

What is
Testicular Cancer?

Let us answer some
of your questions.

Testicular cancer

An ESMO guide for patients

Patient information based on ESMO Clinical Practice Guidelines

This guide has been prepared to help you, as well as your friends, family and caregivers, better understand testicular cancer and its treatment. It contains information on the causes of the disease and how it is diagnosed, up-to-date guidance on the types of treatments that may be available and any possible side effects of treatment.

The medical information described in this document is based on the ESMO Clinical Practice Guideline for testicular cancer, which is designed to help clinicians with the diagnosis and management of testicular cancer. All ESMO Clinical Practice Guidelines are prepared and reviewed by leading experts using evidence gained from the latest clinical trials, research and expert opinion.

The information included in this guide is not intended as a replacement for your doctor's advice. Your doctor knows your full medical history and will help guide you regarding the best treatment for you.

Words highlighted in **colour** are defined in the glossary at the end of the document.

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Testicular cancer: A summary of key information

This summary is an overview of the key information provided within the testicular cancer guide. The following information will be discussed in detail in the main pages of the guide.

Introduction to testicular cancer

- Testicular cancer forms in the cells of the testicles. Most begin in the cells that make sperm and are known as **germ cell tumours**. There are two main types of testicular cancer: **seminoma** and **non-seminoma**.
- **Seminomas** consist of one type of cancer cell whereas **non-seminomas** typically involve a mixture of cell types.
- Other types of testicular cancer exist but are very rare and are not covered in this guide.
- Testicular cancer mostly affects men aged between 15 and 40 years.

Diagnosis of testicular cancer

- Testicular cancer may have no symptoms, but may include a lump, pain or swelling in the testicle or a feeling of heaviness in the **scrotum**.
- A diagnosis of testicular cancer is usually based on the results of a clinical examination of your testicles, a blood test to check the levels of specific **tumour biomarkers (lactate dehydrogenase [LDH], human chorionic gonadotrophin [hCG] and alpha fetoprotein [AFP])**, and an **ultrasound** scan of the testicles.
- A definite diagnosis can only be made once the lump has been examined under a microscope. This means that the lump must be removed by surgery. Usually, the whole testicle is removed (**orchietomy**).

Treatment options for testicular cancer

- Treatment of testicular cancer depends on the type of tumour (**seminoma** or **non-seminoma**), staging of the tumour and risk assessment.
- Treatment options include: surgery (**orchietomy**, nerve-sparing **retroperitoneal lymph node dissection [RPLND]**), **surveillance**, **chemotherapy** and **radiotherapy**.

Seminoma: Stage I

- Following **orchietomy**, most patients with Stage I **seminoma** undergo **surveillance**.
- Some patients with a higher risk of **recurrence** may receive one course of **chemotherapy** with **carboplatin**, or one course of **radiotherapy**.

Seminoma: Stage IIA

- Following **orchietomy**, patients with Stage IIA **seminoma** are typically offered **radiotherapy** or **chemotherapy** with three cycles of **bleomycin**, **etoposide** and **cisplatin (BEP)**, or four cycles of **etoposide** and **cisplatin (EP)** if **BEP** is unsuitable.

Seminoma: Stage IIB/C

- Patients with Stage IIB and IIC **seminoma** are usually treated with three cycles of **BEP** following **orchiectomy**, or four cycles of **EP** if **BEP** is unsuitable.
- **Radiotherapy** to abdominal and pelvic **lymph nodes** is an alternative option.

Seminoma: Stage III

- **Chemotherapy** with **BEP** is the standard treatment for Stage III **seminoma** following **orchiectomy**.
- Patients with a good **prognosis** receive three cycles of **BEP** whereas patients with intermediate **prognosis** receive four cycles.
- **Etoposide**, **ifosfamide** and **cisplatin (VIP)** is an alternative **chemotherapy** option if **BEP** is not suitable.

Non-seminoma: Stage I

- Most patients with Stage I **non-seminoma** who are at low risk of **recurrence** undergo **surveillance** following **orchiectomy**.
- Patients at high risk of **recurrence** may undergo **surveillance** or receive one cycle of **chemotherapy** with **BEP**.
- Patients with rising levels of **tumour biomarkers** after **orchiectomy** may receive three cycles of **BEP**. Four cycles of **EP** or **VIP** are alternatives for patients who are unsuitable for **BEP**.

Non-seminoma: Stage II/III

- Patients with Stage II or III **non-seminoma** and a good **prognosis** are typically treated with three cycles of **BEP** or four cycles of **EP**.
- Patients with Stage IIA **non-seminoma** may be offered nerve-sparing **RPLND** if their **biomarker** levels are normal.
- Intermediate and poor **prognosis** patients usually receive four cycles of either **BEP** or **VIP**.

Recurrent testicular cancer

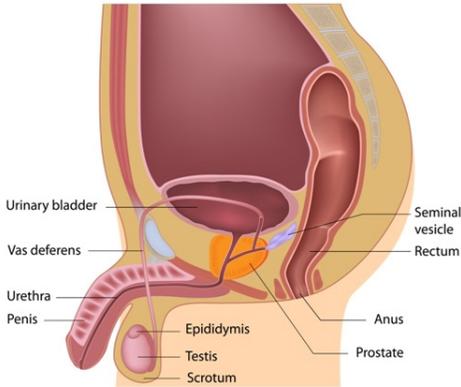
- **Radiotherapy** or **chemotherapy** may be used to treat a recurrence. Surgery may also be an option if the recurrence is a single **tumour**.

Follow-up after treatment

- Your doctor will arrange follow-up appointments to ensure that any **recurrence** or late toxicity are diagnosed and treated quickly.
- The recommended frequency of follow-up appointments depends on the type and stage of testicular cancer at diagnosis, treatment received and time since treatment was completed.
- Typical follow-up appointments include a blood test to monitor **biomarker** levels, an abdominal **computed tomography (CT)** or **magnetic resonance imaging (MRI)** scan and a chest **x-ray**.
- Support groups can help patients and their families to better understand testicular cancer, and to learn how to cope with all aspects of the disease, from diagnosis to long-term physical and emotional effects.

What are the testicles?

The testicles are two small oval organs located below the penis in men. They are contained within a pouch of skin called the **scrotum**. The testicles produce sperm and the male **hormone testosterone**.



Anatomy of the male reproductive organs showing the position of the testicles.

What is testicular cancer?

Testicular cancer is a cancer that forms in the cells of the testicles. Most testicular cancers begin in the cells that make sperm (also known as **germ cells**) – these cancers are known as **germ cell tumours**. Other types of testicular cancer exist but are very rare. This guide focuses on the management of testicular **germ cell tumours** only – referred to as testicular cancer for the remainder of this guide.

What are the different types of testicular cancer?

There are two main types of testicular cancer, **seminoma** and **non-seminoma**, which each account for approximately half of testicular cancers (*Oldenburg et al., 2013*). **Seminomas** consist of one type of cancer cell derived from a gonadal **stem cell**, whereas **non-seminomas** typically involve a mixture of cell types, including **teratoma**, **embryonal carcinoma**, **choriocarcinoma** and **yolk sac tumours**.



Most testicular cancers are germ cell tumours and are categorised as seminoma or non-seminoma

Testicular cancer may also be classified according to how far the disease has spread:

Stage I testicular cancer

Stage I testicular cancer means that the cancer is completely contained within the testicle and has not spread anywhere else in the body. Stage I testicular cancer is further divided into Stages IA, IB and IS according to the size of the tumour and the levels of **tumour biomarkers** (**lactate dehydrogenase [LDH]**, **human chorionic gonadotrophin [hCG]** and **alpha fetoprotein [AFP]**) circulating in the blood (see Staging section for more details).

Stage II testicular cancer

Stage II testicular cancer means that the cancer has spread beyond the testicle into nearby **lymph nodes** in the abdomen or pelvis. Stage II testicular cancer is further divided into Stages IIA, IIB and IIC, depending on the size of the affected lymph nodes and the levels of **tumour biomarkers** in the blood (see Staging section for more details).

Stage III testicular cancer

Stage III testicular cancer means that the cancer has spread beyond the testicle into **lymph nodes** or other organs. Stage III testicular cancer is further divided into Stages IIIA, IIIB and IIIC, depending on where the cancer has spread to and the levels of **tumour biomarkers** in the blood (see Staging section for more details).

What are the symptoms of testicular cancer?

There may be no symptoms of testicular cancer. However, if there are symptoms, they may include:

- A lump or swelling in the testicle.
- A feeling of heaviness in the **scrotum**.
- Pain or discomfort in a testicle or the **scrotum**.

Backache or pain in the lower abdomen can occur if the cancer has spread into **lymph nodes** at the back of the abdomen. Symptoms in other parts of the body, such as the lungs, pelvis or brain may also occur if the cancer has spread beyond the testicle. You should see your doctor if you experience any of these symptoms. However, it is important to remember that these symptoms may also occur in people who do not have testicular cancer; they could be caused by other conditions such as infections.



