?
2. List the function of each.
3. Draw the diagram.

The immune system 8
White blood cells

In your blood, you have red blood cells and white blood cells, and in lymph there are white blood cells.
There are several different types of white cells which work together to seek out and destroy bacteria and viruses.

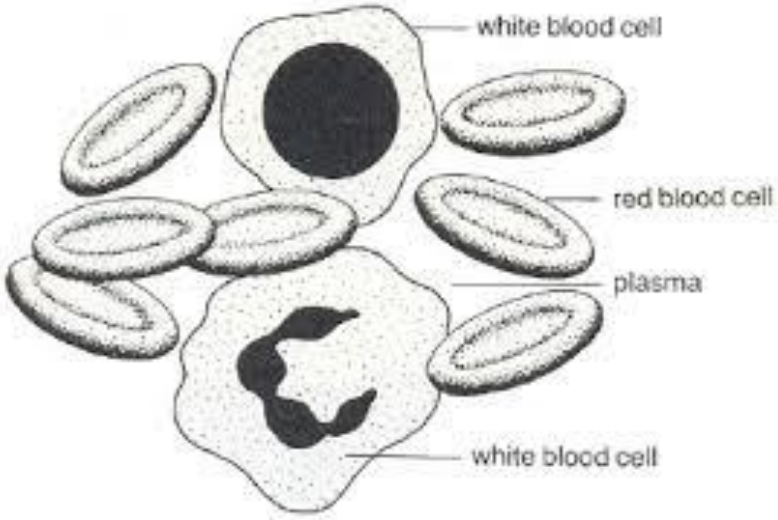
All of them start off in the bone marrow, growing from 'stem cells'.
The disease-fighting white blood cells are specialists. Some of the white blood cells are:
Neutrophils, which move around the body in the blood and seek out foreign material (things that don't belong in your body).

Macrophages are the biggest blood cells. Some live in different parts of the body and help to keep it clean, e.g. in the lungs. Others swim around cleaning up other white blood cells that have been damaged while doing their jobs, e.g. cleaning up pus that has been caused by neutrophils when they work to clear out bacteria from a wound.
Lymphocytes work on bacterial and viral infections
There are two different types:
B cells produce antibodies. Each cell watches out for a particular germ, and when that germ arrives, the cell starts to produce more antibodies which begin the process of killing that germ. Antibodies attach themselves to the germs so that other cells can recognize that these germs need to be destroyed.

T cells look for cells in your body that are hiding invaders (germs) or body cells that are different to normal healthy cells (such as cells that could develop into a cancer) and kill them.

List the three types of white blood cells and briefly explain what they do.

The immune system 9
The difference between red blood cells and white blood cells



The red blood cells are donut shaped and regular. They carry oxygen around the body.

The white blood cells are all different shapes because there are different types. They kill bacteria and viruses in your body.

1. Copy the diagram including the labels.
2. What is the difference in the function of red and white blood cells?

The immune system 10
How does your immune system know which cells to attack?

Your body has lots of friendly bacteria around it which help your body work properly, e.g. some bacteria inside your bowel help you to digest your food and break it up into the different things that are needed in various parts of the body.

These friendly bacteria live on the surfaces of the body, such as on our skin or inside the bowel. They do not try to invade the body, so the immune system does not try to get rid of them.

Other germs which cause illness, try to enter the body.
Antibodies, which are made by the lymphocytes, attach to the invaders so that the other white blood cells can destroy them. They 'tag' them so they can be easily noticed.

As well as attacking germs, your immune system recognizes and destroys other cells which do not belong in your body. The cells in your own body are marked with a special system called *antigens.*

Your immune system can recognize these markings as 'you'. Any cells which do not have the right markings are 'not you' and are therefore attacked. This happens if, for example, you have a blood transfusion with the wrong types of blood cells. Your body's immune system recognizes that these cells do not belong in your body, so it destroys them.

1. What do antibodies do?
2. What do antigens do?

The immune system 11
How you know your immune system is working

You know your immune system is working:

- if you get better after you are sick
- if cuts heal without getting infected
- if you don't catch the same diseases over and over again
- when you get swollen glands
- when you get swelling and soreness around a cut.

Your immune system is in there working to get rid of any infection.
Sometimes the immune system will make a mistake.
It may attack your own body as if it were the enemy. This happens when a person has an allergy.

Allergies are caused by the immune system over-reacting to something that is not really a threat, like when pollen triggers hay fever or asthma.

When the immune system is damaged, they get lots of infections and are much more likely to get serious illnesses. Their body cannot recognize the infection or abnormal cells very well and the immune system does not destroy them as well as usual.

How do you know if your immune system is working well?

The immune system 12
How to build a strong immune system

A strong immune system is an immune system that is working well. This means that when an invader comes into your body, it can be destroyed very quickly. It may mean that you catch a cold sometimes, but you will be able to get better quite quickly. It may also mean that you don't catch the cold in the first place because your immune system destroys the germ as soon as it enters your body.

To stay healthy, we should wash our hands before eating and after the toilet, so that we don't get germs coming into our mouths when we handle food or put our hand to our mouth.

To build a strong immune system there are certain foods we should eat. These are fruits, vegetables and other foods from nature. Fruits containing Vitamin C are particularly good. Examples of these are oranges, lemons, apples and pineapples.

The foods that make our immune systems weak are foods containing high sugar and salt, like processed snack foods in packets, sweets, cakes and biscuits.

Make a list of things we can do to build a strong immune system.