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Breast Cancer

What is **Breast Cancer**?

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ESMO Patient Guide Series

based on the ESMO Clinical Practice Guidelines

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Breast 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 breast cancer and its treatment. It contains information on early and advanced breast cancer, including 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 Guidelines for breast cancer, which are designed to help doctors with the diagnosis and management of early and advanced breast 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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WHAT'S INSIDE

Breast cancer: A summary of key information

Introduction to breast cancer

- Breast cancer arises from cells in the breast that have grown abnormally and multiplied to form a lump or **tumour**.
- The earliest stage of breast cancer is **non-invasive** disease (Stage 0), which is contained within the **ducts** or **lobules** of the breast and has not spread into the healthy breast tissue (also called in situ carcinoma). **Invasive** breast cancer has spread beyond the **ducts** or **lobules** into healthy breast tissue, or beyond the breast to lymph nodes or distant organs (Stages I IV).
- Breast cancer is the most common cause of cancer-related deaths in women and occurs most frequently in postmenopausal women over the age of 50. Breast cancer also occurs in men but is very rare, making up around 1% of all breast cancer cases.

Diagnosis of breast cancer

- The most common symptoms of breast cancer are changes in the breasts such as the presence of a lump, changes to the nipple, discharge from the nipple or changes in the skin of the breast.
- Initial investigations for breast cancer begin with a physical examination, **mammography** and **ultrasound** scan. In some cases, breast **magnetic resonance imaging** (**MRI**) will also be performed. If a **tumour** is found, a **biopsy** will be taken to assess the cancer before any treatment is planned.

Treatment options for breast cancer

- The treatment of breast cancer depends on how far advanced the cancer is (Stage 0 IV) and what type of cancer is present.
- Surgery, **radiotherapy**, **chemotherapy**, **endocrine therapy** and **targeted therapy** are used in the treatment of breast cancer.
- Breast cancer is 'staged' according to **tumour** size, involvement of **lymph nodes** and whether it has spread outside the breast and **lymph nodes** to other parts of the body, according to the TNM system (T – **tumour**, N – nodes, M – **metastases**). This information is used to help decide the best treatment.
- The presence of **biomarkers** including hormone receptors and a receptor called **HER2** also help to determine what type of therapy is given.

Early stage non-invasive breast cancer Biological testing of the tumour

- Patients with Stage 0 disease will usually have the **tumour** removed by **breast-conserving surgery** or **mastectomy**. **Radiotherapy** is given after **breast-conserving surgery** but is not usually needed after **mastectomy**. Most patients with **oestrogen receptor (ER) positive** cancer will be given **endocrine therapy** after surgery and **radiotherapy**. **Endocrine therapy** is given to decrease the risk of recurrence (the cancer coming back), as well as prevention of new cancers in both the remaining and contralateral breast.

Early stage invasive breast cancer

- Patients with Stage I IIA disease will usually be treated with surgery to remove the **tumour** and any affected **lymph nodes**. **Breast-conserving surgery** is always followed by **radiotherapy**. Most patients will then receive **adjuvant** therapy with one or a combination of **systemic** treatments, depending on the type of cancer present.
- Some patients, particularly those with larger **tumours**, may receive preoperative **neoadjuvant systemic** therapy to shrink the **tumour** and improve the likelihood of successful surgical removal of the **tumour**, or to decrease the extent of surgery (which can also achieve a better cosmetic result).
- The standard **chemotherapy** regimens in early breast cancer usually contain **anthracyclines** (e.g. **epirubicin** or **doxorubicin**) and/or **taxanes** (e.g. **paclitaxel** or **docetaxel**), given **sequentially**.
- Patients with **ER positive** disease will receive **endocrine therapy**. In premenopausal women this is usually **tamoxifen** alone or in combination with drugs that suppress the ovarian production of **oestrogen** (called **gonadotropin-releasing hormone analogues**). Suppression of ovarian function may also be used with **aromatase inhibitors**. In postmenopausal women, **aromatase inhibitors** or **tamoxifen** are used, either alone or **sequentially**.
- Patients with **HER2** positive breast cancer will usually receive the anti-**HER2** drug **trastuzumab** as well as **chemotherapy**. In some patients, this may also be combined with **pertuzumab**. **Neratinib** is a new anti-**HER2** agent that may also be used to treat **HER2** positive disease.

Locally-advanced and metastatic breast cancer (also called advanced breast cancer)

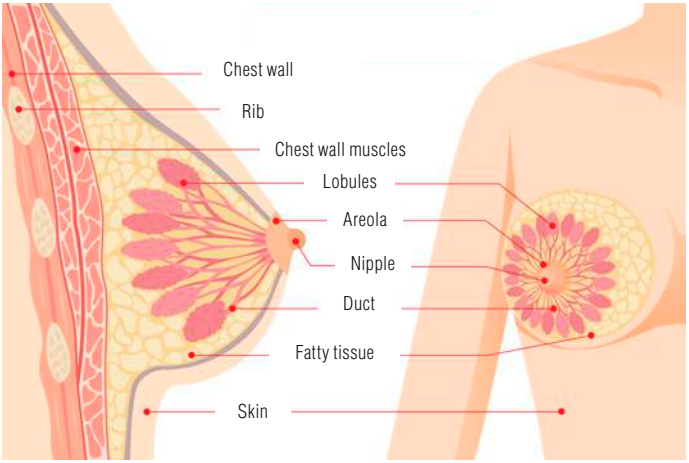
- Most patients whose breast cancer has been classed as Stage IIB III will receive **neoadjuvant** therapy before surgery is performed. Depending on the type of breast cancer, this can include one or a combination of **chemotherapy**, **endocrine therapy**, anti-**HER2** therapy and **radiotherapy**.
- Patients with Stage IV breast cancer will not usually be treated with surgery, but it may be discussed in some cases.
- **ER positive** advanced disease is usually treated with **endocrine therapy** using **aromatase inhibitors**, **tamoxifen** or **fulvestrant**. In some cases, these drugs are combined with **targeted therapies** such as **cyclin-dependent kinase 4/6** (**CDK4/6**) inhibitors (**palbociclib**, **ribociclib** and **abemaciclib**) or **mechanistic target of rapamycin** (**mTOR**) inhibitors (**everolimus**) to improve outcomes.
- For ER negative **tumours** and for **ER positive tumours** that have stopped responding to **endocrine therapy**, **chemotherapy** with **capecitabine**, **vinorelbine** or **eribulin** is usually used. A **taxane** or an **anthracycline** may also be used in some patients.
- **HER2**-positive advanced disease is usually treated with **trastuzumab** and **pertuzumab** in combination with **chemotherapy** (**docetaxel**, **paclitaxel**, **vinorelbine** or **capecitabine**). Further-line treatments include **trastuzumab emtansine** (**T-DM1**), **trastuzumab** in combination with **lapatinib**, **lapatinib** in combination with **capecitabine** or **trastuzumab** in combination with other **chemotherapy** agents.
- **Bevacizumab** can be combined with **chemotherapy** but provides only a small benefit with no impact on survival, and is therefore rarely used. **Olaparib** and **talazoparib** are new **targeted therapies** that may be used to treat **BRCA**-associated advanced breast cancer (i.e. hereditary advanced breast cancer).

Follow-up of early breast cancer after treatment

- You will usually be seen by your doctor every 3-4 months for the first two years after finishing treatment, every 6-8 months from years 3-5 and once a year thereafter.
- You will also have a **mammography** every year, and some patients will also have regular **MRI** or **ultrasound** scans. Patients taking **endocrine therapy** will have regular assessments to monitor the side effects of the treatment.

What is breast cancer?

Breast cancer is a cancer that forms in the tissues of the breast – usually in the ducts (tubes that carry milk to the nipple) or **lobules** (glands that make milk). It occurs in both men and women, although male breast cancer is rare.



Anatomy of the female breast.

What are the different types of breast cancer?

Breast cancer can be categorised by whether it is **non-invasive** or **invasive**:

Non-invasive breast cancer (in situ)

Ductal carcinoma in situ (DCIS) is a pre-malignant lesion – it is not yet cancer, but can progress to become an **invasive** form of breast cancer. In this type of cancer, the cancer cells are in the **ducts** of the breast but have not spread into the healthy breast tissue.

Lobular neoplasia (previously called lobular carcinoma *in situ*) is when there are changes in the cells lining the **lobules**, which indicate that there is an increased risk of developing breast cancer in the future. Lobular neoplasia is not actually breast cancer, and although women with lobular neoplasia will have regular check-ups, most will not develop breast cancer.

Invasive breast cancer

Invasive breast cancer is the name given to a cancer that has spread outside the **ducts** (**invasive** ductal breast cancer) or **lobules** (**invasive** lobular breast cancer). These can be further classified by their histology; for example, tubular, mucinous, medullary and papillary breast **tumours** are rarer subtypes of breast cancer.

Breast cancer is also categorised by how advanced the disease is:

Early breast cancer

Breast cancer is described as early if the **tumour** has not spread beyond the breast or **axillary lymph nodes** (also known as Stage 0 IIA breast cancer). These cancers are usually operable and the primary treatment is often surgery to remove the cancer, although many patients also have preoperative **neoadjuvant systemic** therapy.

Locally-advanced breast cancer

Breast cancer is locally-advanced if it has spread from the breast to nearby tissue or **lymph nodes** (Stage IIB III). In the vast majority of patients, treatment for locally-advanced breast cancer starts with **systemic** therapies. Depending on how far the cancer has spread, locally-advanced **tumours** may be either operable or inoperable (in which case surgery may still be performed if the **tumour** shrinks after **systemic** treatment).

Metastatic breast cancer

Breast cancer is described as metastatic when it has spread to other parts of the body, such as the bones, liver or lungs (also called Stage IV). **Tumours** at distant sites are called **metastases**. Metastatic breast cancer is not curable but is treatable.

Advanced breast cancer

Advanced breast cancer is a term used to describe both locally-advanced inoperable breast cancer and metastatic breast cancer.

Subtypes based on hormone receptor status and HER2 gene expression

- The growth of some tumours is stimulated by the hormones **oestrogen** and **progesterone**. It is important to find out whether a **tumour** is **oestrogen receptor** (**ER**) or **progesterone receptor** (**PgR**) positive or negative, as **tumours** with a high level of hormone receptors can be treated with drugs that reduce the supply of hormone to the **tumour**.

HER2 is also a receptor that is involved in the growth of cells and is present in about 20% of breast cancers. **Tumours** that have a high level of **HER2** can be treated with anti-**HER2** drugs.

Tumours that don't have **ER**, **PgR** or high levels of **HER2** are described as triple-negative **tumours**.

Tumours can be classified into subtypes based on hormonal and **HER2** receptor status as follows: luminal A-like (**ER** and **PgR** positive, **HER2** negative **tumours**), luminal B-like (**ER** and/or **PgR** positive, **HER2** positive or negative **tumours**), **HER2** overexpressing (**ER** and **PgR** negative, **HER2** positive **tumours**) and basal-like (triple-negative **tumours**).

Further information regarding the impact of these subtypes on breast cancer treatment will be explained later in this guide in the section: '*How will my treatment be determined?*'.

What are the symptoms of breast cancer?

Symptoms of breast cancer include:

- A lump in the breast
- Change in the size or shape of the breast
- Dimpling of the skin or thickening in the breast tissue
- An inverted nipple
- Rash on the nipple
- Discharge from the nipple
- Swelling or a lump in the armpit
- Pain or discomfort in the breast that doesn't go away
- Skin redness
- Skin thickening

You should see your doctor if you experience any of these symptoms. However, it is important to remember that these symptoms may also be caused by other conditions.

Certain symptoms may indicate the presence of **metastases** – for example, a lump or swelling under the armpit, in the breast bone or collar bone area may be a symptom of **lymph node metastases**. Pain in a bone or a bone prone to fracture might suggest bone **metastases**, and lung **metastases** may cause symptoms of ongoing chest infections, persistent cough and breathlessness. It's important not to be alarmed by these symptoms as they don't necessarily mean that you have **metastases**; however, you should discuss any concerns with your doctor.

Any changes to your breasts should be reported to your doctor as they may be a symptom of breast cancer

How common is breast cancer?