Any changes in a testicle should be checked by a doctor

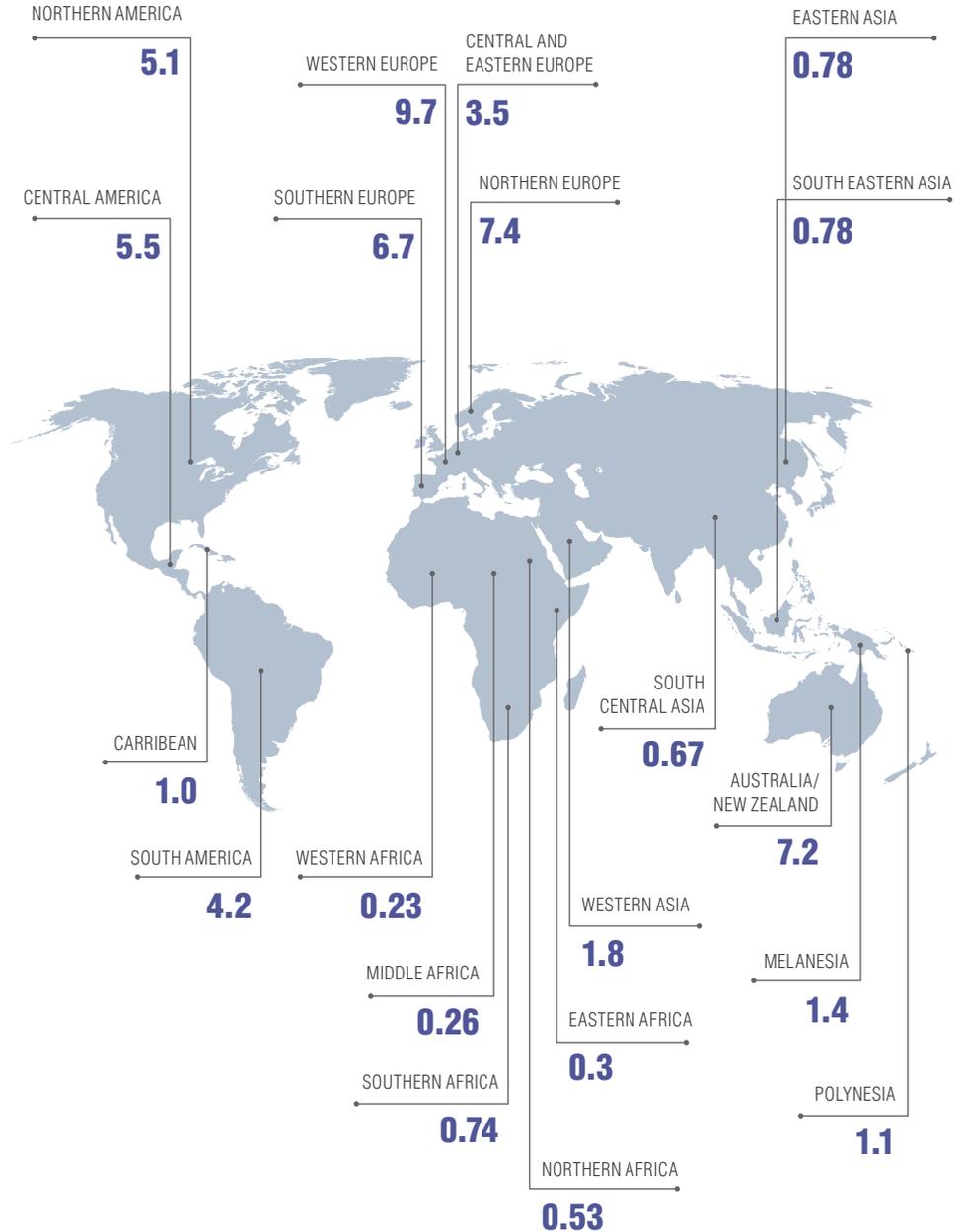
How common is testicular cancer?

Testicular cancer is most common in younger men

Testicular cancer mostly affects men aged between 15 and 40 years (*Oldenburg et al., 2013*). It is a rare cancer, with the highest incidences reported in Western Europe, Northern Europe and Australia/New Zealand. The lowest incidences are in Africa and South Central Asia (*Ferlay et al., 2018*).

Testicular cancer

The map shows estimated numbers of new cases of testicular cancer diagnosed in 2018 per 100,000 people of each region's population (Ferlay et al., 2018).



What causes testicular cancer?

The causes of testicular cancer are not known, but several **risk factors** for developing testicular cancer have been identified. It is important to remember that having a **risk factor** increases the risk of cancer developing but it does not mean that you will definitely get cancer. Likewise, not having a **risk factor** does not mean that you definitely won't get cancer.



The precise causes of testicular cancer are not known

FACTORS THAT MAY INCREASE RISK

| |
|---|
| Undescended testicle(s) |
| Abnormal cells in the testicle |
| Fertility problems |
| Personal or family history of testicular cancer |
| Hypospadias |
| Inguinal hernia |
| HIV or AIDS |
| Race (being Caucasian [White]) |
| Testicular microlithiasis |
| Being tall |

*There are various **risk factors** associated with developing testicular cancer although each factor may not apply to every man who develops the disease.*

Family history is more relevant for testicular cancer than for many other cancers. The risk of testicular cancer is higher if a first-degree relative (i.e. father, brother or son) is affected, with the highest risk seen when a twin brother or two family members are affected (*Honecker et al., 2018*). Individuals classified as being at higher risk of developing testicular cancer based on family history should undertake regular self-examinations to check for any lumps in the testicles.

How is testicular cancer diagnosed?

A diagnosis of testicular cancer is based on the results of the following examinations and tests:

Clinical examination

If you have symptoms of testicular cancer, your doctor may carry out a clinical examination to check your testicles.

Biomarker blood test

Your doctor may recommend that you have a blood test to check the levels of **tumour biomarkers** in your blood. Testicular **tumours** can produce three **biomarkers**: **AFP**, **HCG** and **LDH**. However, it is important to understand that not all testicular cancers result in high levels of these **biomarkers**.



Clinical examination and a blood test can indicate if testicular cancer might be present, but further tests are needed for a definite diagnosis

Imaging

Your doctor may recommend that you have an **ultrasound** scan to check whether a testicular lump is solid or a fluid-filled cyst that is less likely to be cancer. A handheld **ultrasound** scanner is placed onto the skin of the **scrotum** and produces sound waves to create a clear picture of the testicles. If the ultrasound scan does not show whether the lump is testicular cancer or not, then your doctor may recommend a **magnetic resonance imaging (MRI)** scan. **MRI** uses magnetic fields and radio waves to produce detailed images of the inside of the body.

Orchiectomy

The tests outlined above will give your doctor a good idea of whether or not you have testicular cancer. However, a definite diagnosis can only be made once the lump has been examined under a microscope. This means that the lump must be removed by surgery. Usually, the whole testicle is removed – this is called an **orchiectomy**. The surgeon may also remove nearby **lymph nodes** and a **gland** called the **seminal vesicle**. All of the removed tissue will be sent to a laboratory for examination. In some patients, a **biopsy** may be taken from the other testicle to check for any early signs of cancer (Honecker et al., 2018).



A diagnosis of testicular cancer can only be confirmed once the lump is removed and analysed

How will my treatment be determined?

Your treatment will depend on the staging of your cancer and risk assessment.

Staging

Staging of the cancer is used to describe its size and position and whether it has spread from where it started. For testicular cancer, staging is usually based on examination of the removed tissue, a **computed tomography (CT)** scan and blood levels of the **tumour biomarkers AFP, HCG and LDH** (Oldenburg et al., 2013).

A **CT** scan is a type of **x-ray** technique that lets doctors see your internal organs in cross-section. If you are diagnosed with testicular cancer, you will usually have a **CT** scan of your abdomen and pelvis to check if the cancer has spread. You may also have a **CT** scan of your lungs. Some patients with advanced testicular cancer might have an **MRI** scan of the **central nervous system** to check for brain **metastases** (Oldenburg et al., 2013).



After diagnosis, imaging scans can show if the cancer has spread to other parts of the body

Staging to determine the size and spread of the cancer is described using a sequence of letters and numbers. For testicular cancer, there are three stages designated with Roman numerals I to III. Generally, the lower the stage, the better the outcome (or **prognosis**) for the patient. Staging for testicular cancer considers:

- Whether the cancer has spread to abdominal **lymph nodes**.
- How large the abdominal **lymph node metastases** are.
- Whether the cancer has spread to distant sites.
- Blood levels of **AFP, HCG and LDH** – these are categorised as S0 (normal), S1 (slightly raised), S2 (moderately raised) or S3 (very high).

Staging helps to determine the most appropriate treatment for testicular cancer

Testicular cancer

The stage grouping system for testicular cancer is described in the table below (Oldenburg et al., 2017). This may seem complicated but your doctor will be able to explain which parts of this table correspond to your cancer.

| | | |
|------------------|-------------|---|
| Stage I | | <ul style="list-style-type: none"> • Cancer is confined to the testicle |
| Stage II | IIA | <ul style="list-style-type: none"> • Abdominal lymph node metastases are present (<2 cm in diameter) |
| | IIB | <ul style="list-style-type: none"> • Abdominal lymph node metastases are present (2-5 cm in diameter) |
| | IIC | <ul style="list-style-type: none"> • Abdominal lymph node metastases are present (>5 cm in diameter) |
| Stage III | IIIA | <ul style="list-style-type: none"> • Metastases are present in distant lymph nodes or in the lungs and biomarker levels are S0 or S1 |
| | IIIB | <ul style="list-style-type: none"> • Metastases are present in nearby lymph nodes, distant lymph nodes or in the lungs and biomarker levels are S2 |
| | IIIC | <ul style="list-style-type: none"> • Metastases are present in nearby lymph nodes, distant lymph nodes or in the lungs and biomarker levels are S3 • Metastases are present in other distant sites, such as the liver or brain |

Stage grouping system for testicular cancer.

