

## **Chemotherapy**

Here are some basic notes on Chemotherapy. The use of chemotherapy is outside the remit of the course but it provides an alternative to the radiotherapy material we have covered in class. Most of this material has been taken from [www.cancerhelp.org.uk](http://www.cancerhelp.org.uk), a site that provides extensive information on all aspects of cancer diagnosis and treatment.

The word 'chemotherapy' comes from two words: Chemical & Therapy. It literally means 'drug treatment'. In cancer treatment, the term chemotherapy means treatment with cell killing (cytotoxic) drugs. You may have just one chemotherapy drug or a combination of different chemotherapy drugs. There are more than 60 different drugs currently available and new ones are being developed all the time.

There are other types of cancer medicines or drugs that are not classed as chemotherapy. Some newer types of cancer drugs kill cancer cells but they work in a different way to chemotherapy. Drugs such as interferon and monoclonal antibodies like trastuzumab ([Herceptin](#)) and rituximab help to kill cancer. But they were developed from substances found naturally in the human immune system and they tend to be called immunotherapy or biological therapy or targetted therapy. Sometimes chemotherapy may be given alongside other types of cancer therapy, such as biological therapy.

Whether chemotherapy is a suitable treatment for you, and which drugs you might have, depends on many things;

- the type of cancer you have
- where in your body the cancer started
- what the cancer cells look like under the microscope (the 'grade')
- whether the cancer has spread

You may have chemotherapy

- on its own
- with radiotherapy
- with surgery
- with hormone therapy
- with immunotherapy
- with a combination of any of these treatments

You may have 'high dose chemotherapy treatment', with a drip (infusion) of stem cells or bone marrow cells afterwards. This is called a 'bone marrow transplant' or 'stem cell transplant'. There is information about these treatments in the bone marrow transplant and stem cell transplant section of [CancerHelp UK](#).

[About Cancer](#) explains that cancer is a disease of your body's cells. Normal cells divide into two to repair damage or during growth. This growth is very tightly controlled in healthy cells.

In cancer, the cells multiply out of control and may either

- form a lump (called a 'tumour')
- or
- produce too many white blood cells ('leukaemia')

Chemotherapy treatment affects the way cancer cells grow (see [How Chemotherapy Works](#)).

#### Why use chemotherapy?

Some types of cancer are very sensitive to chemotherapy, but unfortunately others aren't. In a cancer that is sensitive to chemotherapy, doctors use it because it circulates throughout the body in the bloodstream. So it can treat cancer cells anywhere in the body. It is what is called a 'systemic' treatment. Surgery and radiotherapy are known as 'local' treatments as they only affect the area of the operation or the area the radiotherapy is directed at.

Sometimes cancer cells break away from a tumour. They may travel to other parts of your body through your blood stream or lymphatic system. The cells may settle in other parts of your body and develop into new tumours. These are called 'secondary cancers' or 'metastases'. The chemotherapy drugs also travel in your blood and can reach cancer cells wherever they are in your body. Chemotherapy may be given if there is a chance that your cancer may spread in the future - or if it has already spread.

## When is chemotherapy used?

Doctors use chemotherapy

- to shrink the cancer before surgery or radiotherapy
- to try to stop the cancer coming back after surgery or radiotherapy
- as a treatment on its own in cancers that are very sensitive to chemotherapy
- to treat cancer that has spread from where it first started

You may have chemotherapy before surgery. The aim is to shrink a tumour so that you need less surgery or to make it easier for your surgeon to get all the cancer out. Or you may have chemotherapy so that you only need radiotherapy to a smaller area of your body. Chemotherapy given before other treatments in this way is known as 'neoadjuvant' treatment. Sometimes this is called 'primary treatment'.

You may have chemotherapy after surgery or radiotherapy. The aim is to lower the risk of the cancer coming back in the future. The idea is that it circulates throughout the body and kills off any cancer cells that have broken away from the main tumour before your operation. In this situation it is known as 'adjuvant' treatment.