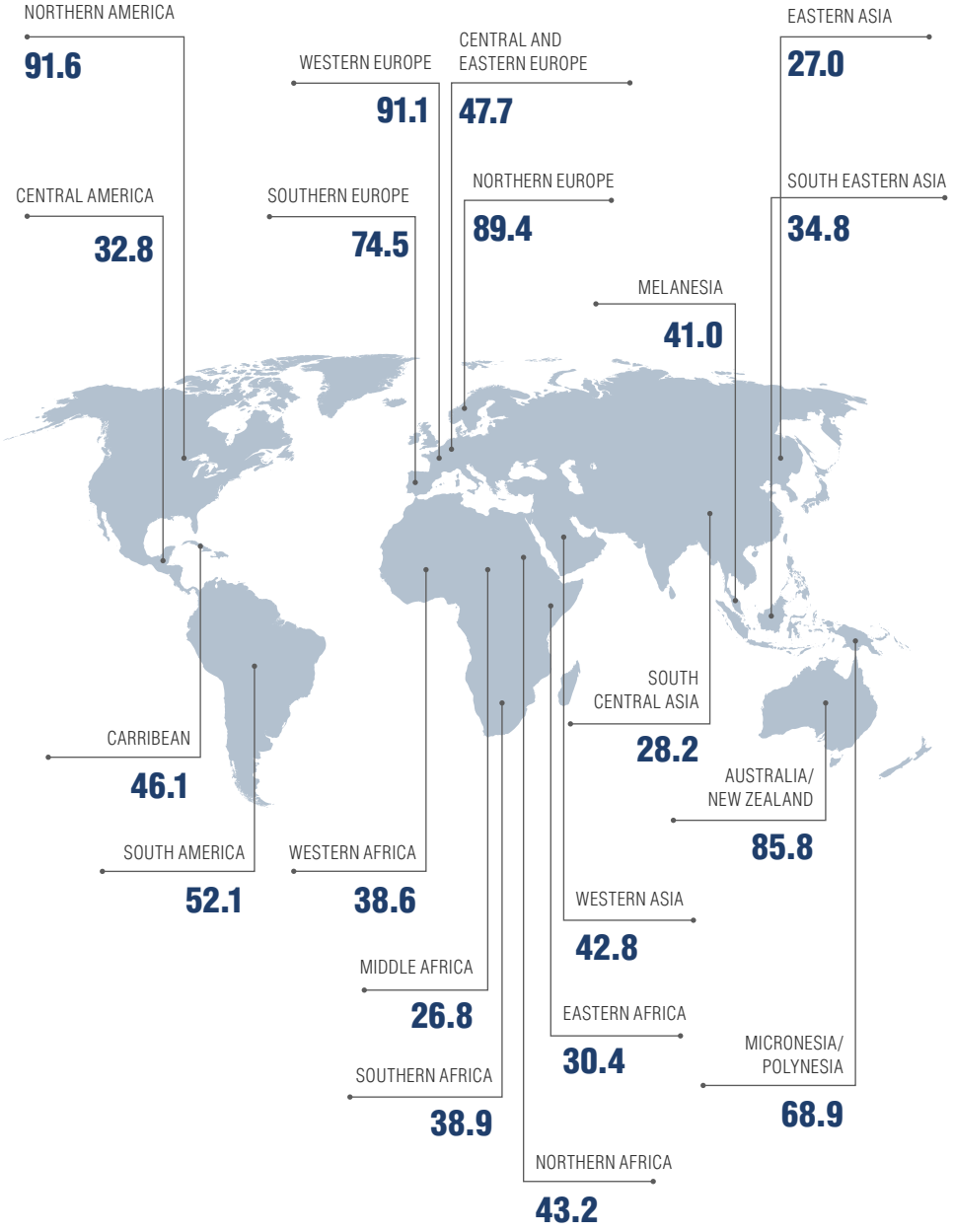
Breast cancer is most common in women over 50, but may also occur in young women

Breast cancer is a leading cause of cancer-related deaths in women, with almost 1.7 million cases diagnosed per year and more than half a million deaths every year *(Ferlay et al. 2013)*. In developed countries, 1 in every 8 women will develop breast cancer in their lifetime. In Europe, there is a breast cancer diagnosis every 2 minutes and a death due to breast cancer every 6 minutes. Breast cancer mostly affects older women, with the majority of patients being over the age of 50 when diagnosed, although around 1 in 5 breast cancers are diagnosed before the age of 50. Breast cancer in men is rare and makes up around 1% of breast cancer cases.

Female breast cancer incidence rates vary widely between regions, with the highest incidence rates in Western Europe and the United States, and the lowest in Africa and Asia. Higher breast cancer incidence in more developed countries reflects the presence of more breast cancer risk factors in these countries *(Torre et al. 2016)*. However, the incidence of breast cancer in developing countries is rapidly increasing. Despite higher incidence rates, deaths due to breast cancer in most Western countries have decreased in recent years due to improved treatment and earlier detection, but have substantially increased in developing countries. In developed countries, around 10–15% of patients have advanced disease at diagnosis, compared with 40–90% in developing countries *(Balogun and Formenti 2015)*.

Deaths due to breast cancer have decreased in Western countries due to earlier detection and improved treatment

The map shows estimated numbers of new cases of breast cancer diagnosed in 2012 (the most recent statistics available) per 100,000 people of each region's population (Ferlay et al. 2013).



What causes breast cancer?

The precise cause of breast cancer is unknown, but several risk factors for developing the disease 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.

Most important risk factors

- Female gender
- Increasing age
- Genetic predisposition (family history or **mutations** in certain **genes**)
- Exposure to **oestrogens**
- Exposure to **ionising radiation**
- Having fewer children
- History of atypical hyperplasia
- **Obesity**
- Alcohol

There are various risk factors associated with developing breast cancer although most of the factors will not apply to every woman who develops the disease.

A woman's family history of breast cancer is an important factor that determines her risk of developing the disease

Family history plays a very important role in whether or not a woman will develop breast cancer. Women with a first-degree relative (parent, sibling or child) with breast cancer have twice the risk of developing breast cancer compared with a woman with no such family history. The risk is increased 3-fold if that relative was diagnosed with breast cancer before the **menopause** (Collaborative Group on Hormonal Factors in Breast Cancer 2001).

BRCA mutation

Around 5% of breast cancers and up to 25% of familial breast cancer cases are caused by a **BRCA1** or **BRCA2 mutation** *(Skol et al. 2016)*. A woman carrying a **BRCA1 mutation** has a 65 95% lifetime risk of breast cancer, and more than 90% of hereditary breast and ovarian cancers are thought to be due to a **mutation** in **BRCA1** or **BRCA2** *(Paluch-Shimon et al. 2016)*.

A doctor will refer a woman for **BRCA1** and **BRCA2 mutation** testing based on her family history and ethnic background. If she is found to be carrying a **mutation** in one or both of these **genes**, she will be offered counselling during which her options for reducing the risk of developing breast cancer, such as a preventative double **mastectomy** and/or **salpingo-oophorectomy** (removal of the ovaries and fallopian tubes), will be discussed *(Paluch-Shimon et al. 2016)*.

Women who test positive for BRCA1/2 mutation will be monitored carefully and offered risk-reduction measures

Women who are found to be carrying a **BRCA mutation** and do not opt for risk-reducing surgery should be offered a clinical examination every 6 12 months from the age of 25 (or 10 years before the youngest breast cancer diagnosis in the family, if earlier), **magnetic resonance imaging** (**MRI**) every 12 months and **mammography** every 12 months from the age of 30 *(Paluch-Shimon et al. 2016)*.

How is breast cancer diagnosed?

Breast cancer is usually diagnosed by clinical examination, imaging and **biopsy**.

Clinical examination

Your doctor will examine your breasts and **lymph nodes**. He/she will also ask you about any family history of breast cancer and whether you have reached **menopause** or not. He/she may also take a blood sample for routine blood tests. If there is a suspicion that you may have a breast **tumour**, he/she may arrange for you to have an imaging scan.

Imaging

Imaging techniques used for women in whom breast cancer is suspected include **mammography**, **ultrasound** and/or **MRI** scan:

- **Mammography**: **Mammography** is a type of low-dose **x-ray** that looks for early breast cancers. Your breasts will each be placed on the **x-ray** machine and pressed between two plates to produce a clear image. If the **mammography** screening shows anything suspicious in your breast tissue, your doctor will investigate further.
- **Ultrasound** scan: **Ultrasound** uses high-frequency sound waves to create an image of the inside of your body. In investigations for breast cancer, a hand-held **ultrasound** device lets the doctor examine your breasts and the **lymph nodes** in your armpit. The **ultrasound** can show whether a lump is solid or is a fluid-filled cyst.

- **MRI** scan: **MRI** uses magnetic fields and radio waves to produce detailed images of the inside of your body. An **MRI** scanner is usually a large tube that contains powerful magnets. You lie inside the tube during the scan, which takes 15–90 minutes. Although these are not used as part of routine investigations, an **MRI** scan might be used in certain circumstances, for example in patients with a family history of breast cancer, **BRCA mutations**, breast implants, lobular cancers, if there is a suspicion of multiple tumours, or if the results of other imaging techniques are inconclusive *(Cardoso et al. 2018 [in press])*. **MRI** is also used to see if a **tumour** has responded to treatment, and to plan further therapy.

Biopsy

A tumour biopsy gives the doctor information about the type of breast cancer present and helps to plan treatment

When breast cancer is suspected, a **biopsy** is taken from the **tumour** before any treatment is planned *(Cardoso et al. 2018 [in press])*. The **biopsy** is taken with a needle, usually guided by **ultrasound** (or sometimes using **mammography** or **MRI**, if the **tumour** is not visible on **ultrasound**) to make sure the **biopsy** is taken from the correct area in the breast. The **biopsy** gives the doctors important information on the type of breast cancer. At the same time as the **biopsy**, a marker may be placed into the **tumour** to help surgeons remove the whole **tumour** at a later date.

How will my treatment be determined?

Once diagnosed with breast cancer, you will be looked after by a team of breast cancer specialists

Your treatment will depend on a number of factors, including how far advanced your cancer is, the type of cancer (see section below) and risk assessment. Treatment is best done in a specialist centre that cares for a high number of breast cancer patients. The team treating you will typically include a surgeon, radiation oncologist, medical oncologist, radiologist and pathologist. A **nurse specialist** should also be available to guide you through each stage of diagnosis and treatment.

Staging

It is important for your doctor to know the stage of the cancer so that he/she can determine the best treatment approach

Staging of cancer is used to describe its size and position and whether it has spread from where it started. Clinical staging involves a physical examination, blood tests and imaging. In addition to your initial **mammography**, further scans may also be required, including a **computed tomography** (**CT**) scan of your chest, an **ultrasound**, **CT** or **MRI** scan of your abdomen and a bone scan. Alternatively, a **positron emission tomography** (**PET**) scan may be used to assess the whole body.

- **CT** scan: This is a type of **x-ray** technique that lets doctors see your internal organs in cross-section.
- **MRI** scan: **MRI** uses magnetic fields and radio waves to produce detailed images of the inside of your body.
- Bone scan: This test involves a small amount of radioactive substance injected into a vein and allows doctors to see abnormal areas of bone across your whole body, as abnormal bone absorbs more radioactivity than healthy bone.
- **PET** scan: **PET** uses a radioactive substance injected into a vein and can help identify areas of cancer that an **MRI** or **CT** scan may miss. Most **PET** scans are now performed along with a **CT** scan.

Surgical staging is based on examination of the tissue removed during surgery.

Cancer staging to determine the size and spread of the **tumour** is described using a sequence of letters and numbers. For breast cancer, there are five stages designated with Roman numerals 0 to IV. Generally, the lower the stage, the better the **prognosis**. The TNM staging system considers:

- How big the cancer is, or **tumour** size (T)
- Whether the cancer has spread to **lymph nodes** (N)
- Whether it has spread to distant sites, or **metastases** (M)

Lymph node biopsy

Lymph node biopsy is an important part of breast cancer staging. Fine needle aspiration of suspicious **lymph nodes** is performed to confirm or exclude the presence of **metastases** in the **lymph nodes** before start of therapy. To evaluate **lymph node** involvement, a process called sentinel **lymph node biopsy** is usually performed *(Cardoso et al. 2018 [in press])*, in which the sentinel **lymph node** (the first **lymph node** to which cancer cells are most likely to spread from a **tumour**) is identified, removed and checked for the presence of cancer cells.

The stage grouping system for breast cancer is described in the table below *(Cardoso et al. 2018 [in press])*. This may seem complicated but your doctor will be able to explain which part of this table corresponds to your cancer.