Doctors use the staging information to classify testicular cancer into good, intermediate or poor **prognosis** groups. The **prognosis** groups for testicular cancer are described in the table below (Oldenburg et al., 2017). Your doctor will be able to explain which **prognosis** group corresponds to your cancer.

| Type of testicular cancer | Prognostic group | Criteria |
|---------------------------|---------------------|--|
| Seminoma | Good | <ul style="list-style-type: none"> • No metastases found in other organs* • Normal (S0) AFP levels |
| | Intermediate | <ul style="list-style-type: none"> • Metastases present in other organs* • Normal (S0) AFP levels |
| | Poor | <ul style="list-style-type: none"> • No patients with seminoma are classified as poor prognosis |
| Non-seminoma | Good | <ul style="list-style-type: none"> • No metastases found in other organs* • Biomarker levels are S0 or S1 |
| | Intermediate | <ul style="list-style-type: none"> • No metastases found in other organs* • One or more of the three biomarker levels are S2 |
| | Poor | <ul style="list-style-type: none"> • Metastases present in other organs*, OR • One of the three biomarker levels are S3 |

* **Metastases** in the lungs are not considered in this assessment

What are the treatment options for testicular cancer after an orchiectomy?

Most cases of testicular cancer can be cured. After undergoing an **orchiectomy**, your treatment will depend upon the type and stage of the **tumour**, as well as your general health and level of fitness. The choice of treatments will be discussed with you and your preferences will be taken into account. Your treatment will be discussed by a **multidisciplinary team**, which means that experts in different areas of cancer treatment (e.g. surgeons, urologists, oncologists, radiotherapists and nurses) come together to share their expertise in order to provide the best patient care.



It is important that patients are fully involved in the treatment decision-making – when there are several treatments available, doctors should involve patients in making decisions about their care so that they can choose the care that meets their needs and reflects what is important to them. This is called ‘shared decision-making’.

It is important that patients are fully involved in discussions and decisions about their treatment

Your doctor will be happy to answer any questions you have about your treatment. Three simple questions that may be helpful when talking with your doctor or any healthcare professional involved in your care are:

- What treatment options do I have?
- What are the possible advantages and disadvantages of these options?
- How likely am I to experience these advantages and disadvantages?

Following **orchiectomy**, your doctor may recommend one or more of the following approaches:

Surveillance

Surveillance involves close monitoring of your health following **orchidectomy**, with no immediate additional treatment. **Surveillance** is used in patients who are considered to be at low risk of the cancer coming back (**recurrence**). Regular tests check for early signs of **recurrence** so that it can be diagnosed and treated early. During **surveillance**, doctors will check your other testicle, test your blood **biomarker** levels and send you for chest **x-rays** and **CT** scans.

For early-stage testicular cancer, there is often no immediate treatment following orchidectomy

Chemotherapy

Chemotherapy destroys cancer cells and is widely used in the treatment of testicular cancer. **Adjuvant chemotherapy** (after **orchidectomy**) is given in patients considered to be at risk of **recurrence** after surgery.

Chemotherapy may also be given before **orchidectomy** in some patients with high **biomarker** levels who are very sick at initial diagnosis.

Chemotherapy agents and **regimens** used in the treatment of testicular cancer include (Oldenburg et al., 2013):



- **Carboplatin**
- A combination of **bleomycin, etoposide** and **cisplatin** (commonly known as **BEP**)
- A combination of **etoposide** and **cisplatin** (commonly known as **EP**)
- A combination of **etoposide, ifosfamide** and **cisplatin** (commonly known as **VIP**)
- A combination of **paclitaxel, ifosfamide** and **cisplatin** (commonly known as **TIP**)
- A combination of **vinblastine, ifosfamide** and **cisplatin** (commonly known as **VeIP**)
- A combination of **paclitaxel, ifosfamide, carboplatin** and **etoposide** (commonly known as **TI-CE**)
- A combination of **carboplatin** and **etoposide** (commonly known as **CE**)

Chemotherapy is widely used in the treatment of testicular cancer

Radiotherapy

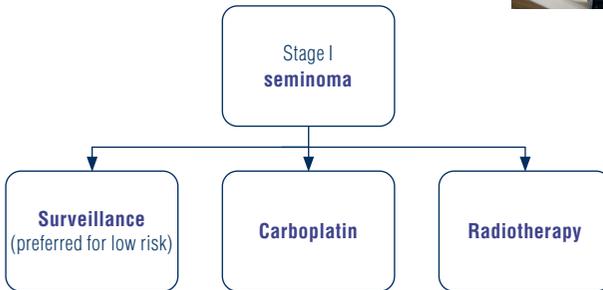
Radiotherapy uses **ionising radiation** to damage the deoxyribose nucleic acid (**DNA**) of cancerous cells, causing them to die. **Radiotherapy** to **lymph nodes** may be used to reduce the risk of testicular cancer returning, or to treat patients who are unsuitable for **chemotherapy**.

What are the treatment options for seminoma?

Treatment for **seminoma** after orchiectomy is determined by the stage of the cancer:

Stage I seminoma

Following **orchiectomy**, most patients with Stage I **seminoma** undergo **surveillance**. Some patients who are considered to be at an elevated risk of **recurrence** might be offered one course of **chemotherapy** with **carboplatin**, or one course of **radiotherapy**. In these patients, **carboplatin** and **radiotherapy** are believed to be equally effective, but **radiotherapy** may result in more side effects (Oldenburg et al., 2013).



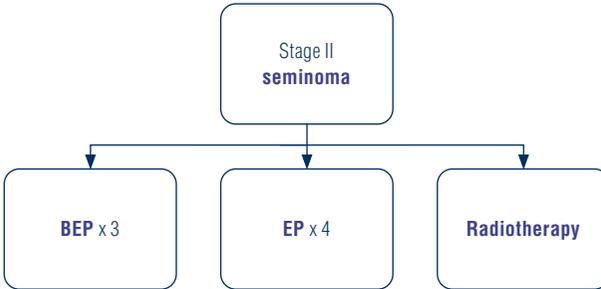
*Treatment options for Stage I **seminoma** following **orchiectomy***

Stage IIA seminoma

Patients with Stage IIA **seminoma** are typically offered **chemotherapy** with three cycles of **BEP** or four cycles of **EP** if **BEP** is unsuitable. Alternatively, **radiotherapy** to the abdominal and pelvic **lymph nodes** may be offered (Oldenburg et al., 2013).

Stage IIB and IIC seminoma

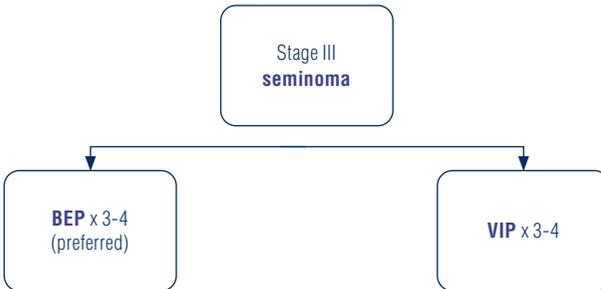
Stage IIB and IIC **seminoma** are usually treated with three cycles of **BEP** following **orchidectomy**. Patients who are not able to tolerate **bleomycin** are usually offered four cycles of **EP**. **Radiotherapy** to abdominal and pelvic **lymph nodes** is given to patients who are unsuitable for **chemotherapy** (Oldenburg et al., 2013).



Treatment options for Stage II **seminoma** following **orchidectomy**

Stage III seminoma

Adjuvant chemotherapy with **BEP** is the standard treatment for Stage III **seminoma**. Patients with a good **prognosis** will typically receive three cycles of **BEP**, whereas patients with intermediate **prognosis** receive four cycles. **VIP** is an alternative **chemotherapy** option if **BEP** is not suitable (Oldenburg et al., 2013).



Treatment options for Stage III **seminoma** following **orchidectomy**

BEP is the standard adjuvant chemotherapy regimen for patients with seminoma

Treatment of residual disease

If there is evidence of cancer remaining after the treatments outlined above, the **tumour** may be **biopsied** or removed if it is larger than 3 cm in diameter. Patients with residual **tumours** smaller than 3 cm typically undergo **surveillance** or further investigation with a **positron emission tomography (PET)** scan (*Oldenburg et al., 2013*).

What are the treatment options for non-seminoma?

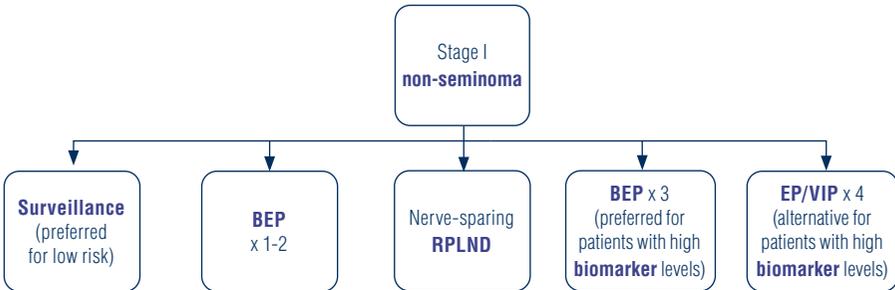
Treatment for **non-seminoma** after **orchidectomy** is determined by the stage of the cancer:

Stage I non-seminoma

Surveillance is the standard post-**orchidectomy** strategy in patients with Stage I **non-seminoma** who are considered to be at low risk of **recurrence**. If **surveillance** is not possible, **adjuvant chemotherapy** with one cycle of **BEP** may be given (Oldenburg et al., 2013). Alternatively, a procedure called nerve-sparing **retroperitoneal lymph node dissection (RPLND)** may be an option – this involves removal of any large **lymph nodes** in the back of the abdomen (called the **retroperitoneal lymph nodes**) while preserving the nerves that allow the patient to ejaculate (Oldenburg et al., 2013).

