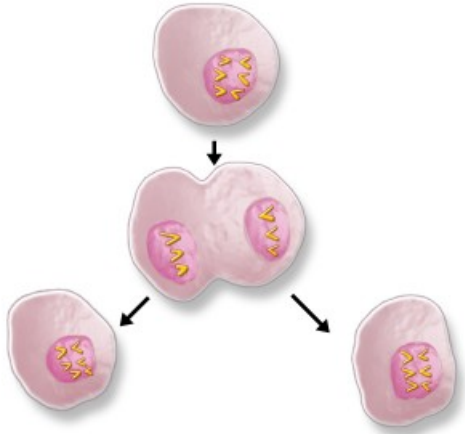


**informedhealthonline.org**

INDEPENDENT, OBJECTIVE AND EVIDENCE-BASED

How do cancer cells grow and spread?

The human body is made up of billions of cells. Cells are the tiny building blocks of our tissues and organs. We all started life as a single cell. That cell made an internal copy of itself (replication) and then divided into 2 cells.



Those 2 cells then also replicated and divided, so the 2 cells became 4 cells. The 4 cells replicated too and divided into 8 cells, and so on.

Cells specialise to perform particular tasks. Some cells will cluster together to form a finger, for example. Others create skin and heal the skin when it is wounded. Cells get old and die after a certain amount of time (“programmed cell death”, or apoptosis), and replication ensures that new cells are made to take their place.

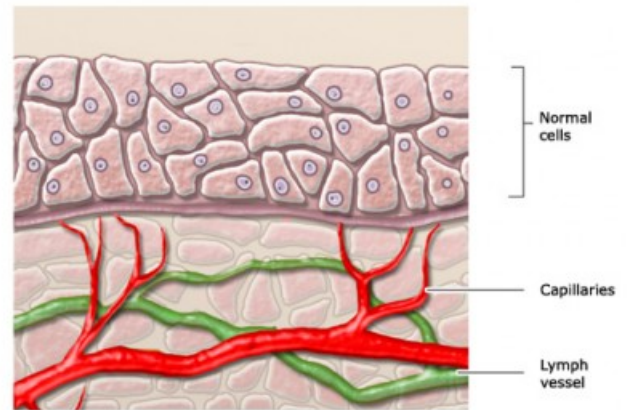
When they are acting normally, cells “know” which other cells to join up with and stick to – and they also know when to stop replicating and die. Each type of cell has a particular role and set of knowledge or instructions in their DNA (genes). Our cells know how to make the right number of fingers on our hand for us (and they know that fingers should only grow on our hands).

Each finger is covered with skin and each finger has a fingernail. If we cut our finger, the skin cells will start replicating and create new skin to heal the wound. If we lose a fingernail, our cells can grow a new one. But the cells will not create extra fingers, even if we lose one. The rules are clear for those cells, and they keep to the rules.

### The role of hormones and the lymphatic system

Our hormones carry messages to our cells, triggering the

cells to take action. These messages are carried by our blood through our vascular system (arteries, veins and capillaries). The blood carries the other things that cells need to function too. Our cells need oxygen and glucose to keep them alive, for example. Our blood vessels also carry away waste products and oxygen-poor blood once the cells have used the oxygen in the blood. Our lymphatic system helps to clean and drain what we do not need. The lymphatic system is a part of our body’s defence system (immune system), and it drains away bacteria and germs. You can read more about the lymphatic system here (URL: <http://www.gesundheitsinformation.de/the-lymphatic-system.630>).



### Benign and malignant growth

Cells become abnormal if their DNA - and therefore their "knowledge" - becomes damaged. As long as there are very few abnormal cells and they are kept under control by our immune system, they will not harm us. It is only when these cells start to divide uncontrollably, forming lumps or growths, that we have one of the more than 200 diseases called cancer. Growths like this are called tumours. The main differences between malignant (cancerous) and benign (non-cancerous) tumours are that malignant ones can

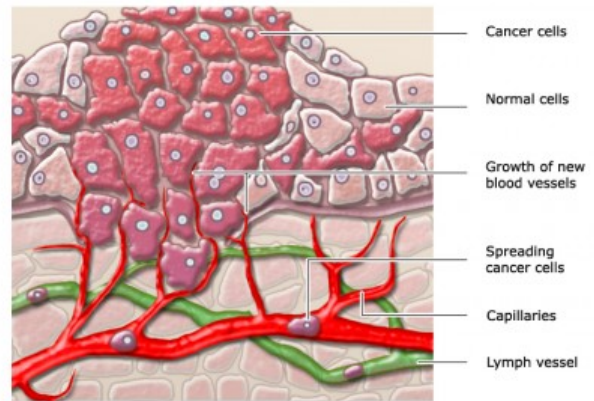
- spread into the surrounding tissue,
- destroy the surrounding tissue, and
- cause other tumours to develop.

Malignant tumours can be life-threatening. But there are also some kinds of cancer that develop so slowly in older

people that they do not lead to any problems in their lifetime.

Benign tumours usually do not cause much damage and are not normally life-threatening. But there is no guarantee: benign growths can become dangerous if they grow a lot, or they might become malignant after a certain amount of time.

If cancer cells start replicating, they do not behave like normal cells. For example, they do not know when to stop replicating and when to die. And they do not always stick together, so they might break away and move through the vascular or lymphatic system and start growing somewhere else in the body. That is called metastasis (the medical word for a cancer that is spreading).