Stage 0. Non-invasive tumour confined to the breast (TisN0M0)	
Stage I. Tumour is small and confined to breast tissue or with evidence of cancer in lymph nodes close to the breast	
IA	• The **tumour** is no bigger than 20 mm in diameter and is confined to the breast (T1N0M0)
IB	• There is no evidence of a primary **tumour** (T0) or the **tumour** is no bigger than 20 mm in diameter (T1), but micro**metastases** (no bigger than 2 mm) are present in the **ipsilateral** level I/II **axillary lymph node**(s); **lymph nodes** are movable (N1mi); no distant **metastases** are present (M0)
Stage II. Tumour is in the breast or in the nearby lymph nodes, or both	
IIA	• There is no evidence of a primary **tumour** (T0) or the **tumour** is no bigger than 20 mm in diameter (T1); **metastases** are present in the **ipsilateral** level I/II **axillary lymph node**(s) and **lymph nodes** are movable (N1); no distant **metastases** are present (M0) • The **tumour** is larger than 20 mm but no bigger than 50 mm in diameter (T2) and is confined to the breast (N0); no distant **metastases** are present (M0)
IIB	• The **tumour** is larger than 20 mm but no bigger than 50 mm in diameter (T2); **metastases** are present in the **ipsilateral** level I/II **axillary lymph node**(s) and **lymph nodes** are movable (N1); no distant **metastases** are present (M0) • The **tumour** is larger than 50 mm in diameter (T3) and is confined to the breast (N0); no distant **metastases** are present (M0)
Stage III. Tumour has spread from the breast to lymph nodes close to the breast, to the skin of the breast or to the chest wall	
IIIA	• There is no evidence of a primary **tumour** (T0), the **tumour** is no bigger than 20 mm in diameter (T1), the **tumour** is larger than 20 mm but no bigger than 50 mm in diameter (T2), the **tumour** is larger than 50 mm in diameter (T3); **metastases** are present in the **ipsilateral** level I/II **axillary lymph node**(s) and **lymph nodes** are fixed or matted (N2); no distant **metastases** are present (M0) • The **tumour** is larger than 50 mm in diameter (T3); **metastases** are present in the **ipsilateral** level I/II **axillary lymph node**(s) and **lymph nodes** are movable (N1); no distant **metastases** are present (M0)
IIIB	• The **tumour** (of any size) has extended to the chest wall and/or skin (T4); **lymph nodes** are not involved (N0) or **metastases** are present in the **ipsilateral** level I/II **axillary lymph node**(s) and **lymph nodes** are movable (N1) or **lymph nodes** are fixed or matted (N2); no distant **metastases** are present (M0)
IIIC	• **Tumour** of any stage (any T); **metastases** are present in the **ipsilateral** level III **axillary lymph node**(s), in **ipsilateral** internal mammary **lymph node**(s) with clinically evident level I/II **axillary lymph node metastases**, or in **ipsilateral** supraclavicular **lymph node**(s) (N2 or N3); no distant **metastases** are present (M0)
Stage IV. The tumour has spread to other areas of the body (any T any N M1)	

Other factors

The treatment of breast cancer takes a number of factors into account. Some of these factors can be determined from a **biopsy**, but others may only be determined after surgery has taken place to remove the **tumour**.

Histology

The histology of a breast cancer tells us which tissues of the breast the cancer has formed in (ductal or lobular carcinomas) and whether it is **invasive** or **non-invasive**. Histology can also reveal some of the rarer subtypes of breast cancer, including the following:

- Tubular breast cancers are usually small and are made up of tube-shaped structures called 'tubules'. These **tumours** are usually low-**grade**, meaning that their cells look similar to normal, healthy cells and tend to grow slowly.
- Mucinous breast **tumours** are made up of abnormal cells that float in pools of mucin (the main ingredient of mucus). These **tumours** usually respond well to treatment.
- Medullary breast **tumours** are soft, fleshy masses which tend to grow slowly and don't usually spread outside the breast.
- Papillary breast **tumours** are made up of small, finger-like projections. These **tumours** are usually moderate-**grade**, meaning that their cells don't look like normal cells and are growing and dividing a little faster than normal.

Grade

Grade is based on how different **tumour** cells look from normal breast cells, and on how quickly they grow. The **grade** will be a value between one and three and reflects the aggressiveness of **tumour** cells; the higher the **grade**, the more aggressive the **tumour**.

Hormone receptor status and HER2 gene expression

Oestrogen and **progesterone** are sex hormones that are naturally present in women. Some breast **tumours** depend on a supply of **oestrogen** and/or **progesterone** to grow; these types of **tumour** have a high number of receptors (**ER** or **PgR**) that the hormones attach to in order to stimulate growth of the **tumour**. **Tumours** with expression of **ER** are called **ER positive tumours** and can be treated by reducing the supply of **oestrogen** to the **tumour**, typically by blocking the ER or limiting the levels of **oestrogen** in the blood.

HER2 receptors are expressed on the surface of all cells and are involved in the normal processes of cell growth, multiplication and repair. About 20% of breast cancers have abnormally high levels of **HER2** on the surface of the **tumour** cells and are therefore called **HER2** positive **tumours**. These **tumours** tend to grow faster and are more likely to spread compared with **HER2** negative breast cancers. **HER2** positive breast cancer can be treated with drugs that block **HER2** receptors to stop the uncontrolled growth of the **tumour**.

Hormone receptor and HER2 status of a tumour are major factors in determining which treatment will work best

Hormone receptor status and **HER2** expression are assessed using a technique called **immunohistochemistry**, in which breast cancer tissue is stained with chemicals that will show if cancer cells have hormone receptors or **HER2** receptors. Another technique, called ***in situ* hybridisation** can also be used to localise specific **genes**, allowing doctors to see if breast cancer cells have extra copies of the **HER2 gene**. Expression of hormone receptors and **HER2** can vary between different parts of a **tumour**, therefore hormone receptor negative and **HER2** negative **biopsy** specimens are usually retested on the **tumour** tissue removed by surgery *(Cardoso et al. 2018 [in press])*.

Proliferation markers

Other **biomarkers** may also be evaluated in the **tumour biopsy**/surgery specimen. For example, **Ki-67** is a protein found in cells when they are dividing (e.g. in cancer) but not when they rest. Therefore, if **Ki-67** is present in a high proportion of cells, this indicates that the **tumour** is growing quickly.

Gene expression profiles, which show distinct sets of **genes** expressed by a **tumour**, may be used to give extra information and classify patients as 'high risk' or 'low risk'; however, their use varies from country to country, depending on resources.

Breast cancer subtypes

Breast **tumours** can be grouped into subtypes using the results from the **biomarker** tests described above. These groupings, summarised in the table below, can give an indication of **prognosis** and can help doctors to determine which treatments should be considered for each type of breast cancer *(Cardoso et al. 2018 [in press])*.

SUBTYPE	SURROGATE DEFINITION	FEATURES
Luminal A-like	Luminal A-like	• **ER positive** • **HER2** negative • **Ki67** low • **PgR** high • Low-risk molecular signature (if available)
Luminal B-like	Luminal B-like (**HER2** negative)	• **ER positive** • **HER2** negative • Either **Ki67** high or **PgR** low • High-risk molecular signature (if available)
	Luminal B-like (**HER2** positive)	• **ER positive** • **HER2** positive • Any **Ki67** • Any **PgR**
HER 2 overexpressing	**HER2** positive (non-luminal)	• **HER2** positive • **ER** and **PgR** absent
Basal-like	Triple-negative (ductal)	• **HER2** negative • **ER** and **PgR** negative

What are the treatment options for breast cancer?

Your treatment will depend upon the size, location and number of **tumours** and the pathology (subtype, **grade** and presence of **biomarkers**) of the **tumour**, as well as your age and general health. The choice and combination of treatments will be discussed with you and your preferences will be taken into account.

One of the most important decisions you will have to make is where to be treated. Treatment within a multidisciplinary and specialised team improves survival and quality of life, as opposed to being treated by a single doctor. All of your treatment decisions should be taken after discussion in a multidisciplinary meeting, where doctors from different specialties, nurses and other health professionals involved in your care will discuss your case and decide which treatment is the best option for you.

Surgery

The two types of surgery for breast cancer are **breast-conserving surgery**, in which the surgical team removes the **tumour** but tries to keep as much of the breast as possible, or **mastectomy**, in which the whole breast is removed. If the **lymph nodes** in your armpit look like they are clear of cancer in imaging tests, then a technique called sentinel **lymph node biopsy** should be performed. This identifies the most important (sentinel) **lymph node** and examines it; if no cancer is detected, then no other **lymph nodes** will be removed, but if cancer is found in that **lymph node**, more nodes may have to be removed (called axillary dissection). Patients undergoing **mastectomy** should usually be offered immediate or delayed breast reconstruction, except in the case of inflammatory breast cancer.

Radiotherapy

Radiotherapy is a type of treatment that uses **ionising radiation**, which damages the DNA of cancerous cells, causing the cells to die. **Radiotherapy** is usually given after **breast-conserving surgery** and may also be given after **mastectomy**. **Radiotherapy** may also be given to patients with locally-advanced disease which remains inoperable after **systemic** treatment and may be considered in certain patients with metastatic disease to treat the symptoms of the primary **tumour** or distant **metastases** and improve quality of life.

Radiotherapy after **breast-conserving surgery** is usually given as **whole breast radiotherapy** (**WBRT**). In patients considered to be at high risk of recurrence who have already undergone **WBRT**, a **radiotherapy** 'boost' may be given – this is an extra, lower dose of radiation directed specifically to the area that the **tumour** was removed from. This may be done similarly to **WBRT** with external **radiotherapy** or with brachytherapy, in which a radiation source is placed into the breast tissue for a short time to provide internal **radiotherapy** focused only on a small **margin** of tissue surrounding the site of surgery.

Patients who are considered to be at a low risk of recurrence may instead receive a short course of **radiotherapy** using a technique called **accelerated partial breast irradiation** (**APBI**) *(Cardoso et al. 2018 [in press])*. This treatment is shorter than **WBRT** and reduces the exposure of healthy breast tissue and other organs in the chest (e.g. heart, lungs) to radiation, reducing the risk of long-term side effects.

Some patients also require **radiotherapy** after **mastectomy**, because of the presence of factors that increase the risk of the cancer coming back. This is done similarly to **radiotherapy** after **breast-conserving surgery**.

Systemic therapy

There are several types of **systemic** therapy that you may be treated with, depending on the type and stage of cancer you have.

Chemotherapy

Chemotherapy destroys cancer cells and is used to treat most triple negative, **HER2** positive and luminal B-like breast cancers. **Chemotherapy** is usually given every 1–3 weeks as **intravenous** infusions. Some patients may also be offered additional oral **chemotherapy** following completion of standard **intravenous chemotherapy**.

Endocrine therapies

Endocrine therapies aim to reduce the effects of **oestrogen** in **ER positive** breast cancers. This is the most important type of **systemic** treatment for **ER positive tumours**, also called hormone-dependent **tumours**. There are a number of types of **endocrine therapy** available, which are taken orally or administered as an injection:

- Selective **oestrogen** receptor modulators (SERMs) block **ER** on breast cells to prevent **oestrogen** attaching to the receptors. **Tamoxifen** is a type of SERM.
- Selective **oestrogen** receptor downregulators (SERDs), such as **fulvestrant**, work in a similar way to SERMs, but also reduce the number of **ER**s.
- **Ovarian function suppression** by **gonadotropin-releasing hormone analogues** or by surgery may be offered to pre- and perimenopausal women to reduce the supply of **oestrogen** from the ovaries to the **tumour**.
- **Aromatase inhibitors** reduce the production of **oestrogen** in tissues and organs other than the ovaries, and is therefore effective only in postmenopausal women, unless the function of the ovaries is suppressed (**oestrogen** levels are artificially lowered) in premenopausal women. **Anastrozole**, **letrozole** and **exemestane** are all **aromatase inhibitors**.

Targeted therapy

Targeted therapies are drugs that block specific signalling pathways in cancer cells that encourage them to grow. A number of **targeted therapies** are used in the treatment of breast cancer:

- Anti-**HER2** agents act on the **HER2** receptor to block signalling and reduce cell proliferation in **HER2** positive breast cancers. **Trastuzumab**, **lapatinib**, **pertuzumab** and **trastuzumab emtansine** (**TDM-1**) are all currently-used anti-**HER2** agents. **Neratinib** is a new anti-**HER2** agent that may also be used to treat **HER2** positive disease.
- Inhibitors of **cyclin-dependent kinases 4/6** (**CDK4/6**) reduce cellular proliferation in **tumours**. **Palbociclib**, **ribociclib** and **abemaciclib** are **CDK4/6** inhibitors used in the treatment of breast cancer.
- Inhibitors of **mechanistic target of rapamycin** (**mTOR**), such as **everolimus**, reduce the growth and proliferation of **tumour** cells stimulated by **mTOR** signalling.
- Inhibitors of **poly ADP-ribose polymerase** (**PARP**) make it difficult for cancer cells to fix damaged DNA, which can cause cancer cells to die. **Olaparib** and **talazoparib** are new **PARP** inhibitors that may be used to treat some patients with a **BRCA mutation**.
- **Vascular endothelial growth factor** (**VEGF**) inhibitors, such as **bevacizumab**, stop **tumours** from stimulating blood vessel growth within the **tumour**, thereby starving them of the oxygen and nutrients they need to continue growing.