Patients with Stage I **non-seminoma** who are considered to be at high risk of **recurrence** may undergo **surveillance** or receive one or two cycles of **chemotherapy** with **BEP**. Nerve-sparing **RPLND** may be an option for patients unsuitable for **surveillance** or **chemotherapy** (Oldenburg et al., 2013).

Patients with Stage I **non-seminoma** who have rising levels of **biomarkers** after **orchidectomy** may receive three cycles of **BEP**. Four cycles of **EP** or **VIP** are alternative options for patients who are unsuitable for **BEP** (Oldenburg et al., 2013).

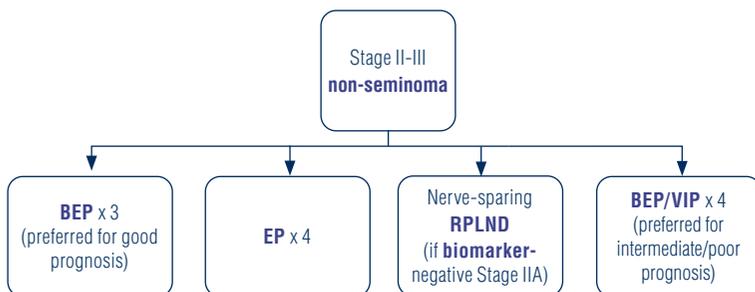


Treatment options for Stage I **non-seminoma** following **orchidectomy**

Treatment for non-seminoma is determined by the stage of the cancer and risk assessment

Stage II and III non-seminoma

Stage II and Stage III **non-seminoma** with good **prognosis** are typically treated with three cycles of **BEP** or four cycles of **EP**. Patients with Stage IIA **non-seminoma** may be offered nerve-sparing **RPLND** if their **biomarker** levels are normal. Intermediate and poor **prognosis** patients usually receive four cycles of either **BEP** or **VIP** (*Oldenburg et al., 2013*).



Treatment options for Stage II-III non-seminoma following orchiectomy

Treatment of residual disease

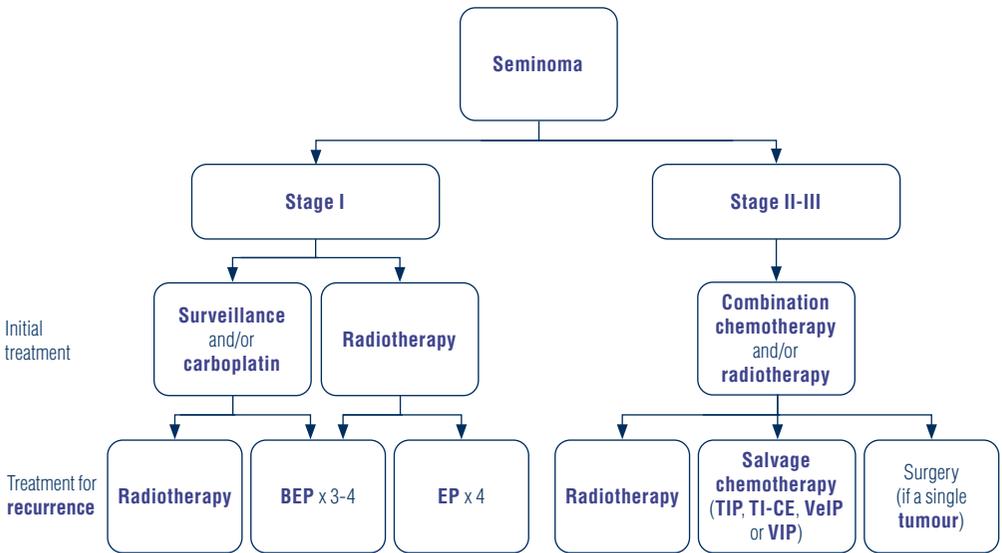
If there is evidence of cancer remaining in any organs after the treatments outlined above, the **tumour(s)** may be removed by surgery. Any **lymph nodes** larger than 1 cm in diameter after initial treatment should also be removed by nerve-sparing **RPLND**. However, patients with normal biomarker levels, no residual cancer and **lymph nodes** smaller than 1 cm after initial treatment do not require any further treatment (*Oldenburg et al., 2013*).

What are the treatment options for testicular cancer that returns after treatment?

Seminoma

Patients with Stage I **seminoma** who experience a **recurrence** after **surveillance** and/or **carboplatin** treatment may be offered **radiotherapy** or **chemotherapy** with three or four cycles of **BEP**. **Recurrences** after **first-line radiotherapy** treatment are typically treated with three cycles of **BEP** or four cycles of **EP** (Oldenburg et al., 2013).

Recurrences after **first-line chemotherapy** for Stage II and III **seminoma** may be treated with **salvage chemotherapy** (options may include **TIP**, **TI-CE**, **VeIP** or **VIP**), **radiotherapy** or surgery if the **recurrence** is a single **tumour** (Oldenburg et al., 2013).



Treatment options for **recurrence** in patients with **seminoma**.

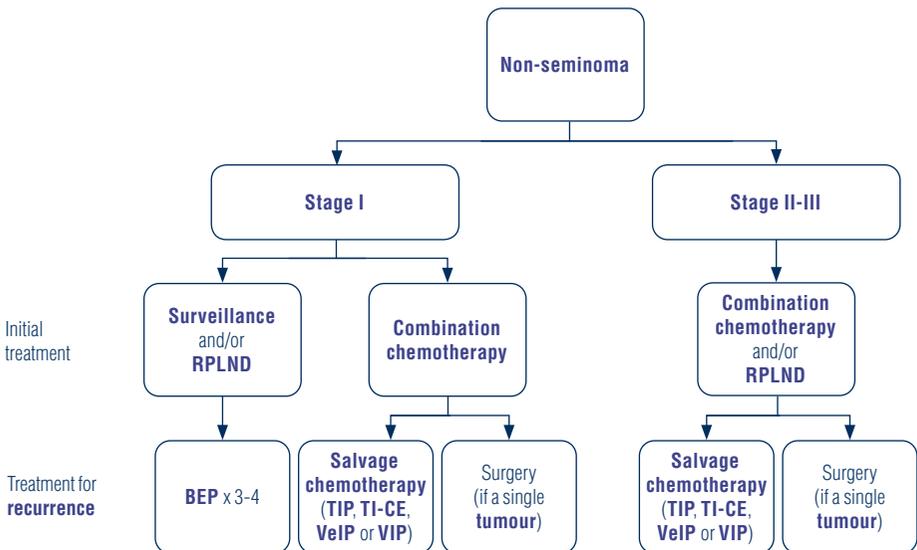
Non-seminoma

Patients with Stage I **non-seminoma** who experience a **recurrence** after **surveillance** and/or **RPLND** may receive three or four cycles of **BEP**. **Recurrences** after **first-line chemotherapy** may be treated with **salvage chemotherapy** or surgery if the **recurrence** is a **single tumour** (Oldenburg *et al.*, 2013).

Recurrences after **first-line** treatment for Stage II and III **non-seminoma** may be treated with **salvage chemotherapy** or surgery if the **recurrence** is a **single tumour** (Oldenburg *et al.*, 2013).

Testicular cancer recurrences can usually be treated with chemotherapy

Patients who do not respond to **salvage** treatment may be offered further individualised treatment and are enrolled in **clinical trials** whenever possible (Oldenburg *et al.*, 2013).



Treatment options for **recurrence** in patients with **non-seminoma**.

Clinical trials

Your doctor may ask you whether you would like to take part in a **clinical trial**. This is a research study conducted with patients in order to (*ClinicalTrials.gov, 2017*):

- Test new treatments.
- Look at new combinations of existing treatments or change the way they are given to make them more effective or reduce side effects.
- Compare the effectiveness of drugs used to control symptoms.
- Find out how cancer treatments work.



Clinical trials help to improve knowledge about cancer and develop new treatments, and there can be many benefits to taking part. You would be carefully monitored during and after the study and the new treatment may offer benefits over existing therapies. It's important to bear in mind, however, that some new treatments are found not to be as good as existing treatments or to have side effects that outweigh the benefits (*ClinicalTrials.gov, 2017*).

Clinical trials help to improve knowledge about diseases and develop new treatments – there can be many benefits to taking part

As most patients with testicular cancer are cured with currently-available treatments, the number of **clinical trials** available is much lower than for other types of cancer. However, **clinical trials** are ongoing in order to further improve treatment options available in the following key situations:

- Identifying the least toxic method to treat early-stage, low-risk testicular cancer.
- Identifying the most effective high-dose chemotherapy regimen for patients with high-risk testicular cancer.
- Identifying new treatment options (e.g. **immunotherapy**) for patients with recurrent testicular cancer.

You have the right to accept or refuse participation in a **clinical trial** without any consequences for the quality of your treatment. If your doctor does not ask you about taking part in a **clinical trial** and you want to find out more about this option, you can ask your doctor if there is a trial for your type of cancer taking place nearby (*ClinicalTrials.gov, 2017*).