Chemotherapy may sometimes be given at the same time (concurrently) as radiotherapy. This is known as chemoradiation. It can make the radiotherapy more effective but can also increase the side effects that you may have.

## How chemo kills cancer cells

Chemotherapy drugs damage cells that are dividing. Body tissues are made of billions of individual cells. Once we are fully-grown, most of the body's cells are not dividing. They spend most of their time in a resting state and only divide if they need to repair damage. When cells divide they split into two, identical new cells. Cells in the process of dividing are more at risk of being damaged by chemotherapy. And cancer cells divide much, much more often than most normal cells. There is more detailed information about how normal cells grow and about how cancer cells differ from normal cells in the About Cancer section of CancerHelp UK. So when an individual cell divides, there are 2 and these divide to make 4 and then 8 and so on. This is how

tumours grow and form lumps. Chemotherapy damages part of the control centre inside each cell that makes cells divide. Or it interrupts the chemical processes involved in cell division. The damaged cells then die.

### How chemotherapy kills dividing cells

Chemotherapy damages cells as they divide. In the centre of each living cell is a dark blob, called the nucleus. The nucleus is the control centre of the cell. It contains chromosomes, which are made up of genes. These genes have to be copied exactly each time a cell divides into 2 to make new cells.

Chemotherapy damages the genes inside the nucleus of cells. Some drugs damage cells at the point of splitting. Some damage them while they are busy making copies of all their genes before they split. Cells that are at rest (most normal cells, for instance) are much less likely to be damaged by chemo. You may have a combination of different chemotherapy drugs. The combination will include chemo drugs that damage cells at different stages in the process of cell division. With more than one type of drug, there is more chance of killing more cells.

The fact that chemo drugs kill dividing cells helps to explain why chemotherapy causes side effects. It affects healthy body tissues where the cells are constantly growing and dividing. The skin, bone marrow, hair follicles and lining of the digestive system are examples of these. Your hair is always growing. Your bone marrow is constantly producing blood cells. The cells of your skin and the lining of your digestive system are constantly renewing themselves. These tissues have dividing cells and they can be damaged by chemotherapy.

But, normal cells can replace the healthy cells that are damaged by chemotherapy. So the damage to healthy cells doesn't usually last. Most side effects disappear once your treatment is over, and many only occur for the days while you are actually having the drugs (for example, sickness or diarrhoea). The section on chemotherapy side effects goes into this in more detail.

## Will chemotherapy cure me?

The chance of the chemotherapy curing your cancer depends on the type of cancer you have

With some types of cancer, most people are cured by chemotherapy  
With other types of cancer, fewer people are completely cured  
Examples of cancers that respond particularly well to chemotherapy are testicular cancer and Hodgkin's lymphoma.

With some cancers, chemotherapy can't cure the cancer on its own. But it can help in combination with other types of treatment. Many people with breast or bowel cancer, for example, have chemotherapy after surgery to help lower the risk of the cancer coming back.

With some cancers, if a cure is unlikely, your doctor may still suggest chemotherapy to

- shrink the cancer
- relieve your symptoms
- give you a longer life by controlling the cancer or putting it into remission

## What does 'remission' mean?

Remission is a word doctors often use when talking about cancer. It means there is no sign of the cancer. Doctors can be reluctant to say that a cancer is 'cured' because some cancers can come back years later. The more time that goes by, the less likely it is that a cancer will come back. But there is still that small chance. So doctors use the word 'remission'. You may hear your doctor talk about complete remission and partial remission. Complete remission means that the cancer can't be detected on scans, X-rays, or blood tests etc.

Partial remission means the treatment has killed some of the cells, but not all. The cancer has shrunk, but can still be seen on scans and doesn't appear to be growing. The treatment may have stopped the cancer from growing. Or made it smaller so that other treatments are more likely to help, such as surgery or radiotherapy.