Other treatments

Patients with bone **metastases** should be treated with bone-modifying drugs such as **bisphosphonates** or **denosumab**, in combination with calcium and vitamin D supplements. These agents strengthen the bone, reducing bone pain and the risk of fractures. **Bisphosphonates** are also used in the postoperative treatment of early breast cancer, as they may reduce the risk of recurrence.

What are the treatment options for non-invasive (Stage 0) breast cancer (also called in situ carcinoma or DCIS)?

Surgery

The aim of surgery for early **non-invasive** breast cancer is to remove the **tumour** and confirm that it is **non-invasive**. The surgical team will ensure that the cancer is taken away along with a healthy **margin** of tissue to help stop it from coming back.

Non-invasive breast cancer may be treated with **mastectomy** or **breast-conserving surgery** *(Cardoso et al. 2018 [in press])*. Immediate breast reconstruction should be available to women undergoing a **mastectomy**, unless there is a clinical reason not to. Breast reconstruction can make it easier to accept losing a breast and does not affect the ability of doctors to detect any recurrences of your cancer.

The primary treatment for non-invasive breast cancer is surgical removal of the tumour

Radiotherapy

After **breast-conserving surgery**, you will typically receive **WBRT** to reduce the risk of the cancer returning. If you have undergone a **mastectomy** with successful removal of a **non-invasive** cancer, you will not need to have **radiotherapy** *(Cardoso et al. 2018 [in press])*.

Systemic therapy

If your cancer is **ER positive** and you have had **breast-conserving surgery**, you will usually be treated with **tamoxifen** or an **aromatase inhibitor** to reduce the risk of recurrence. If your cancer is **ER positive** and you have had a **mastectomy**, you will only be treated with **tamoxifen** an **aromatase inhibitor** if your doctor thinks you have a high risk of developing new **tumours** *(Cardoso et al. 2018 [in press])*.

What are the treatment options for early invasive (Stage I-IIA) breast cancer?

Surgery and radiotherapy

The aim of surgery for early **invasive** breast cancer is to remove the **tumour** by **breast-conserving surgery** or **mastectomy**. After **breast-conserving surgery**, you will usually receive **radiotherapy** as this lowers the risk of the cancer returning. Most patients have **WBRT**, but some patients who are considered to be at a low risk of recurrence may receive **APBI** *(Cardoso et al. 2018 [in press])*. If you have had a **mastectomy**, you may also receive **radiotherapy** if cancer cells are found in the **axillary lymph nodes**, or occasionally if you are considered to be at a high risk of recurrence.

Adjuvant systemic therapy

Following surgery to remove the **tumour**, many patients with early **invasive** breast cancer will receive **adjuvant systemic** treatment. Your doctor will discuss this decision with you, taking into account the hormone receptor, **HER2** and **Ki67** status of your **tumour**, the possible risks and benefits to you, and your personal preferences. **Adjuvant** treatment usually starts between 2 and 6 weeks after surgery and several types of therapy may be used.

Most patients with early invasive breast cancer will receive systemic therapy after surgery

Neoadjuvant systemic therapy

Some patients with early **invasive** breast cancer, particularly those with larger (more than 2cm in diameter) **tumours** or involved **lymph nodes**, may receive **neoadjuvant systemic** therapy to shrink the **tumour** to improve the likelihood of successful surgical removal of the **tumour** with a clear **margin**, or to allow less extensive surgery that may lead to a better cosmetic and/or functional outcome. All of the **adjuvant** treatments summarised below may also be used as **neoadjuvant** therapy.

Endocrine therapy

All patients with **ER positive** breast cancer will be offered **endocrine therapy** *(Cardoso et al. 2018 [in press])*. In premenopausal women, **ER positive** early breast cancer is usually treated with **tamoxifen** for 5 10 years. This may be changed to an **aromatase inhibitor** if the patient becomes postmenopausal during the first 5 years of **tamoxifen** treatment. **Ovarian function suppression** with **gonadotropin-releasing hormone analogues** or ovarian ablation may also be offered to premenopausal patients in combination with **tamoxifen** or an **aromatase inhibitor**.

In post-menopausal women, **ER positive** early breast cancer may be treated with either **aromatase inhibitors** or **tamoxifen**. **Aromatase inhibitors** may be used immediately, or after 2 3 years of **tamoxifen** treatment, or as an extended **adjuvant** therapy after 5 years of **tamoxifen** treatment.

Chemotherapy

Chemotherapy regimens used in early breast cancer usually contain chemicals called **anthracyclines** (e.g. **epirubicin** or **doxorubicin**) and/or **taxanes** (e.g. **paclitaxel** or **docetaxel**) used **sequentially** for 12-24 weeks *(Cardoso et al. 2018 [in press])*, although in some patients a combination of **cyclophosphamide**, **methotrexate** and **5-fluorouracil** (**CMF**) may be used. Dose-dense schedules (given every 2 weeks instead of the standard schedule of every 3 weeks) may be used in patients with highly proliferative **tumours**. Non-**anthracycline** regimens (e.g. **docetaxel** and **cyclophosphamide**) can be used in patients who are unsuitable for **anthracycline** treatment, or instead of it. **Chemotherapy** is recommended in the vast majority of triple-negative, **HER2** positive and high-risk luminal **HER2** negative **tumours**.

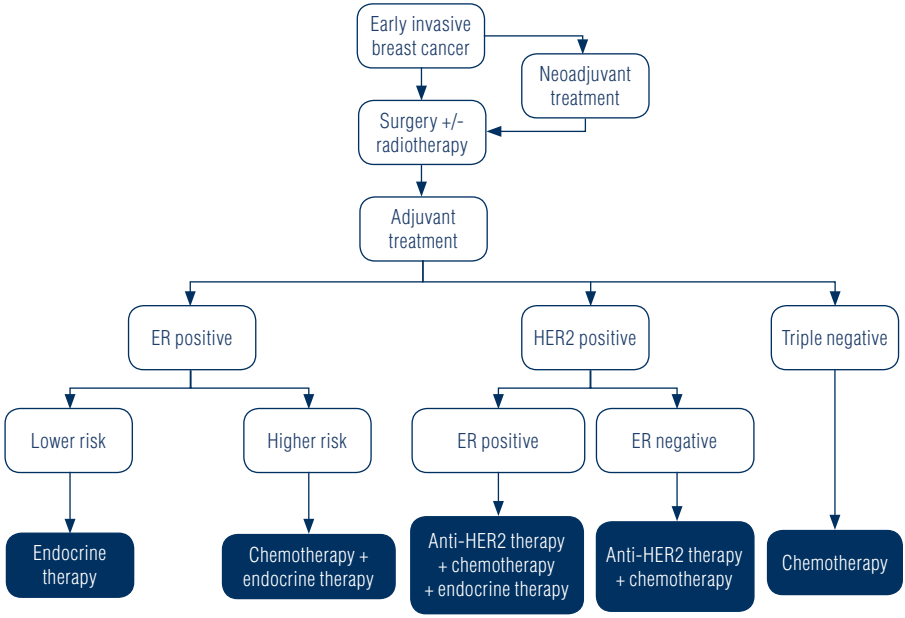
Anti-HER2 therapy

HER2 positive breast cancer is usually treated with the anti-**HER2** agent **trastuzumab** via **intravenous** infusion or **subcutaneous** injection, as well as **chemotherapy** *(Cardoso et al. 2018 [in press])*. **Trastuzumab** is approved for use in patients with **HER2** positive cancer following surgery, **neoadjuvant** or **adjuvant chemotherapy** and **radiotherapy**, in combination with **adjuvant chemotherapy**, and in combination with **neoadjuvant chemotherapy** for **tumours** larger than 2cm in diameter *(Herceptin SPC, 2017)*. The optimal duration of **trastuzumab** treatment is considered to be 1 year. **Trastuzumab** is not normally administered at the same

time as **anthracyclines** due to the risk of cardiac side effects (see section 'What are the possible side effects of treatment?' for more details), but can be given **sequentially**. **Taxanes** can be administered at the same time as **trastuzumab**. In some higher risk patients, a combination of **trastuzumab** and **pertuzumab** may be used. Some patients might also be offered a year of treatment with the new anti-**HER2** therapy **neratinib** following completion of **trastuzumab**.

Treatment overview

The variety of treatments available may seem confusing, but the combination of systemic treatment you receive will depend on the findings from your biopsy or samples from the tumour and/or lymph nodes after they have been removed by surgery. The following figure gives a general overview of the types of treatment options recommended for each disease subtype:



*Flowchart showing **systemic** treatment approaches in early **invasive** breast cancer.*

What are the treatment options for locally-advanced (Stage IIB-III) breast cancer?

In most cases, a combination of **systemic** therapy, surgery and **radiotherapy** is used for locally-advanced breast cancer.

Systemic therapy

Neoadjuvant therapy for locally-advanced disease

The initial treatment for locally-advanced breast cancer is usually **neoadjuvant systemic** therapy to shrink the **tumour** and improve the likelihood of successful surgical removal of the **tumour** with a clear **margin**. In general, the **systemic** therapies used for early breast cancer are also used for locally-advanced breast cancer, although in locally-advanced disease, **systemic** treatment is usually given first, patients generally require **radiotherapy**, and overall, the treatment is more aggressive.

The table below gives an overview of the types of **neoadjuvant** treatment that may be considered in different types of inoperable locally-advanced breast cancer *(Cardoso et al. 2018)*.

TYPE OF LOCALLY-ADVANCED BREAST CANCER	NEOADJUVANT THERAPY
ER positive breast cancer	**Endocrine therapy** or **anthracycline**- and **taxane**-based **chemotherapy**
HER2 positive breast cancer	**Anthracycline**-based **chemotherapy sequentially** with **taxanes** and anti-**HER2** therapy
Triple-negative breast cancer	**Anthracycline**- and **taxane**-based **chemotherapy**

Patients with locally-advanced breast cancer may also receive **radiotherapy** as a **neoadjuvant** treatment. Following effective **neoadjuvant systemic** therapy, surgical **resection** of the **tumour** is often possible. In most cases, surgery will involve a **mastectomy** and removal of the **axillary lymph nodes**, but **breast-conserving surgery** might be possible in some patients *(Cardoso et al. 2018)*.

Locally-advanced breast cancer is usually treated with systemic therapy, after which surgery may be possible to remove the tumour

What are the treatment options for metastatic (Stage IV) breast cancer?

If you have been diagnosed with metastatic breast cancer, a new **biopsy** will often be taken to confirm the histology and to re-assess the expression of **biomarkers** (e.g. hormone receptors and **HER2**).

The aim of **systemic** therapy for advanced disease is to prolong life and to maximise quality of life. This is most effectively achieved with **targeted therapies** (including **endocrine therapy**), which are typically used as the primary treatment in the majority of patients. In addition to **systemic** treatments, patients may receive **radiotherapy** (e.g. to reduce bone pain associated with bone **metastases**, for brain **metastases** and to reduce bleeding caused by **tumours** in soft tissue) or surgery (e.g. to relieve the pressure of a **tumour** pressing on the spinal cord, or to remove brain **metastases**). Patients with liver or lung **metastases** may also be offered novel ablative therapies such as **stereotactic radiotherapy**, **radioembolism** and **radiofrequency ablation**, however these treatments may not be suitable for all patients and their benefits have not yet been proven.

Bone modifying agents such as **bisphosphonates** and **denosumab** can help to reduce the occurrence of fractures commonly associated with the presence of bone **metastases** as well as pain.