Supplementary interventions

Patients may find that supplementary care helps them to cope with their diagnosis, treatment and the long-term effects of testicular cancer

Over the course of disease, anti-cancer treatments should be supplemented with interventions that aim to prevent the complications of disease and treatment, and to maximise your quality of life. These interventions may include supportive, **palliative**, survivorship and end-of-life care, which should all be coordinated by a **multidisciplinary team** (Jordan et al., 2018). Ask your doctor or nurse about which supplementary interventions are available; you and your family may receive support from several sources, such as a dietician, social worker, priest or occupational therapist

Supportive care

Supportive care involves the management of cancer symptoms and the side effects of therapy. Supportive care for men with testicular cancer may include **sperm banking**, and treatment for the side effects of **chemotherapy**.

Palliative care

Palliative care is a term used to describe care interventions in advanced disease, including the management of symptoms as well as support for coping with **prognosis**, making difficult decisions and preparation for end-of-life care. **Palliative** care in men with testicular cancer may include treatment for pain, diarrhoea, nutritional problems and bedsores.

Survivorship care

Support for patients surviving cancer includes social support, education about the disease and rehabilitation. For example, psychological support can help you to cope with any worries or fears.

Psychosocial problems impacting your quality of life may include concerns about body image, fertility and the long-term effects of your treatment. Patients often find that social support is essential for coping with the cancer diagnosis, treatment and the emotional consequences. A survivor care plan can help you to recover wellbeing in your personal, professional and social life. For further information and advice on survivorship, see ESMO's patient guide on survivorship (<https://www.esmo.org/for-patients/patient-guides/survivorship>).



End-of-life care

End-of-life care for patients with incurable cancer primarily focusses on making the patient comfortable and providing adequate relief of physical and psychological symptoms, for example **palliative** sedation to induce unconsciousness can relieve severe pain, **dyspnoea**, delirium or convulsions (*Cherny, 2014*). Discussions about end-of-life care can be very distressing, but support should always be available to you and your family at this time.

What are the possible side effects of treatment?

As with any medical treatment, you may experience side effects from your anti-cancer treatment. The most common side effects for each type of treatment are highlighted below, along with some information on how they can be managed. You may experience side effects other than those discussed here. It is important to talk to your doctor about any potential side effects that are worrying you.

Doctors classify side effects from any cancer therapy by assigning each event a 'grade', on a scale of 1–4, by increasing severity. In general, grade 1 side effects are considered to be mild, grade 2 moderate, grade 3 severe and grade 4 very severe. However, the precise criteria used to assign a grade to a specific side effect varies depending on which side effect is being considered. The aim is always to identify and address any side effect before it becomes severe, so you should always report any worrying symptoms to your doctor as soon as possible.



It is important to talk to your doctor about any treatment-related side effects that are worrying you

Fatigue is very common in patients undergoing cancer treatment and can result from either the cancer itself or the treatments. Your doctor can provide you with strategies to limit the impact of **fatigue**, including getting enough sleep, eating healthily and staying active (*Cancer.Net, 2017*). Loss of appetite and weight loss can also arise due to the cancer itself or the treatments. Significant weight loss, involving loss of both fat and muscle tissue, can lead to weakness, reduced mobility and loss of independence, as well as anxiety and depression (*Escamilla and Jarrett, 2016*). Your doctor may refer you to a dietician who can look at your nutritional needs and advise you on your diet and any supplements that you might need.

Surgery

Following **orchietomy**, you may experience discomfort in your groin and scrotum for a week or so. Most men can go back to their normal activities after 2 weeks but heavy lifting and strenuous exercise should be avoided for longer. Most men who have had one testicle removed will still be able to have erections after **orchietomy** and most will be able to have children. If both testicles are removed, you will need **testosterone** replacement therapy to preserve your sex drive and ability to get an erection. Your doctor will also ask you if you would like to collect and store sperm (**sperm banking**) before surgery to allow you the option to have children (the effects of testicular cancer treatment on fertility are discussed later in this guide).

Radiotherapy

Common side effects of **radiotherapy** after **orchidectomy** include **fatigue**, redness of the skin (like mild sunburn) in the treatment area, nausea/vomiting and diarrhoea.

Fatigue from radiotherapy usually starts during treatment and last for about a week after you have finished treatment. Staying active can help.

Nausea/vomiting from **radiotherapy** is usually mild. However, you can ask your doctor or nurse for anti-sickness tablets to help with this. If you don't feel like eating, you can try a high calorie food supplement drink to help ensure you are still getting enough nutrition.

Diarrhoea from **radiotherapy** is also usually mild and you may not experience it at all. If you do have diarrhoea, it is important to ensure you drink plenty of fluids to avoid becoming dehydrated. A low-fibre diet can also help. Your doctor or nurse may be able to give you medications to help slow down your bowel.

Radiotherapy for testicular cancer does not usually make you infertile since a lead shield is used to protect your remaining testicle from the **radiotherapy** beams. However, there is a small chance that the healthy testicle may get a dose of radiation which could cause temporary sperm damage. To avoid any possible risk of birth abnormalities, you should not try to conceive during treatment or for up to a year after your treatment has finished. Your doctor will also ask you about **sperm banking** before your treatment begins.

Chemotherapy

Side effects from **chemotherapy** vary depending upon the drugs and the doses used – you may get some of those listed below but you are very unlikely to get all of them. You may also experience some side effects that are not listed below. The main areas of the body affected by **chemotherapy** are those where new cells are being quickly made and replaced (**bone marrow, hair follicles**, the digestive system, the lining of your mouth). Some patients find that their sense of taste is affected – changes in **enzymes** in your mouth can lead to a metallic taste and blisters. Reductions in your levels of **neutrophils** (a type of white blood cell) can lead to **neutropenia**, which can make you more susceptible to infections. Most side effects of **chemotherapy** are temporary and can be controlled with drugs or lifestyle changes – your doctor or nurse will help you to manage them (*Macmillan, 2016*). The table below lists the most important side effects of **chemotherapy** drugs used in the treatment of testicular cancer.

| CHEMOTHERAPY DRUG | POSSIBLE SIDE EFFECT | HOW THE SIDE EFFECTS MAY BE MANAGED |
|---|--|---|
| <p>Bleomycin (Bleomycin SPC, 2018)</p> | <ul style="list-style-type: none"> • Lung toxicity: interstitial pneumonitis, pulmonary fibrosis, dyspnoea • Hypersensitivity reaction / anaphylaxis • Raynaud-like phenomena • Nausea / vomiting • Decreased appetite / weight loss • Mucositis / stomatitis • Skin reactions (reddening, itching, blistering, inflammation, tenderness) • Hair loss • Decreased fertility | <ul style="list-style-type: none"> • Your lung function will be carefully monitored during treatment with bleomycin, including weekly x-rays. Let your doctor or nurse know if you experience a persistent cough or any other lung problems. Troublesome dyspnoea can be treated with drugs called opioids or benzodiazepines, and in some cases, steroids are used (<i>Kloke and Cherny, 2015</i>) • Hypersensitivity reactions are uncommon and typically occur immediately or within a few hours of treatment. Your doctor will be able to manage any signs of hypersensitivity with medications such as antihistamines and corticosteroids • You should let your doctor know if you experience any numbness or tingling in your fingers or toes (symptoms of Raynaud-like phenomena) so that he/she can help you to manage this side effect • Effects on the gastrointestinal system may lead to nausea, vomiting, loss of appetite and weight loss. Your doctor will be able to help you to prevent or manage these side effects • To prevent and treat stomatitis/mucositis you can maintain good oral hygiene using a steroid mouthwash and mild toothpaste. Steroid dental paste can be used to treat developing ulcerations. For more severe (grade 2 and above) stomatitis, your doctor may suggest lowering the dose of treatment, or delaying therapy until the stomatitis resolves, but in most cases, symptoms will be mild and will subside once you have finished treatment • Report any skin changes or itchiness to your doctor, who will help you to manage this side effect • Hair loss (alopecia) can be upsetting for many patients; your doctor will provide you with information on how to cope with this side effect. Some hospitals can provide cold caps to reduce hair loss • Treatment can cause reduced/abnormal sperm production, which can result in irreversible infertility in some patients. Advice on sperm banking should be provided by your doctor prior to starting treatment. Reliable contraception should also be used during and for at least 6 months after treatment |
| <p>Carboplatin (Carboplatin SPC, 2018)</p> | <ul style="list-style-type: none"> • Leukopenia • Anaemia • Neutropenia • Thrombocytopenia • Nausea / vomiting • Posterior Leukoencephalopathy Syndrome • Decreased fertility | <ul style="list-style-type: none"> • Your blood cell counts will be monitored frequently throughout your treatment in order to detect any neutropenia, anaemia, leukopenia or thrombocytopenia – your doctor may adjust your treatment according to test results, and will advise you on how to prevent infections • Your doctor will be able to help you prevent or manage any nausea or vomiting • Posterior Leukoencephalopathy Syndrome is associated with symptoms such as seizure, hypertension, headache, confusion and visual disturbances. However, this is a rare condition that is reversible as soon as treatment is stopped. You should let your doctor know if you experience any of these symptoms so that your doctor can decide whether to stop treatment and to help you manage these side effects • Treatment can cause reduced/abnormal sperm production, which can result in irreversible infertility in some patients. Advice on sperm banking should be provided by your doctor prior to starting treatment. Reliable contraception should also be used during and for at least 6 months after treatment |