Active cancer cells can enter the bloodstream or lymphatic system and move to other parts of the body to start the process of forming a tumour all over again somewhere else (metastatic or secondary cancer).

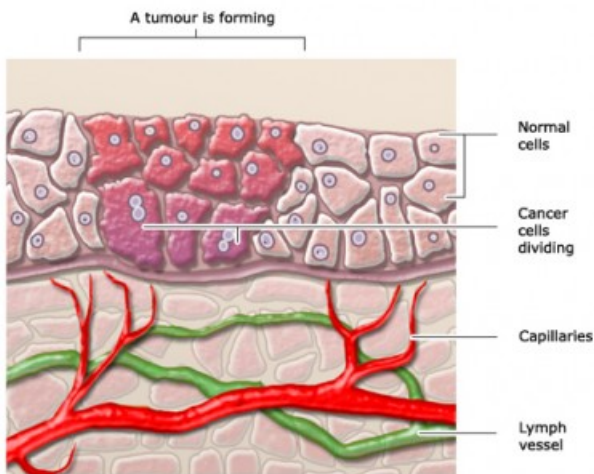
### **Cancer therapy aims to remove tumours or limit their growth**

There are many different types of cancer treatments that all try to remove the malignant tumour, or at least limit the growth and spread of the cancer. Some cancers can be removed by surgery. Drugs (chemotherapy) or various types of radiotherapy are also sometimes used to shrink tumours before surgery. Chemotherapy and/or radiotherapy might be used after surgery too, to destroy leftover cancer cells and prevent the cancer from growing back (recurrence).

If the tumour cannot be removed by surgery, medication and/or radiotherapy may be used. The exact treatment depends on various things, like the type of tumour and the stage of the disease.

You can read more about radiotherapy here (URL: <http://www.gesundheitsinformation.de/radiotherapy.359.56.en.htm>). Cancer drugs work in different ways. Some aim to interfere with the cancer growth process by stopping the development of blood vessels that feed the tumour, for example. Other drugs specifically aim to stop the cancer cells replicating or reacting to hormones. Researchers are always trying to find new ways to limit the growth and spread of cancer cells.

*Author: German Institute for Quality and Efficiency in Health Care (IQWiG)*



When a malignant tumour is contained within one area and has not spread to the surrounding tissue, like the one in the picture above, the medical term is "carcinoma in situ". If this tumour does not keep growing, that means it is just lying there quietly ("dormant cancer cells"). It is not likely to cause harm unless it starts growing.

To keep growing, these tumours start to create their own blood vessels to supply them with the extra oxygen, glucose and hormones they need to survive and keep getting bigger. That process of developing a blood supply system is called angiogenesis (the growth of new blood vessels). Once a tumour does this, it can start to invade the surrounding tissue. This is called an invasive cancer, and you can see what that looks like below:



## Glossary

### metastasis

Metastasis is the process where tumour or cancer cells start to leave the original cancer. These new cancer cells can then spread through the body via the blood or lymph system. It is one of the characteristics that turns a tumour into cancer. A metastatic cancer is basically an advanced form of cancer that is spreading.

### hormones

“Hormones” is the collective term for different types of messenger substances in the body. They are produced in different organs or tissues and released into the blood or the lymphatic system to be distributed throughout the body. Hormones only have an effect on those parts of the organism that have a corresponding docking site. This is how hormones can have such specific effects. Insulin, estrogens, vasopressin and thyroxine are some well-known hormones. Many medical ingredients imitate the effect of hormones.

### bacteria

Bacteria are micro-organisms that, unlike viruses, can exist on their own. Viruses, on the other hand, can only exist inside a living cell. Most bacteria are not harmful to people, and some are actually beneficial. Bowel bacteria support bowel health. However if they get into the urinary system, they can cause an infection there. Doctors prescribe antibiotics for illnesses where bacteria need to be stopped or killed off. Immunisation is also possible against some bacterial infections, such as diphtheria, tetanus or whooping cough.

### immune system

The immune system is the body's defense system and its task is to protect the body against germs or degenerated cells (like cancer cells). The immune system is very complex and has not been understood in every detail yet. There are two components: the cellular immune defense (for example “scavenger cells” and “killer cells”) and the complement system (“antibodies”, for example).

**Sources**

## **The German Institute for Quality and Efficiency in Health Care (IQWiG)**

The German Institute for Quality and Efficiency in Health Care (IQWiG) was established by legislation to provide evaluations of the effectiveness, quality and efficiency of healthcare services. This includes the assessment of medicines as well as the publication of health information for consumers and patients.

## **Evidence basis of our health information**

Our information is based primarily on systematic reviews of the effects of health care. Systematic reviews are necessary to gain an objective picture of health care. In order to do this, a clear question is formulated. Researchers then find all the relevant studies that could answer this question. They then evaluate those studies.

You can find a list of the evidence and other scientific literature on which this information is based at **[www.informedhealthonline.org](http://www.informedhealthonline.org)**

## **Disclaimer**

This information was prepared and published by the German Institute for Quality and Efficiency in Health Care (IQWiG). It is based on the evidence and other scientific literature available at the time of publication. The information is intended for the use of patients in Germany. It is not intended to for use to diagnose illnesses and the information is not intended to substitute for medical advice.