Chemotherapy for advanced disease

Chemotherapy is the standard treatment for triple-negative breast cancer and for **ER-positive**, **HER2**-negative patients who have stopped responding to **endocrine therapy**. Occasionally, **ER-positive** patients may require **chemotherapy** because the cancer is particularly aggressive. **Chemotherapies** are usually given **sequentially** for metastatic disease but may be given in combination if the cancer is progressing quickly. Patients are usually treated with **capecitabine**, **vinorelbine** or **eribulin**. **Taxanes** or **anthracyclines** may be used again if they have been given before as **neoadjuvant** or **adjuvant** therapy, if the patient has been considered to be 'disease-free' for at least 1 year and the doctor considers it safe. There are also several other **chemotherapy** choices which your doctor may discuss with you *(Cardoso et al. 2018)*. A **platinum**-containing **chemotherapy** such as **carboplatin** or **cisplatin** might also be used in patients with triple-negative disease who have been treated with **anthracyclines** previously.

Endocrine therapy for advanced disease

ER positive, **HER2** negative advanced disease should almost always be initially treated with **endocrine therapy**: an **aromatase inhibitor**, **tamoxifen** or **fulvestrant** *(Cardoso et al. 2018)*. In pre- and perimenopausal patients, **ovarian function suppression** or ablation (surgical removal) is recommended in combination with **endocrine therapy**. Where available, **endocrine therapy** is usually combined with **targeted therapies** such as

palbociclib, **ribociclib**, **abemaciclib** or **everolimus** to improve outcomes. **Megestrol acetate** and estradiol (a type of **oestrogen**) are options for further lines of treatment. Patients with **ER positive**, **HER2** positive metastatic disease will typically be treated with anti-**HER2** therapy and **chemotherapy** as **first-line** treatment, then may receive **endocrine therapy** in combination with further anti-**HER2** therapy as **maintenance** treatment after completing **chemotherapy**.

Endocrine resistance is a term used when a patient experiences a relapse (or progression of metastatic disease) while taking **endocrine therapy**, or within 12 months of completing **endocrine therapy** *(Cardoso et al. 2018)*. Patients showing signs of **endocrine resistance** will usually have their treatment switched to a different **endocrine therapy**, or to **chemotherapy**.

Anti-HER2 therapy for advanced disease

The first-line treatment for **HER2** positive advanced disease is likely to be **trastuzumab** and **pertuzumab** in combination with **chemotherapy** (usually **docetaxel** or **paclitaxel**) *(Cardoso et al. 2018)*. Second-line treatment in these patients is typically **T-DM1**. Some patients may also receive second-line treatment with **trastuzumab** in combination with **lapatinib**. Further treatment lines may include combinations of **trastuzumab** with other **chemotherapy** drugs, or a combination of **lapatinib** and **capecitabine**.

Metastatic breast cancer is not curable but can be treated with an increasing choice of therapies

Other targeted therapies

CDK4/6 inhibitors (**palbociclib**, **ribociclib** and **abemaciclib**) are an option for the treatment of **ER positive** advanced breast cancer in combination with an **aromatase inhibitor** or **fulvestrant** *(Ibrance SPC, 2017; Kisqali SPC, 2017; Cardoso et al. 2018)*.

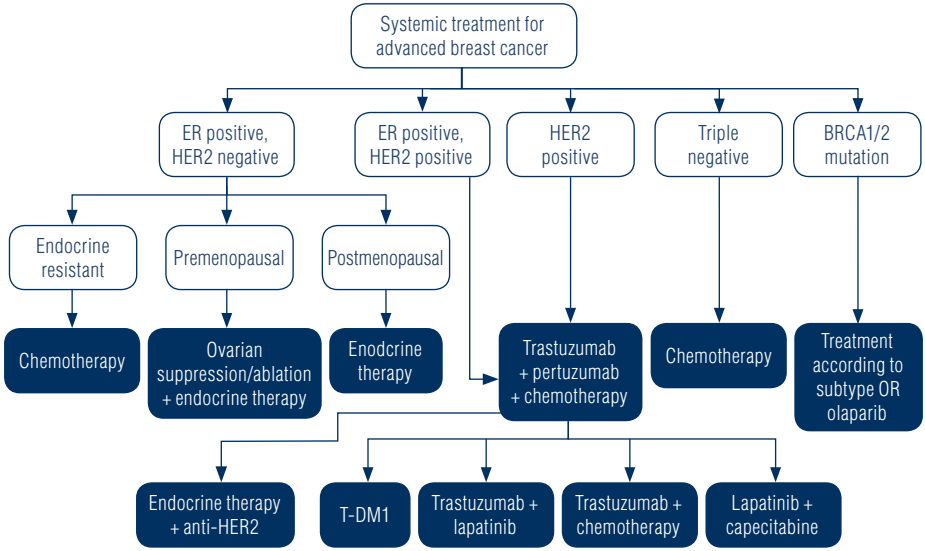
Everolimus in combination with **exemestane**, **tamoxifen** or **fulvestrant** is a treatment option for some postmenopausal patients with **ER positive** advanced breast cancer which has progressed after treatment with a non-steroidal **aromatase inhibitor** *(Cardoso et al. 2018)*.

The new agents **olaparib** and **talazoparib** are **PARP** inhibitors that may be used as an alternative to **chemotherapy** in patients with **BRCA1/2 mutations**.

Bevacizumab in combination with **paclitaxel** or **capecitabine** is approved in Europe for the **first-line** treatment of metastatic breast cancer *(Avastin SPC, 2017)*; however, this treatment is not currently recommended in European treatment guidelines for routine use as it only provides moderate benefits to some patients *(Cardoso et al. 2018)*.

Treatment overview

The number of potential treatments can be very confusing, but your doctor or **nurse specialist** will guide you through the options available for you. The following figure gives a broad overview of the types of treatment recommended for each disease subtype:



*Flowchart showing **systemic** treatment approaches in advanced breast cancer.*

Special populations

Patients with BRCA mutations

Due to their increased risk of developing breast cancer, women carrying a **BRCA1** or **BRCA2 mutation** may be offered preventative bilateral **mastectomy** with breast reconstruction and bilateral **salpingo-oophorectomy**. After a bilateral **mastectomy**, the risk of breast cancer in these patients is reduced by 90–95% *(Cardoso et al. 2018)*. In general, **BRCA**-associated early breast cancers are treated in a similar way to other breast cancers, and **adjuvant** therapies should be given according to clinical need *(Paluch-Shimon et al. 2016)*. As with non-**BRCA** triple-negative breast cancer, **carboplatin** is recommended for **BRCA**-associated advanced triple-negative disease *(Cardoso et al. 2018)*. In **BRCA**-associated triple-negative or **ER-positive tumours** resistant to **endocrine therapies**, **olaparib** or **talazoparib** might be an alternative to **chemotherapy**.

Breast cancer and pregnancy

There is no contraindication to becoming pregnant after having breast cancer. There are, however, several important points to consider, especially in the case of **ER positive** breast cancer, due to the long duration of **endocrine therapy**. **Endocrine therapy** must be stopped before trying to get pregnant and should be resumed after delivery and breastfeeding. If you wish to get pregnant, please discuss all of the issues carefully with your doctor.

Treating breast cancer that occurs during pregnancy is a very difficult situation that should be handled by an experienced team. In the vast majority of cases, there is no need to terminate the pregnancy (i.e. there is no need to have an abortion). Terminating the pregnancy does not improve the **prognosis** of the mother. However, this is a delicate decision that must be taken by the woman and her partner, after being well informed of all available options. Several types of treatment are possible during pregnancy, depending on the trimester *(Peccatori et al. 2013)*. Surgery is usually safe in any trimester. **Chemotherapy** is safe during the second and third trimesters; **anthracycline**-based **chemotherapy** is usually the first choice of treatment in pregnancy and **taxanes** may also be used. **Endocrine** and anti-**HER2** therapies can only be given after the baby is born. **Radiotherapy** is usually postponed until after the baby is born. The most important factor for the baby is to avoid premature birth.

Young women

In younger, premenopausal patients, treatment for breast cancer can reduce fertility and can cause an early or temporary **menopause**. Before starting treatment, your doctor will discuss all possible fertility issues with you and will give you information about any suitable fertility-preservation options available to you *(Peccatori et al. 2013, Cardoso et al. 2018)*.

As some forms of cancer treatment can be harmful to unborn babies, especially in the first trimester, you should avoid pregnancy during breast cancer therapy. It is important to understand that a lack of **menstruation** does not mean you are postmenopausal, therefore you will still need to take **contraceptive** measures.

Breast cancer treatment can affect fertility in young women, but fertility-preservation measures are available

Older women

Doctors will use your biological age rather than your **chronological age** when deciding on the best treatment for you – this means that if you are a fit and healthy elderly patient, you are likely to receive identical treatments to younger patients, with full doses of drugs *(Cardoso et al. 2018)*. If you are frail, it may be necessary to adjust standard treatments to balance the benefits of the treatment against the risks for you.

Men

Almost all cases of breast cancer in men are hormone receptor-positive for both **oestrogen** and **androgen** hormone receptors. Therefore, if you are told you have a triple-negative or **HER2** positive breast cancer, you should ask for a second pathology opinion. Approaches to surgery and **radiotherapy** are similar to those used in female breast cancer. Although **mastectomy** is more common than **breast-conserving surgery**, the latter is also possible, as well as some forms of less invasive **mastectomy** such as nipple-sparing **mastectomy** (removal of breast tissue without removal of the skin, nipple or areola). **Tamoxifen** is the standard **adjuvant endocrine therapy** *(Cardoso et al. 2018)*. For male metastatic breast cancer, **endocrine therapy** with **tamoxifen** is standard, but an **aromatase inhibitor** in combination with **gonadotropin-releasing hormone analogues** or surgical removal of the testicles to reduce **androgen** levels (**orchiectomy**), may also be considered *(Cardoso et al. 2018)*. The current recommendations for **chemotherapy** and anti-**HER2** therapy are the same as for breast cancer in females *(Cardoso et al. 2018)*.

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

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

Over the entire course of disease the anticancer treatments should be supplemented with interventions aimed at preventing complications of disease and treatment, and maximization of quality of life, such as supportive, palliative, survivorship, and end-of-life care that should be coordinated by a multidisciplinary team *(Jordan et al. 2018)*.

Supportive care

Supportive care involves the management of cancer symptoms and the side effects of therapy.

Palliative care

Palliative care is a term used to describe care interventions in the setting of advanced disease, including the management of symptoms and support for coping with prognosis, making difficult decisions and preparation for end-of-life care.

Survivorship care

Support for patients surviving cancer includes social support, education about the disease and rehabilitation. Survivor care plans can help patients to recover wellbeing in their personal, professional and social lives. For further information and advice on survivorship, see ESMO's patient guide on survivorship (ESMO 2017) (http://www.esmo.org/Patients/Patient-Guides/Patient-Guide-on-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 intolerable pain, **dyspnoea**, delirium or convulsions *(Cherny 2014)*. Discussions about end-of-life care can be very distressing, but support should always be available to patients and their families 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 summarised 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 or **nurse specialist** 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. 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 or **nurse specialist** as soon as possible.

It is important to talk to your doctor or nurse specialist 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 or **nurse specialist** can provide you with strategies to limit the impact of **fatigue**, including getting enough sleep, eating healthily and staying active *(Cancer.Net 2016)*.

Surgery

Lymphoedema in the arm and breast area is a fairly common side effect following surgery to remove **lymph nodes** in patients with breast cancer. It affects up to 25% of patients after **axillary lymph node** removal, but is less common after sentinel **lymph node biopsy**, affecting less than 10% of patients *(Cardoso et al. 2018 [in press])*. You can reduce your risk of **lymphoedema** in several ways:

- Maintain a healthy body weight to reduce the strain on your lymphatic system
- Use the arm on the operated side normally to encourage lymphatic drainage, and exercise regularly
- Protect your skin to avoid infection
  - Moisturise the skin in the area to prevent cracked skin
  - Use sunscreen to prevent sunburn
  - Apply insect repellent to prevent bites
  - Wear oven gloves when cooking
  - Wear protective gloves when gardening

If you notice any signs of swelling or infection, tell your doctor or **nurse specialist** as soon as possible.

Following surgery, your arm and shoulder on the operated side may feel stiff and sore for several weeks. Your **nurse specialist** or a physiotherapist can give you some gentle exercises to help you regain the movement you had before the operation.

Radiotherapy

There are several common side effects of **radiotherapy**, including **fatigue** and skin irritation, aches and swelling in the treated breast. Let your doctor know of any symptoms as he/she may be able to help; for example, creams or dressings can help with skin irritation. You should also avoid exposing the treated area to sun for at least a year after treatment. As **radiotherapy** for breast cancer will also result in some irradiation to the heart and lungs, the risk of heart disease and lung cancer (particularly in people who smoke) may be slightly higher in patients who have undergone **radiotherapy** *(Henson et al. 2013)*. However, modern **radiotherapy** techniques minimise this risk.