| CHEMOTHERAPY DRUG | POSSIBLE SIDE EFFECT | HOW THE SIDE EFFECTS MAY BE MANAGED |
|---|---|---|
| <p>Cisplatin (Cisplatin SPC, 2015)</p> | <ul style="list-style-type: none"> • Anaemia • Thrombocytopenia • Leukopenia • Nausea / vomiting • Decreased appetite / weight loss • Diarrhoea • Peripheral neuropathy • Kidney disorders: kidney failure, nephrotoxicity, hyperuricaemia • Tinnitus / changes in hearing • Decreased fertility • Hyponatraemia | <ul style="list-style-type: none"> • Your blood cell counts will be monitored frequently throughout your treatment in order to detect any leukopenia, anaemia or thrombocytopenia – your doctor may adjust your treatment according to test results, and will advise you on how to prevent infections • Effects on the gastrointestinal system may lead to nausea, vomiting, diarrhoea, loss of appetite and weight loss. You should try to eat a healthy, balanced diet and drink plenty of fluids. Your doctor may also give you some medications to help prevent or manage these side effects • Report any signs of peripheral neuropathy (tingling or numbness in your hands or feet) to your doctor, who will help you to manage this side effect • You will have tests before and during treatment to check how well your kidneys are functioning. You will be asked to drink plenty of fluids to prevent your kidneys from becoming damaged • Tell your doctor if you notice any changes in your hearing or experience tinnitus. Changes in hearing are usually temporary but can occasionally be permanent • Treatment can cause reduced/abnormal sperm production, which can result in irreversible infertility in some patients, although this is uncommon. Advice on sperm banking should be provided by your doctor prior to starting treatment. Reliable contraception should also be used during and for at least 6 months after treatment • Hyponatraemia may occur as a result of changes in kidney function or diarrhoea. It is important to drink plenty of fluids and tell your doctor if you experience any lethargy or confusion (symptoms of hyponatraemia) |

| CHEMOTHERAPY DRUG | POSSIBLE SIDE EFFECT | HOW THE SIDE EFFECTS MAY BE MANAGED |
|---|---|--|
| Etoposide (Etopophos SPC, 2018) | <ul style="list-style-type: none"> • Anaemia • Neutropenia • Thrombocytopenia • Leukopenia • Nausea / vomiting • Abdominal pain • Decreased appetite • Constipation • Hypotension • Asthenia / fatigue • Hypersensitivity • Hair loss • Decreased fertility | <ul style="list-style-type: none"> • Your blood cell counts will be monitored frequently throughout your treatment in order to detect any neutropenia, anaemia, thrombocytopenia or leukopenia – your doctor may adjust your treatment according to test results, and will advise you on how to prevent infections. Report any fever to your doctor, as this may be a sign of infection • Fever or chills could be a sign of infection. You should report these symptoms to your doctor immediately so that any infection can be effectively managed • Effects on the gastrointestinal system may lead to nausea, vomiting, abdominal pain, constipation and loss of appetite. You should try to eat a healthy, balanced diet and drink plenty of fluids. Your doctor may also give you some medications to help prevent or manage these side effects • Hypotension can cause you to feel lightheaded or dizzy. You should tell your doctor if you experience these symptoms so that they can be effectively managed. You should avoid driving or operating machinery if you experience these symptoms until you have spoken to your doctor • Hypersensitivity reactions are uncommon and typically occur during or immediately after treatment. Your doctor will be able to manage any signs of hypersensitivity with medications such as antihistamines and corticosteroids • Hair loss can be upsetting for many patients; your doctor will provide you with information on how to cope with this side effect. Some hospitals can provide cold caps to reduce hair loss • Treatment can cause reduced/abnormal sperm production, which can result in decreased fertility in some patients. Advice on sperm banking should be provided by your doctor prior to starting treatment. Reliable contraception should also be used during and for at least 6 months after treatment |
| Ifosfamide (Ifosfamide SPC, 2016) | <ul style="list-style-type: none"> • Anaemia • Leukopenia • Thrombocytopenia • Agranulocytosis • Nausea / vomiting • Acute renal failure • Haemorrhagic cystitis / haematuria • Hair loss • Decreased fertility | <ul style="list-style-type: none"> • Your blood cell counts will be monitored frequently throughout your treatment in order to detect any thrombocytopenia, anaemia or leukopenia – your doctor may adjust your treatment according to test results, and will advise you on how to prevent infections. Report any fever to your doctor, as this may be a sign of infection • Your doctor will be able to help you prevent or manage any nausea or vomiting • Your kidney function will be monitored before, during and after therapy • You will be asked to drink plenty of fluids during or immediately after treatment to reduce the risk of side effects such as blood in the urine or bladder pain (symptoms of haematuria) • Hair loss can be upsetting for many patients; your doctor will provide you with information on how to cope with this side effect. Some hospitals can provide cold caps to reduce hair loss • Treatment can cause reduced/abnormal sperm production, which can result in decreased fertility in some patients. Advice on sperm banking should be provided by your doctor prior to starting treatment. Reliable contraception should also be used during and for at least 6 months after treatment |

| CHEMOTHERAPY DRUG | POSSIBLE SIDE EFFECT | HOW THE SIDE EFFECTS MAY BE MANAGED |
|---|---|--|
| <p>Paclitaxel (Paclitaxel SPC, 2018)</p> | <ul style="list-style-type: none"> • Neutropenia • Anaemia • Thrombocytopenia • Leukopenia • Peripheral neuropathy • Hypersensitivity reactions • Hypotension • Nausea / vomiting • Diarrhoea • Arthralgia / myalgia • Hair loss • Mucosal inflammation • Decreased fertility | <ul style="list-style-type: none"> • Your blood cell counts will be monitored frequently throughout your treatment in order to detect any neutropenia, leukopenia, anaemia or thrombocytopenia – your doctor may adjust your treatment according to test results and will advise you on how to prevent infections. Report any fever to your doctor, as this may be a sign of infection. Report any prolonged or unusual bleeding to your doctor as this can be a sign of thrombocytopenia • Report any signs of peripheral neuropathy (tingling or numbness in your hands or feet) to your doctor, who will help you to manage this side effect • Minor hypersensitivity reactions are very common and typically present as flushing or rash that do not require any treatment. However, you should tell your doctor if you experience any of these symptoms so that they can be effectively managed • Hypotension can cause you to feel lightheaded or dizzy. You should tell your doctor if you experience these symptoms so that they can be effectively managed. You should avoid driving or operating machinery if you experience these symptoms until you have spoken to your doctor • Effects on the gastrointestinal system may lead to nausea, vomiting or diarrhoea. You should try to eat a healthy, balanced diet and drink plenty of fluids. Your doctor may also give you some medications to help prevent or manage these side effects • To prevent and treat mucosal inflammation, try to maintain good oral hygiene using a steroid mouthwash and mild toothpaste. Steroid dental paste can be used to treat developing ulcerations. Severe (Grade 2 and above) stomatitis is rare, but if this occurs, your doctor may suggest lowering the dose of treatment or delaying therapy until the stomatitis resolves. In most cases, symptoms will subside once you have finished treatment • Let your doctor know if you experience any muscle or joint pains (symptoms of arthralgia and myalgia) so that they can decide how to manage these • Hair loss can be upsetting for many patients; your doctor will provide you with information on how to cope with this side effect. Some hospitals can provide cold caps to reduce hair loss • Treatment may cause decreased fertility in some patients. Advice on sperm banking should be provided by your doctor prior to starting treatment. Reliable contraception should also be used during and for at least 6 months after treatment |

| CHEMOTHERAPY DRUG | POSSIBLE SIDE EFFECT | HOW THE SIDE EFFECTS MAY BE MANAGED |
|---|--|--|
| Vinblastine (Vinblastine sulphate, SPC 2018) | <ul style="list-style-type: none"> • Leukopenia • Thrombocytopenia • Anaemia • Peripheral neuropathy / paraesthesia • Hypertension • Nausea / vomiting • Constipation • Diarrhoea • Blistering of the skin • Mouth ulcers • Arthralgia / myalgia • Fatigue • Dizziness • Hair loss • Reduced / loss of sperm production | <ul style="list-style-type: none"> • Your blood cell counts will be monitored frequently throughout your treatment in order to detect any leukopenia, thrombocytopenia or anaemia – your doctor may adjust your treatment according to test results and will advise you on how to prevent infections. Report any fever to your doctor, as this may be a sign of infection • Let your doctor know if you experience any numbness or paraesthesia, as he/she will help you to manage these side effects • Your doctor will monitor your blood pressure during treatment. However, if you experience a pounding feeling in your chest, or feel lightheaded or dizzy (symptoms of hypertension), you should tell your doctor so that these symptoms can be effectively managed • Effects on the gastrointestinal system may lead to nausea, vomiting, constipation or diarrhoea. You should try to eat a healthy, balanced diet and drink plenty of fluids. Your doctor may also give you some medications to help prevent or manage these side effects • You can help to prevent the development of mouth ulcers by maintaining good oral hygiene using a steroid mouthwash and mild toothpaste. Steroid dental paste can also be used to treat developing ulcerations • Blistering of the skin may be treated with topical creams or an antihistamine. Tell your doctor if you have any skin blisters so that they can decide how to manage these • Let your doctor know if you experience any muscle or joint pains (symptoms of arthralgia and myalgia) so that they can decide how to manage these • Hair loss can be upsetting for many patients; your doctor will provide you with information on how to cope with this side effect. Some hospitals can provide cold caps to reduce hair loss • Treatment may cause a reduction or loss of sperm production in some patients. Advice on sperm banking should be provided by your doctor prior to starting treatment. Reliable contraception should also be used during treatment |

Important side effects associated with individual chemotherapy drugs used in the treatment of testicular cancer. The most recent Summary of Product Characteristics (SPC) for any individual drug can be located at: <http://www.ema.europa.eu/ema/>.