Chemotherapy

Side effects from **chemotherapy** vary depending upon the drugs and doses used – you may experience some of the side effects listed below but you are very unlikely to get all of them. Patients who receive a combination of different **chemotherapy** drugs are likely to experience more side effects than those who receive a single **chemotherapy** drug. The main areas of the body affected by **chemotherapy** are those where new cells are being quickly made and replaced (i.e. **bone marrow**, **hair follicles**, the digestive system and the lining of your mouth). Reductions in your levels of **neutrophils** (a type of white blood cell) can lead to **neutropenia**, which can make you more susceptible to infections. An accidental leak of **chemotherapy** drug from the vein into the surrounding tissues (**extravasation**) can occasionally occur and may cause blisters or ulcerations; these effects may be counteracted using anti-histamines and steroid-based ointments, as well as warm soaks for to

ease skin pain. Some **chemotherapy** drugs can affect fertility – if you are worried about this, speak to your doctor before treatment starts. Nausea and vomiting are common and may be distressing in patients receiving **chemotherapy**, but your doctor will be able to use a variety of approaches to manage and prevent these symptoms *(Roila et al. 2016)*. 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)*.

CHEMOTHERAPY DRUG	POSSIBLE SIDE EFFECT	HOW THE SIDE EFFECTS MAY BE MANAGED
Capecitabine (Xeloda SPC, 2017)	• Abdominal pain • **Anorexia** • **Asthenia** • Diarrhoea • **Fatigue** • **Hand-foot syndrome** • Nausea • **Stomatitis** • Vomiting	• Effects on the **gastrointestinal system** (nausea, vomiting, diarrhoea, abdominal pain) and **stomatitis** may result in loss of appetite (**anorexia**) or feelings of weakness (**asthenia**). Your doctor will be able to help you to prevent or manage these side effects. Diarrhoea may be a temporary, mild side effect, but if it is severe then your doctor may be able to prescribe anti-diarrhoea medicine. • To prevent and treat **stomatitis**, 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. • To prevent and treat **hand-foot syndrome**, you can try keeping hands and feet cool by exposing them to cool water (soaks, baths or swimming), avoiding excessive heat/hot water and keeping them unrestricted (no socks, gloves or shoes that are tight fitting). Your treatment schedule may need to be adjusted if you experience severe **hand-foot syndrome** but in most cases, symptoms will be mild and treatable with creams and ointments and will subside once you have finished treatment.
Carboplatin (Macmillan 2015)	• **Anaemia** • Constipation • **Fatigue** • **Hepatic** (liver) toxicity • Increased risk of infection • Nausea • **Neutropenia** • **Renal** (kidney) toxicity • **Thrombocytopenia** • Vomiting	• Your blood cell counts will be monitored frequently throughout your treatment in order to detect any **neutropenia**, **anaemia** 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, vomiting or constipation. • You will have tests before and during treatment to check how well your kidneys and liver are functioning, and you will be asked to drink plenty of fluids to prevent your kidneys from becoming damaged.

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CHEMOTHERAPY DRUG	POSSIBLE SIDE EFFECT	HOW THE SIDE EFFECTS MAY BE MANAGED
Cisplatin (Macmillan, 2016)	• **Anaemia** • **Anorexia** • Changes in kidney function • Decreased fertility • Diarrhoea • **Fatigue** • Increased risk of infection • Increased risk of **thrombosis** • Nausea/vomiting • **Neutropenia** • **Peripheral neuropathy** • Taste changes • **Thrombocytopenia** • **Tinnitus**/changes in hearing	• Your blood cell counts will be monitored frequently throughout your treatment in order to detect any **neutropenia**, **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** (nausea, vomiting, diarrhoea, taste changes) may result in loss of appetite (**anorexia**). Your doctor will be able to help you to 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.
Cyclophosphamide (Cyclophosphamide SPC, 2017)	• **Alopecia** • Fever • Nausea • **Neutropenia** • **Renal** and urinary tract toxicity • Vomiting	• Your blood cell counts will be monitored frequently throughout your treatment in order to detect any **neutropenia** – 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. • You will have tests before and during treatment to check how well your kidneys are functioning, and you will be asked to drink plenty of fluids to prevent your kidneys from becoming damaged. • Your doctor will be able to help you prevent or manage any nausea or vomiting. • **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.

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CHEMOTHERAPY DRUG	POSSIBLE SIDE EFFECT	HOW THE SIDE EFFECTS MAY BE MANAGED
Docetaxel (Taxotere SPC, 2005)	• **Alopecia** • **Anaemia** • **Anorexia** • **Asthenia** • Diarrhoea • **Extravasation**-related tissue damage • Increased infections • Nail disorders • Nausea • **Neutropenia** • **Oedema** • **Peripheral neuropathy** • Skin reaction • **Stomatitis** • **Thrombocytopenia** • Vomiting	• Your blood cell counts will be monitored frequently throughout your treatment in order to detect any **neutropenia**, **anaemia** or **thrombocytopenia** – your doctor may adjust your treatment according to test results and will advise you on how to prevent infections. • Report any signs of **peripheral neuropathy** to your doctor, who will help you to manage this side effect. • Effects on the **gastrointestinal system** (nausea, vomiting, diarrhoea) and **stomatitis** may result in loss of appetite (**anorexia**) or feelings of weakness (**asthenia**). Your doctor will be able to help you to prevent or manage these side effects. • Let your doctor know if you experience any nail changes, skin reactions or fluid retention/swelling (**oedema**) – they will help you to manage these side effects. • **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. • Let your doctor know if you experience any burning or skin changes at the injection site, so that they can decide how to manage these. Many **extravasations** cause very little damage, but you may need to be treated with an antidote and apply compresses to the area for a few days *(Perez Fidalgo et al. 2012).*
Pegylated liposomal **doxorubicin** (Caelyx SPC, 2016)	• **Hand-foot syndrome** • **Neutropenia** • **Stomatitis** • **Thrombocytopenia**	• Your blood cell counts will be monitored frequently throughout your treatment in order to detect any **neutropenia** or **thrombocytopenia** – your doctor may adjust your treatment according to test results and will advise you on how to prevent infections. • To prevent and treat **hand-foot syndrome**, you can try keeping hands and feet cool by exposing them to cool water (soaks, baths or swimming), avoiding excessive heat/hot water and keeping them unrestricted (no socks, gloves or shoes that are tight fitting). Your treatment schedule may need to be adjusted if you experience severe **hand-foot syndrome** but in most cases, symptoms will be mild and treatable with creams and ointments and will subside once you have finished treatment. • To prevent and treat **stomatitis**, 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.

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CHEMOTHERAPY DRUG	POSSIBLE SIDE EFFECT	HOW THE SIDE EFFECTS MAY BE MANAGED
Non-liposomal **doxorubicin** (Doxorubicin SPC, 2016)	• Abnormal **hepatic** enzymes • **Alopecia** • **Anaemia** • **Anorexia** • **Asthenia** • Cardiac effects • Chills • Diarrhoea • **Extravasation**-related tissue damage • Fever • **Hand-foot syndrome** • Increased infections • Increased weight • **Leukopenia** • **Mucositis** • Nausea • **Neutropenia** • **Stomatitis** • **Thrombocytopenia** • Vomiting	• Your blood cell counts will be monitored frequently throughout your treatment in order to detect any **anaemia**, **leukopenia**, **neutropenia** 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. • Your cardiac function will be monitored before and during treatment with non-liposomal **doxorubicin** to minimise the risk of cardiac impairment. • To prevent and treat **hand-foot syndrome**, you can try keeping hands and feet cool by exposing them to cool water (soaks, baths or swimming), avoiding excessive heat/hot water and keeping them unrestricted (no socks, gloves or shoes that are tight fitting). Your treatment schedule may need to be adjusted if you experience severe **hand-foot syndrome** but in most cases, symptoms will be mild and treatable with creams and ointments and will subside once you have finished treatment. • Effects on the **gastrointestinal system** (nausea, vomiting, diarrhoea) and **stomatitis** may result in loss of appetite (**anorexia**) or feelings of weakness (**asthenia**). 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. • **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. • Let your doctor know if you experience any burning or skin changes at the injection site, so that they can decide how to manage these. **Extravasations** can cause necrosis and you may need to have treatment for the tissue damage *(Perez Fidalgo et al. 2012)*.

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CHEMOTHERAPY DRUG	POSSIBLE SIDE EFFECT	HOW THE SIDE EFFECTS MAY BE MANAGED
Epirubicin (Epirubicin hydrochloride SPC, 2017)	• Abnormal **hepatic** enzymes • **Alopecia** • **Anaemia** • **Anorexia** • **Asthenia** • Cardiac effects • Chills • Diarrhoea • **Extravasation**-related tissue damage • Fever • **Hand-foot syndrome** • Increased infections • Increased weight • **Leukopenia** • **Mucositis** • Nausea • **Neutropenia** • **Stomatitis** • **Thrombocytopenia** • Vomiting	• Your blood cell counts will be monitored frequently throughout your treatment in order to detect any **anaemia**, **leukopenia**, **neutropenia** 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. • Your cardiac function will be monitored before and during treatment with **epirubicin** to minimise the risk of cardiac impairment. • To prevent and treat **hand-foot syndrome**, you can try keeping hands and feet cool by exposing them to cool water (soaks, baths or swimming), avoiding excessive heat/hot water and keeping them unrestricted (no socks, gloves or shoes that are tight fitting). Your treatment schedule may need to be adjusted if you experience severe **hand-foot syndrome** but in most cases, symptoms will be mild and treatable with creams and ointments and will subside once you have finished treatment. • Effects on the **gastrointestinal system** (nausea, vomiting, diarrhoea) and **stomatitis** may result in loss of appetite (**anorexia**) or feelings of weakness (**asthenia**). 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. • **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. • Let your doctor know if you experience any burning or skin changes at the injection site, so that they can decide how to manage these. **Extravasations** can cause necrosis and you may need to have treatment for the tissue damage *(Perez Fidalgo et al. 2012)*.

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CHEMOTHERAPY DRUG	POSSIBLE SIDE EFFECT	HOW THE SIDE EFFECTS MAY BE MANAGED
Eribulin (Halaven SPC, 2017)	• **Alopecia** • **Anaemia** • **Anorexia** • **Arthralgia/myalgia** • Back pain and pain in extremity • Constipation • Cough • Diarrhoea • **Dyspnoea** • **Fatigue** • Fever • Headache • Nausea • **Neutropenia** • **Peripheral neuropathy** • Vomiting	• Your blood cell counts will be monitored frequently throughout your treatment in order to detect any **neutropenia** 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. • Report any signs of **peripheral neuropathy** to your doctor, who will help you to manage this side effect. • Effects on the **gastrointestinal system** (nausea, vomiting, diarrhoea, constipation) may result in loss of appetite (**anorexia**). Your doctor will be able to help you to prevent or manage these side effects. • Let your doctor know if you experience a persistent cough. Troublesome **dyspnoea** can be treated with drugs called opioids or benzodiazepines, and in some cases steroids are used *(Kloke and Cherny 2015)*. • **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. • Let your doctor know if you experience **arthralgia**, **myalgia**, headache or pain and they will help you to manage these side effects.
Gemcitabine (Gemcitabine SPC, 2017)	• **Alopecia** • **Anaemia** • **Dyspnoea** • Flu-like symptoms • Increased **hepatic** enzymes • **Leukopenia** • Nausea • **Oedema** • Rash • **Renal effects** • **Thrombocytopenia** • Vomiting	• 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. • Let your doctor know if you experience a persistent cough. Troublesome **dyspnoea** can be treated with drugs called opioids or benzodiazepines, and in some cases steroids are used *(Kloke and Cherny 2015)*. However, this is usually mild and passes rapidly without treatment. • Let your doctor know if you experience any skin reactions, flu-like symptoms or fluid retention/swelling (**oedema**) – they will help you to manage these side effects. • Your **renal** and **hepatic** function will be closely monitored before, during and after treatment. • **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.

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CHEMOTHERAPY DRUG	POSSIBLE SIDE EFFECT	HOW THE SIDE EFFECTS MAY BE MANAGED
Methotrexate (Methotrexate SPC, 2017)	• Abdominal pain • Allergic reactions • **Anorexia** • Fever • Increased infections • **Leukopenia** • Nausea • **Renal** effects • **Stomatitis** • **Thrombocytopenia** • Vomiting	• Your blood cell counts will be monitored frequently throughout your treatment in order to detect any **leukopenia** 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. • Effects on the **gastrointestinal system** (nausea, vomiting, **stomatitis**) may result in loss of appetite (**anorexia**). Your doctor will be able to help you to prevent or manage these side effects. • Your **renal** function will be closely monitored before, during and after treatment.
Paclitaxel (Paclitaxel SPC, 2017)	• **Alopecia** • **Anaemia** • **Arthralgia** • Bleeding • Diarrhoea • Hypersensitivity reactions • Increased infections • **Leukopenia** • Low blood pressure • **Mucositis** • **Myalgia** • Nail disorders • Nausea • **Neutropenia** • **Peripheral neuropathy** • **Thrombocytopenia** • Vomiting	• 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 effects on the **gastrointestinal system** (nausea, vomiting, diarrhoea) to your doctor as they may be able to help you to prevent or manage these side effects. • Report any signs of **peripheral neuropathy** to your doctor, who will help you to manage this side effect. • 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. • Let your doctor know if you experience nail changes, **arthralgia** or **myalgia**, so that they can decide how to manage these. • **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.

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CHEMOTHERAPY DRUG	POSSIBLE SIDE EFFECT	HOW THE SIDE EFFECTS MAY BE MANAGED
Vinorelbin (Navelbine SPC, 2017)	• Abdominal pain • **Alopecia** • **Anaemia** • **Anorexia** • Constipation • Diarrhoea • **Extravasation**-related tissue damage • **Fatigue** • Fever • Gastric disorders • Increased infections • **Leukopenia** • Nausea • **Neurological** disorders • **Neutropenia** • Skin reactions • **Stomatitis** • **Thrombocytopenia** • Vomiting	• 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. • Effects on the **gastrointestinal system** (nausea, vomiting, diarrhoea, abdominal pain, constipation) and **stomatitis** may result in loss of appetite (**anorexia**). Your doctor will be able to help you to prevent or manage these side effects. • Report any signs of **neurological** disorders (e.g. weakness of the legs and feet) to your doctor, who will decide how to manage these side effects. • Let your doctor know if you experience any burning or skin changes at the injection site, so that they can decide how to manage these. • **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. • Let your doctor know if you experience any burning or skin changes at the injection site, so that they can decide how to manage these. Many **extravasations** cause very little damage, but you may need to be treated with an antidote and apply compresses to the area for a few days *(Perez Fidalgo et al. 2012)*.
5-fluorouracil (Fluorouracil SPC, 2017)	• **Agranulocytosis** • **Alopecia** • **Anaemia** • **Anorexia** • **Bronchospasm** • Cardiac effects • Decreased **bone marrow** function • Delayed wound healing • Diarrhoea • Excess uric acid • **Fatigue** • **Hand-foot syndrome** • Increased infections • **Leukopenia** • **Mucositis** • Nausea • **Neutropenia** • Nose bleeds • **Pancytopenia** • **Thrombocytopenia** • Vomiting • Weakness	• Your blood cell counts will be monitored frequently throughout your treatment in order to detect any **neutropenia**, **leukopenia**, **anaemia**, **thrombocytopenia** or **pancytopenia** – 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. • Effects on the **gastrointestinal system** (nausea, vomiting, diarrhoea) may result in loss of appetite (**anorexia**). Your doctor will be able to help you to prevent or manage these side effects. • To prevent and treat **hand-foot syndrome**, you can try keeping hands and feet cool by exposing them to cool water (soaks, baths or swimming), avoiding excessive heat/hot water and keeping them unrestricted (no socks, gloves or shoes that are tight fitting). Your treatment schedule may need to be adjusted if you experience severe **hand-foot syndrome** but in most cases, symptoms will be mild and treatable with creams and ointments and will subside once you have finished treatment. • 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. • **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.

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

Endocrine therapies

The common side effects in patients treated with endocrine therapies often relate to the reduced action of **oestrogen** (e.g. hot flushes, increased sweating). Many of the side effects from **endocrine therapies** can be prevented or managed effectively. Always tell your doctor or nurse as soon as possible if you notice any side effects from taking an **endocrine therapy**. **Ovarian function suppression** can cause menopausal symptoms such as hot flushes, increased sweating, vaginal dryness and a loss of interest in sex. Your doctor or **specialist nurse** will be able to help you manage these symptoms.

THERAPY	POSSIBLE SIDE EFFECT	HOW THE SIDE EFFECTS MAY BE MANAGED
Anastrozole (Arimidex SPC, 2014)	• **Arthralgia**/joint stiffness • **Asthenia** • Headache • Hot flushes • **Hypercholesterolaemia** • Increased sweating • Nausea • **Osteoporosis** • Rash	• If you are at risk of **osteoporosis**, which is more common with advancing age, you will have your bone mineral density tested at the start of treatment and at regular intervals from then on. You will be advised to have adequate calcium and vitamin D3 intake and may be given a treatment to stop further bone mineral loss. • **Hypercholesterolaemia** of grade 2 and 3 might be treated with drugs called statins and fibrates. Your doctor may also need to pause or reduce the dose of your cancer treatment. • Let your doctor know if you experience any skin reactions, **arthralgia** or joint stiffness – they will help you to manage these side effects. • Your doctor may be able to help you to manage hot flushes, headaches, increased sweating and nausea.
Exemestane (Aromasin SPC, 2015)	• Abdominal pain • Depression • Dizziness • **Fatigue** • Headache • Hot flushes • Increased **hepatic** enzymes • Increased sweating • Insomnia • Joint and musculoskeletal pain • **Leukopenia** • Nausea • Pain	• It is important that you tell your doctor if you are suffering from depression – they will make sure you get the help you need. • Let your doctor know if you experience insomnia, dizziness or pain – they will help you to manage these side effects. • Your doctor may be able to help you to manage hot flushes, increased sweating, headache and nausea.

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THERAPY	POSSIBLE SIDE EFFECT	HOW THE SIDE EFFECTS MAY BE MANAGED
Fulvestrant (Faslodex SPC, 2017)	• **Asthenia** • Hot flushes • Hypersensitivity reactions • Increased **hepatic** enzymes • Increased sweating • Injection site reactions • Joint and musculoskeletal pain • Nausea • Rash	• Let your doctor know if you experience any skin reactions, hypersensitivity or joint/musculoskeletal pain – they will help you to manage these side effects. • Your doctor may be able to help you to manage hot flushes, increased sweating and nausea.
Gonadotropin-releasing hormone analogues (e.g. goserelin) (Zoladex SPC, 2017)	• Acne • Breast enlargement • Decreased sex drive • Hot flushes • Increased sweating • Injection site reactions • Vaginal dryness	• Let your doctor know if you experience any skin reactions – they will help you to manage these side effects. • Your doctor may be able to help you to manage hot flushes, vaginal dryness and increased sweating.
Letrozole (Femara SPC, 2015)	• **Arthralgia**/joint stiffness • **Asthenia** • Headache • Hot flushes • **Hypercholesterolaemia** • Increased sweating • Nausea • **Osteoporosis** • Rash	• If you are at risk of **osteoporosis**, which is more common with advancing age, you will have your bone mineral density tested at the start of treatment and at regular intervals from then on. You will be advised to have adequate calcium and vitamin D3 intake and may be given a treatment to stop further bone mineral loss. • **Hypercholesterolaemia** of grade 2 and 3 might be treated with drugs called statins and fibrates. Your doctor may also need to pause or reduce the dose of your cancer treatment. • Let your doctor know if you experience any skin reactions, **arthralgia** or joint stiffness – they will help you to manage these side effects. • Your doctor may be able to help you to manage hot flushes, headaches, increased sweating and nausea.
Megestrol acetate (Megace SPC, 2015)	• **Adrenal insufficiency** • Constipation • **Cushing's syndrome** • Diabetes **mellitus** • **Dyspnoea** • Hot flushes • **Hyperglycaemia** • **Hypertension** • Increased appetite • Increased weight • **Pulmonary embolism** • **Thrombophlebitis**	• Your doctor will monitor you for signs of diabetes, **Cushing's syndrome** and **adrenal insufficiency**. **Hyperglycaemia** is usually treated with antidiabetic drugs • Let your doctor know if you experience a persistent cough. Troublesome **dyspnoea** can be treated with drugs called opioids or benzodiazepines, and in some cases steroids are used *(Kloke and Cherny 2015)*. • Your doctor will monitor you for signs of **thrombosis**. • Your doctor may be able to help you to manage hot flushes.

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THERAPY	POSSIBLE SIDE EFFECT	HOW THE SIDE EFFECTS MAY BE MANAGED
Tamoxifen (Tamoxifen SPC, 2017)	• Endometrial thickening • **Fatigue** • Fluid retention • Hot flushes • Increased sweating • Nausea • Skin rash • Thromboembolic complications • Vaginal bleeding/discharge • Visual disorders	• Let your doctor know if you experience any skin reactions or fluid retention/swelling – they will help you to manage these side effects. • Your doctor will monitor you for signs of **thrombosis**. • Vaginal bleeding/discharge and visual disorders should be reported to your doctor. • Your doctor may be able to help you to manage hot flushes, increased sweating and nausea.

Important side effects associated with endocrine therapies in the treatment of breast cancer. *The most recent Summary of Product Characteristics (SPCs) for individual drugs can be located at: http://www.ema.europa.eu/ema/.*

Anti-HER2 therapies

The common side effects seen in patients treated with some anti-**HER2** therapies are effects on the **gastrointestinal system** (e.g. diarrhoea, vomiting, nausea) and more general effects like **fatigue** and hypersensitivity reactions. There can also be some potentially serious side effects such as cardiac disorders, although these risks are vastly reduced by avoiding concurrent treatment with cardiotoxic **chemotherapy** regimens, such as **anthracyclines** *(Florido et al. 2017)*. Many of the side effects from anti-**HER2** therapies can be prevented or managed effectively. Always tell your doctor or nurse as soon as possible if you notice any side effects from taking an anti-**HER2** therapy.

THERAPY*	POSSIBLE SIDE EFFECT	HOW THE SIDE EFFECTS MAY BE MANAGED
Lapatinib (Tyverb SPC, 2017)	• **Anorexia** • **Arthralgia** • Cardiac effects • Cough • Diarrhoea • **Dyspnoea** • **Fatigue** • Headache • **Hepatic** toxicity • Hot flushes • Insomnia • Nausea • Nose bleeds • Pain • Rash • **Stomatitis** • Vomiting	• Effects on the **gastrointestinal system** (nausea, vomiting, diarrhoea, **stomatitis**) may result in loss of appetite (**anorexia**). Your doctor will be able to help you to prevent or manage these side effects. • To prevent and treat **stomatitis**, 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. • Let your doctor know if you experience a persistent cough. Troublesome **dyspnoea** can be treated with drugs called opioids or benzodiazepines, and in some cases steroids are used *(Kloke and Cherny 2015)*. • Your **hepatic** and cardiac function will be monitored during treatment. • Let your doctor know if you experience **arthralgia** or pain – they will help you to manage these side effects. They can also give you advice on skin reactions, nasal symptoms and insomnia. • Your doctor may also be able to you to manage hot flushes and headaches.

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THERAPY*	POSSIBLE SIDE EFFECT	HOW THE SIDE EFFECTS MAY BE MANAGED
Neratinib (Nerlynx PI, 2017)	• Abdominal pain • Abdominal swelling • **Anorexia** • Diarrhoea • Dry skin • Dyspepsia • **Fatigue** • Increased **hepatic** enzymes • Muscle spasms • Nail disorders • Nausea • Rash • **Stomatitis** • Urinary tract infection • Vomiting • Weight loss	• Effects on the **gastrointestinal system** (nausea, vomiting, diarrhoea, abdominal pain/swelling, **dyspepsia** and **stomatitis**) may result in loss of appetite (**anorexia**). Your doctor will be able to help you to prevent or manage these side effects. • To prevent and treat **stomatitis**, 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. • Your **hepatic** function will be closely monitored before, during and after treatment. • Let your doctor know if you experience skin reactions or muscle spasms – they will help you to manage these side effects. They can also give you advice on preventing infections and weight loss.
Pertuzumab (Perjeta SPC, 2017)	• **Anaemia** • **Anorexia** • **Arthralgia** • Cough • **Dysgeusia** • **Fatigue** • Fever • **Gastrointestinal** effects • Headache • Hypersensitivity reaction • Infusion reaction • Insomnia • **Mucositis**/mucosal inflammation • **Myalgia** • Nail disorder • **Nasopharyngitis** • **Oedema** • Pain • Rash • Upper respiratory tract infection	• Effects on the **gastrointestinal system** (nausea, vomiting, diarrhoea, **stomatitis**, constipation, **dyspepsia**, **dysgeusia**) may result in loss of appetite (**anorexia**). 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. • Let your doctor know if you experience any insomnia, **myalgia**, **arthralgia**, pain, skin reactions, inflammation or fluid retention/ swelling – they will help you to manage these side effects.