Effects of testicular cancer treatment on fertility

Removal of one testicle doesn't usually affect fertility, but removal of both testicles will result in infertility. **RPLND** can affect ejaculation in some men, making natural conception unlikely.

Chemotherapy can lead to reduced/abnormal sperm production, but fertility usually goes back to normal after the **chemotherapy** has finished. However, some men remain infertile, particularly those who have had very high doses of **chemotherapy**.

Radiotherapy can also expose your healthy testicle to radiation causing temporary sperm damage, but it should not have any long-term effects on your fertility.

Before starting treatment, your doctor will talk to you about **sperm banking**, which involves collecting your sperm and storing it for future use. You will have to consider a number of questions, including how long you want the sperm to be stored for, what will happen to the sperm if you die or are no longer able to make decisions for yourself, and whether your sperm can be used for research or donated for someone else's fertility treatment. A doctor, nurse or counsellor will discuss all of these issues with you.

To avoid any risk of birth abnormalities, your doctor will advise you to use reliable contraception during treatment and for up to 6 months after **chemotherapy** or up to one year after **radiotherapy**.

Men who have undergone treatment for testicular cancer have a lower paternity rate after 10 years compared with the general population. However, most (around 70%) of testicular cancer survivors who wish to have children, are able to do so.



Treatments for testicular cancer can affect fertility, but healthy sperm can be collected and stored before treatment begins

Long-term side effects and late toxicity

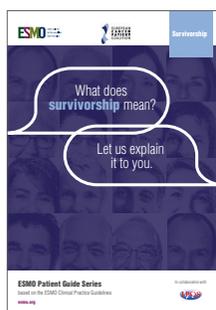
After completing treatment for testicular cancer, you may experience some long-term side effects, depending on the treatment you have received.

Hypogonadism affects up to a third of men after treatment for testicular cancer and can be treated with **testosterone** replacement therapy. Following **chemotherapy**, there is an increased risk of cardiovascular disease, lung and kidney toxicity and effects on the ears and **central nervous system**. **Chemotherapy** may also increase the long-term risk of other cancers, including **leukaemia** and **tumours** of the **gastrointestinal system** and **urinary tract**. **Radiotherapy** for testicular cancer may increase the risk of other cancers more than a decade after treatment has ended, particularly in the **gastrointestinal system** and **urinary tract** (Oldenburg *et al.*, 2013).



Around 20%–30% of patients develop **metabolic syndrome** (a condition involving **diabetes**, high blood pressure and **obesity**) 3–5 years after treatment for testicular cancer. It is therefore important to adopt a healthy lifestyle with regular physical exercise.

The long-term effects of testicular cancer and its treatment can have a negative effect on both physical and mental quality of life, so it is important that you tell your doctor or nurse about any persistent or new symptoms. Your doctor or nurse will also work with you to develop a personalised survivorship care plan.



For further information and advice regarding how to regain your life as far as possible after treatment for cancer, see ESMO's patient guide on survivorship (<https://www.esmo.org/for-patients/patient-guides/survivorship>).

What happens next?

Follow-up appointments

You will be able to discuss any concerns you have at your follow-up appointments

After treatment for testicular cancer, your doctor will arrange follow-up appointments to ensure that any **recurrences** or late toxicity are diagnosed and treated quickly. During these appointments, you will typically have a blood test to monitor your **biomarker** levels. You will also have a **CT** or **MRI** scan and a chest **x-rays** (Oldenburg *et al.*, 2013). The recommended frequency of follow-up appointments depends on the type and stage of testicular cancer at diagnosis, prior treatment received and time since treatment was completed (Honecker *et al.*, 2018). Your doctor will let you know how often you need to return for your follow-up appointments.



Looking after your health

After you have had treatment for testicular cancer, you may feel very tired and emotional. Give your body time to recover and make sure you get enough rest, but there is no reason to limit activities if you are feeling well. It is important to take good care of yourself and get the support that you need.

- **Take plenty of rest when you need it:** Give your body time to recover. Complementary therapies, such as aromatherapy, may help you relax and cope better with side effects. Your hospital may offer complementary therapy; ask your doctor for details.
- **Eat well and keep active:** Eating a healthy diet and keeping active can help improve your fitness. It is important to start slowly and build up as you start to feel better.

The following eight recommendations form a good foundation for a healthy lifestyle after cancer (*Wolin et al., 2013*):

- Don't smoke.
- Avoid second-hand smoke.
- Exercise regularly.
- Avoid weight gain.
- Eat a healthy diet.
- Drink alcohol in moderation (if at all).
- Stay connected with friends, family and other cancer survivors.
- Attend regular check-ups and screening tests.

A healthy, active lifestyle will help you to recover physically and mentally

Regular exercise is an important part of a healthy lifestyle, helping you to keep physically fit and avoid weight gain. This is particularly important for men who have had testicular cancer, as **metabolic syndrome** develops in up to 30% of testicular cancer survivors, putting them at increased risk of heart disease and stroke (*Oldenburg et al., 2013*). It is very important that you listen carefully to the recommendations of your doctor or nurse, and talk to them about any difficulties you have with exercise.



Emotional support

It is common to be overwhelmed by your feelings when you have been diagnosed with cancer and when you have been through treatment. If you feel anxious or depressed, talk to your doctor or nurse – they can refer you to a specialist counsellor or psychologist who has experience of dealing with emotional problems of people dealing with cancer. It may also help to join a support group so that you can talk to other people who understand exactly what you are going through.



Support groups

In Europe, there are patient advocacy groups, which help patients and their families to navigate the testicular cancer landscape. They can be local, national or international, and they work to ensure patients receive appropriate and timely care and education. These groups can provide you with the tools you may need to help you better understand your disease, and to learn how to cope with it, living the best quality of life that you can.

Cerhom is a France-based patient support group for patients with prostate or testicular cancer. It was established in 2014 and works to increase awareness and provide support to patients.

For further information about Cerhom visit: <http://cerhom.fr/index.php>



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GLOSSARY

ADJUVANT (TREATMENT)

Additional treatment given after the primary treatment to reduce the chance of the cancer coming back

AGRANULOCYTOSIS

Severe **leukopenia**

ALOPECIA

Hair loss

ALPHA FETOPROTEIN (AFP)

A protein normally produced by a foetus. An elevated level of **AFP** may indicate the presence of a **germ cell tumour**

ANAEMIA

A condition in which there is a shortage of haemoglobin (a protein in red blood cells that carries oxygen throughout the body)

ANAPHYLAXIS

A severe allergic reaction to a treatment

ANTIHISTAMINE

A medication used to relieve symptoms of allergies

ARTHRALGIA

Joint pain

ASTHENIA

Abnormal feeling of weakness or lack of energy

BEP

A **chemotherapy regimen** consisting of **bleomycin**, **etoposide** and **cisplatin**

BIOMARKER

Biological molecule found in tissue, blood or other body fluids that is a sign of a condition or disease, or describe the behaviour of the disease

BIOPSY

A medical procedure in which a small sample of cells or tissue is taken for examination under a microscope

BLEOMYCIN

A type of **chemotherapy** that is administered through a drip into a vein in your arm or chest

BONE MARROW

A spongy tissue found inside some bones (e.g. hip and thigh bones). It contains stem cells which are cells that can develop into red blood cells, white blood cells or platelets

CARBOPLATIN

A type of **chemotherapy** that is administered through a drip into a vein in your arm or chest

CE

A **chemotherapy regimen** consisting of **carboplatin** and **etoposide**

CENTRAL NERVOUS SYSTEM

The brain and spinal cord

CHEMOTHERAPY

A type of cancer treatment using medicine that kills the cancer cells by damaging them, so that they cannot reproduce and spread

CHORIOCARCINOMA

A type of **germ cell tumour** that develops from trophoblastic cells (cells that help an embryo attach to the uterus and form the placenta). Most **choriocarcinomas** arise in the uterus in women, but a small number develop in testicles

CISPLATIN

A type of **chemotherapy** that is administered through a drip into a vein in your arm or chest

CLINICAL TRIAL

A study that evaluates the effects of one or more treatment

COLD CAP

A cap that cools the scalp before, during and after treatment to reduce the effects of the treatment on **hair follicles**

COMBINATION CHEMOTHERAPY

A **chemotherapy regimen** consisting of more than one different type of **chemotherapy**

COMPUTED TOMOGRAPHY (CT)

A scan using **x-rays** and a computer to create detailed images of the inside of your body

CORTICOSTEROID

A type of drug used to relieve swelling and inflammation

DIABETES

A condition in which the kidneys make a large amount of urine. Usually refers to diabetes mellitus in which there is a high level of sugar in the blood

DNA

Deoxyribose nucleic acid, the chemical that carries genetic information in the cells of your body

GLOSSARY

DYSPNOEA

Shortness of breath

ENZYME

A protein that speeds up chemical reactions in the body

EMBRYONAL CARCINOMA

A type of **germ cell tumour** that can look like tissues of very early embryos when viewed under a microscope

EP

A **chemotherapy regimen** consisting of **etoposide** and **cisplatin**

ETOPOSIDE

A type of **chemotherapy** that is administered through a drip into a vein in your arm or chest, or as an oral tablet or capsule

FATIGUE

Overwhelming tiredness

FIRST-LINE (TREATMENT)

The initial treatment(s) given to a patient

GASTROINTESTINAL SYSTEM

The system of organs responsible for getting food into and out of the body and for making use of food to keep the body healthy – includes the oesophagus, stomach and intestines

GERM CELL

A reproductive cell of the body. **Germ cells** are egg cells in females and sperm cells in males

GLAND

An organ that makes one or more substances, such as **hormones**, digestive juices, sweat, tears, saliva or milk

HAEMATURIA

Blood in urine

HAEMORRHAGIC CYSTITIS

A condition in which the lining of the bladder becomes inflamed and starts to bleed

HAIR FOLLICLE

A small sac in the skin from which hair grows

HORMONE

A substance made by **glands** in the body. **Hormones** circulate in the bloodstream and control the actions of certain cells or organs

HUMAN CHORIONIC GONADOTROPIN (HCG)

A hormone normally produced by the placenta. An elevated level of **HCG** may indicate the presence of a **germ cell tumour**

HYPERSENSITIVITY

An allergic reaction to a treatment

HYPERTENSION

High blood pressure

HYPERURICAEMIA

High levels of **uric acid** in the blood

HYPOGONADISM

A reduction or absence of **testosterone** production by the testicles in men

HYPOSPADIAS

A birth defect in which the opening of the **urethra** is not in its normal place

HYPONATRAEMIA

Low sodium levels in the blood

HYPOTENSION

Low blood pressure

IFOSFAMIDE

A type of **chemotherapy** that is administered through a drip into a vein in your arm or chest

IMMUNOTHERAPY

A type of cancer treatment that stimulates the body's immune system to fight the cancer

IONISING RADIATION

Any type of particle or electromagnetic wave that carries enough energy to ionise or remove electrons from an atom (e.g. **x-rays**)

INGUINAL HERNIA

Protrusion of fatty tissue or a part of the bowel through the inguinal canal, which is located in the groin at the top of the inner thigh

INTERSTITIAL PNEUMONITIS

Inflammation of the lungs

LACTATE DEHYDROGENASE (LDH)

An **enzyme** involved in energy production in cells. An elevated level of **LDH** may indicate the presence of a **germ cell tumour**

GLOSSARY

LEUKAEMIA

Cancer that starts in blood-forming tissue, such as the **bone marrow**, and causes large numbers of abnormal blood cells to be produced and enter the bloodstream

LEUKOPENIA

A decrease in the number of leukocytes (a type of white blood cell) in the blood, which places individuals at increased risk of infection

LYMPHATIC SYSTEM

A network of tissues and organs that help rid the body of toxins, waste and other unwanted materials. The primary function of the **lymphatic system** is to transport lymph, a fluid containing infection-fighting white blood cells, throughout the body

LYMPH NODES

Small structures throughout the **lymphatic system** that work as filters for harmful substances, such as cancer cells or bacteria

METABOLIC SYNDROME

A condition characterised by extra fat around the abdomen, high levels of blood sugar and high blood pressure

METASTASES

Cancerous **tumours** that have originated from a primary **tumour**/growth in another part of the body

MAGNETIC RESONANCE IMAGING (MRI)

A type of scan that uses strong magnetic fields and radio waves to produce detailed images of the inside of the body

MUCOSAL INFLAMMATION

Inflammation of the membranes lining the **gastrointestinal system**

MUCOSITIS

Inflammation and ulceration of the membranes lining the **gastrointestinal system**

MULTIDISCIPLINARY TEAM

A group of healthcare workers who are members of different disciplines (e.g. oncologist, nurse specialist, physiotherapist, radiologist) and provide specific services to the patient. The activities of the team are brought together using a care plan

MYALGIA

Muscular pain

NEPHROTOXICITY

Toxicity in the kidneys

NEUTROPENIA

An abnormally low level of **neutrophils** in the blood which increases the risk of infection

NEUTROPHILS

A type of white blood cell that play an important role in fighting off infection

NON-SEMINOMA

A type of cancer that begins in **germ cells** in males, which involves a mixture of cell types

OBESITY

Abnormal or excessive fat accumulation that may impair health

ORCHIECTOMY

Surgery to remove one or both testicles

PACLITAXEL

A type of **chemotherapy** that is administered through a drip into a vein in your arm or chest

PALLIATIVE (CARE)

The care of patients with advanced, progressive illness. It focuses on providing relief from pain, symptoms and physical and emotional stress, without dealing with the cause of the condition

PARAESTHESIA

An abnormal sensation, typically tingling or pins and needles, caused by pressure on or damage to nerves in the extremities of the body

PERIPHERAL NEUROPATHY

Damage to the nerves in the extremities of the body. Symptoms may include pain, sensitivity, numbness or weakness in the hands, feet or lower legs

POSITRON EMISSION TOMOGRAPHY (PET)

An imaging test that uses a dye with radioactive tracers, which is injected into a vein in your arm

POSTERIOR LEUKOENCEPHALOPATHY SYNDROME

A syndrome characterised by headache, confusion, **seizures** and visual loss. It can occur due to various different causes, including some medical treatments, and is a rare and reversible side effect of carboplatin therapy

PROGNOSIS

The likely outcome of a medical condition

PROSTATE

A gland in the male reproductive system. The prostate surrounds the part of the urethra just below the bladder, and produces a fluid that forms part of the semen

GLOSSARY

PULMONARY FIBROSIS

Development of scar tissue in the lungs

RADIOTHERAPY

Treatment involving the use of high-energy radiation, which is commonly used to treat cancer

RAYNAUD-LIKE PHENOMENA

Episodes of reduced blood flow, typically to the fingers and toes, which causes the affected area to turn white. May be accompanied by numbness and pain

RETROPERITONEAL LYMPH NODE

Lymph nodes at the back of the abdomen

RETROPERITONEAL LYMPH NODE DISSECTION (RPLND)

Surgery to remove the **retroperitoneal lymph nodes**

RECURRENCE

Return of a cancer

REGIMEN

Treatment plan

RENAL

Relating to the kidneys

RISK FACTOR

Something that increases the chance of developing a disease

SALVAGE (TREATMENT)

Treatment that is given when a cancer has not responded to other treatment(s)

SCROTUM

The external sac that contains the testicles

SEIZURE

A sudden, uncontrolled electrical disturbance in the brain. It can cause changes in your behaviour, movements or feelings, and in your levels of consciousness

SEMINAL VESICLE

Gland that helps produce **semen**

SEMINOMA

A type of cancer that begins in **germ cells** in males

SPERM BANKING

Freezing sperm and storing it for future use

STEM CELL

A cell from which other types of cells develop

STERIOD

A type of drug used to relieve swelling and inflammation. Some **steroid** drugs also have anti-**tumour** effects

STOMATITIS

Inflammation of the inside of the mouth

SURVEILLANCE

Regular tests to check for early signs of **recurrence**

TERATOMA

A type of **germ cell tumour** that may contain different types of tissue, such as hair, muscle and bone

TESTICULAR MICROLITHIASIS

Specks of calcium in the testicles

TESTOSTERONE

A **hormone** made mainly in the male reproductive system that is needed to develop and maintain male sex characteristics

THROMBOCYTOPENIA

A decrease in platelets in the blood. This causes bleeding into the tissues, bruising, and slow blood clotting after injury

TI-CE

A **chemotherapy regimen** consisting of **paclitaxel**, **ifosfamide**, **carboplatin** and **etoposide**

TINNITUS

The hearing of a sound (such as ringing, whining or buzzing) when no external sound is present

TIP

A **chemotherapy regimen** consisting of **paclitaxel**, **ifosfamide** and **cisplatin**

TUMOUR

A lump or growth of abnormal cells. **Tumours** may be benign (not cancerous) or malignant (cancerous). In this guide, the term **'tumour'** refers to a cancerous growth, unless otherwise stated

ULTRASOUND

A type of medical scan where sound waves are converted into images by a computer

URETHRA

The tube through which urine leaves the body

URIC ACID

A chemical created as the body breaks down certain food substances

GLOSSARY

URINARY TRACT

The organs of the body that produce and discharge urine, including the kidneys, ureters, bladder and **urethra**

VeIP

A **chemotherapy regimen** consisting of **vinblastine**, **ifosfamide** and **cisplatin**

VINBLASTINE

A type of **chemotherapy** that is administered through a drip into a vein in your arm or chest

VIP

A **chemotherapy regimen** consisting of **etoposide**, **ifosfamide** and **cisplatin**

X-RAY

An imaging test, using a type of radiation that can pass through the body, which allows your doctor to see images of inside your body

YOLK SAC TUMOUR

A type of **germ cell tumour** in which the cells look like the yolk sac of an early human embryo

This guide has been prepared to help you, your friends and your family better understand the nature of testicular cancer and the treatments that are available. The medical information described in this document is based on the clinical practice guidelines of the European Society for Medical Oncology (ESMO) for the management of testicular cancer. We recommend that you ask your doctor about the tests and types of treatments available in your country for your type and stage of testicular cancer.

This guide has been written by Kstorfin Medical Communications Ltd on behalf of ESMO.

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**We can help you understand testicular cancer
and the available treatment options.**

The ESMO Guides for Patients are designed to assist patients, their relatives and caregivers to understand the nature of different types of cancer and evaluate the best available treatment choices. The medical information described in the Guides for Patients is based on the ESMO Clinical Practice Guidelines, which are designed to guide medical oncologists in the diagnosis, follow-up and treatment in different cancer types.

For more information, please visit www.esmo.org