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THERAPY*	POSSIBLE SIDE EFFECT	HOW THE SIDE EFFECTS MAY BE MANAGED
T-DM1 (Kadcyla SPC, 2013)	• Abdominal pain • **Anaemia** • **Arthralgia** • **Asthenia** • Bleeding • Chills • Constipation • Diarrhoea • Dry mouth • **Dyspnoea** • **Fatigue** • Fever • Headache • Increased **hepatic** enzymes • Insomnia • Low potassium • Musculoskeletal pain • **Myalgia** • Nausea • Nose bleeds • **Peripheral neuropathy** • Rash • **Stomatitis** • **Thrombocytopenia** • Urinary tract infection • Vomiting	• Effects on the **gastrointestinal system** (nausea, vomiting, diarrhoea, constipation, **stomatitis**) may result feelings of weakness (**asthenia**). Your doctor will be able to help you to prevent or manage these side effects. • Let your doctor know if you experience respiratory problems. Troublesome **dyspnoea** can be treated with drugs called opioids or benzodiazepines, and in some cases steroids are used *(Kloke and Cherny 2015)*. • To prevent and treat **stomatitis**, 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 signs of **peripheral neuropathy** to your doctor, who will help you to manage this side effect. • Let your doctor know if you experience **arthralgia**, **myalgia**, pain or insomnia – they will help you to manage these side effects.
Trastuzumab (Herceptin SPC, 2017)	• **Anorexia** • **Arthralgia** • Cardiac disorders • **Conjunctivitis** • Dizziness • **Gastrointestinal** effects • Headache • Hot flushes • Insomnia • **Myalgia** • **Nasopharyngitis** • Nose bleeds or mucus-filled nose • **Paraesthesia** • Rash and other skin effects • Respiratory effects including **dyspnoea** • Tremor • Watery eyes • Weight loss	• Your cardiac function will be assessed before starting treatment with **trastuzumab** and will be monitored every 3 4 months during treatment. If your cardiac function is affected, your doctor may decide to reduce or pause **trastuzumab** treatment or prescribe you another drug to treat the cardiac side effects *(Curigliano et al. 2012)*. • Effects on the **gastrointestinal system** (nausea, vomiting, diarrhoea, constipation, **dyspepsia**, lip swelling, abdominal pain, **stomatitis**, **disguesia**) may result in loss of appetite (**anorexia**). Your doctor will be able to help you to prevent or manage these side effects. • Let your doctor know if you experience respiratory problems. Troublesome **dyspnoea** can be treated with drugs called opioids or benzodiazepines, and in some cases steroids are used *(Kloke and Cherny 2015)*. • It is important that you tell your doctor if you suffer from **paraesthesia**, tremor, dizziness or insomnia. • Let your doctor know if you experience **arthralgia**, **myalgia** or pain – they will help you to manage these side effects. They can also give you advice on skin reactions, eye problems and nasal symptoms.

Important side effects associated with anti-HER-2 therapies in the treatment of breast cancer. *The most recent Summary of Product Characteristics (SPCs) for individual drugs can be located at: http://www.ema.europa.eu/ema/.*

**Some of the agents listed in this table may not be available in your country. Please consult your doctor and/or local product prescribing information for further details.*

Other targeted therapies

The commonly reported side effects in patients treated with other **targeted therapies** are generally similar to the side effects from the other treatments listed above. Many of these side effects can be prevented or managed effectively, and you should always tell your doctor or nurse as soon as possible if you notice any side effects from treatment.

THERAPY*	POSSIBLE SIDE EFFECT	HOW THE SIDE EFFECTS MAY BE MANAGED
Abemaciclib (Verzenio PI, 2017)	• Abdominal pain • **Anaemia** • **Anorexia** • Diarrhoea • **Fatigue** • Headache • Increased infections • **Leukopenia** • Nausea • **Neutropenia** • **Thrombocytopenia** • Vomiting	• 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. • Effects on the **gastrointestinal system** (diarrhoea, nausea, vomiting, abdominal pain) may result in loss of appetite (**anorexia**). Your doctor will be able to help you to prevent or manage these side effects. • Report any other side effects, including headache and **fatigue** to your doctor, who will help you to manage these side effects.
Bevacizumab (Avastin SPC, 2017)	• **Anorexia** • **Arthralgia** • Bleeding disorders • Constipation • Diarrhoea • **Dysarthria** • **Dysgeusia** • **Dyspnoea** • **Fatigue** • Headache • **Hypertension** • **Leukopenia** • Nausea • **Neutropenia** • **Peripheral neuropathy** • **Proteinuria** • **Rhinitis** • Skin reactions • **Stomatitis** • **Thrombocytopenia** • Wound healing complications • Vomiting • Watery eyes	• Report any signs of **peripheral neuropathy** to your doctor, who will help you to manage this side effect. • Any treatment will be delayed until wounds have healed satisfactorily. • Your blood pressure will be monitored throughout treatment and any **hypertension** will be managed appropriately. • Your **renal** function will be monitored during treatment. • Effects on the **gastrointestinal system** (**stomatitis**, constipation, diarrhoea, nausea, vomiting) and **dysgeusia** may result in loss of appetite (**anorexia**). Your doctor will be able to help you to prevent or manage these side effects. • Let your doctor know if you experience respiratory problems. Troublesome **dyspnoea** can be treated with drugs called opioids or benzodiazepines, and in some cases steroids are used *(Kloke and Cherny 2015)*. • Let your doctor know if you develop any skin reactions (e.g. rash, dry skin, discolouration) – they will help you to manage these side effects. • Report any other side effects, including changes in vision, **dysarthria**, **arthralgia** or headache to your doctor, who will help you to manage these side effects.

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THERAPY*	POSSIBLE SIDE EFFECT	HOW THE SIDE EFFECTS MAY BE MANAGED
Everolimus (Afinitor SPC, 2017)	• **Anaemia** • **Anorexia** • Cough • Diarrhoea • **Disgeusia** • **Dyspnoea** • **Fatigue** • Headache • **Hypercholesterolaemia** • **Hyperglycaemia** • Infections • Nausea • Nose bleed • **Oedema** • **Pneumonitis** • **Pruritus** • Rash • **Stomatitis** • Weight loss	• Your blood cell counts will be monitored frequently throughout your treatment in order to detect any **anaemia** – your doctor may adjust your treatment according to test results and will advise you on how to prevent infections. • Effects on the **gastrointestinal system** (nausea, diarrhoea, **stomatitis**) and **dysgeusia** may result in loss of appetite (**anorexia**). Your doctor will be able to help you to prevent or manage these side effects. • To prevent and treat **stomatitis**, 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. • It is important that you report any respiratory problems to your doctor. Troublesome **dyspnoea** can be treated with drugs called opioids or benzodiazepines, and in some cases steroids are used *(Kloke and Cherny 2015)*. If you develop non-infectious inflammation of the lungs (**pneumonitis**) of grade 2, your doctor might pause or reduce the dose of **everolimus**. If you suffer from grade 3 or higher non-infectious **pneumonitis** then **everolimus** will probably be stopped. • Your blood sugar and lipid levels will be monitored during therapy. Grade 1 and 2 **hyperglycaemia** is usually treated with antidiabetic drugs. **Hypercholesterolaemia** of grade 2 and 3 might be treated with drugs called statins and fibrates. Your doctor may also need to pause, reduce or stop **everolimus**. • Let your doctor know if you experience any headaches, skin reactions, nose bleeds or fluid retention/swelling – they will help you to manage these side effects.
Olaparib (Lynparza PI, 2017)	• **Anaemia** • **Anorexia** • **Arthralgia** • Constipation • Diarrhoea • **Dysgeusia** • **Dyspepsia** • **Fatigue** • Headache • **Myalgia** • **Nasopharyngitis** • Nausea • **Stomatitis** • Upper respiratory tract infection • Vomiting	• Effects on the **gastrointestinal system** (nausea, diarrhoea, vomiting, constipation, **dyspepsia**, **stomatitis**) and **dysgeusia** may result in loss of appetite (**anorexia**). Your doctor will be able to help you to prevent or manage these side effects. • To prevent and treat **stomatitis**, 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. • Let your doctor know if you experience **arthralgia**, **myalgia** or headache and they will help you to manage these side effects.

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THERAPY*	POSSIBLE SIDE EFFECT	HOW THE SIDE EFFECTS MAY BE MANAGED
Palbociclib (Ibrance SPC, 2017)	• **Alopecia** • **Anaemia** • **Anorexia** • Diarrhoea • **Fatigue** • Nausea • **Neutropenia** • Rash • **Stomatitis** • **Thrombocytopenia** • Vomiting	• Your blood cell counts will be monitored frequently throughout your treatment in order to detect any **neutropenia**, **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** (**stomatitis**, diarrhoea, nausea, vomiting) and **dysgeusia** may result in loss of appetite (**anorexia**). Your doctor will be able to help you to prevent or manage these side effects. • To prevent and treat **stomatitis**, 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. • Let your doctor know if you develop any skin reactions – they will help you to manage these side effects. • **Alopecia** can be upsetting for many patients; your doctor will provide you with information on how to cope with this side effect.
Ribociclib (Kisqali SPC, 2017)	• Abdominal pain • Abnormal **hepatic** function • **Alopecia** • **Anaemia** • **Anorexia** • **Asthenia** • Back pain • Cardiac effects • Constipation • Diarrhoea • **Dyspnoea** • **Fatigue** • Fever • Headache • Insomnia • **Lymphopenia** • Nausea • **Neutropenia** • **Oedema** • **Pruritus** • Rash • Stomatitis • Vomiting	• Your blood cell counts will be monitored frequently throughout your treatment in order to detect any **anaemia**, **neutropenia** or **lymphopenia** – 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 cardiac function will be assessed before treatment begins. • Effects on the **gastrointestinal system** (**stomatitis**, abdominal pain, diarrhoea, constipation, nausea, vomiting) may result in loss of appetite (**anorexia**) or feelings of weakness (**asthenia**). Your doctor will be able to help you to prevent or manage these side effects. • To prevent and treat **stomatitis**, 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. • Let your doctor know if you experience any **dyspnoea**, insomnia, headache, skin reactions or fluid retention/swelling – they will help you to manage these side effects. • Your doctor will regularly monitor your **hepatic** enzyme levels and might do additional liver function tests if they are concerned. • **Alopecia** can be upsetting for many patients; your doctor will provide you with information on how to cope with this side effect.

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THERAPY*	POSSIBLE SIDE EFFECT	HOW THE SIDE EFFECTS MAY BE MANAGED
Talazoparib	• Alopecia • Anaemia • Anorexia • Back pain • Constipation • Diarrhoea • Dyspnoea • Fatigue • Lymphopenia • Nausea • Neutropenia • Thrombocytopenia • Vomiting	• Your blood cell counts will be monitored frequently throughout your treatment in order to detect any anaemia, neutropenia, thrombocytopenia or lymphopenia – your doctor may adjust your treatment according to test results and will advise you on how to prevent infections. • Effects on the gastrointestinal system (nausea, diarrhoea, vomiting, constipation) may result in loss of appetite (anorexia). Your doctor will be able to help you to prevent or manage these side effects. • Let your doctor know if you experience a persistent cough. Troublesome dyspnoea can be treated with drugs called opioids or benzodiazepines, and in some cases steroids are used *(Kloke and Cherny 2015)*. • Alopecia can be upsetting for many patients; your doctor will provide you with information on how to cope with this side effect.

Important side effects associated with targeted therapies in the treatment of breast cancer. *The most recent Summary of Product Characteristics (SPCs) for individual drugs can be located at: http://www.ema.europa.eu/ema/.*

**Some of the agents listed in this table may not be available in your country. Please consult your doctor and/or local product prescribing information for further details.*

Other treatments

Supportive therapy with bisphosphonates can result in side effects including flu-like symptoms, renal toxicity and low calcium levels. Bisphosphonates can also occasionally lead to osteonecrosis (death of bone tissues) in the jaw. Although this is very rare, it is important that you clean your teeth regularly and carefully and report any oral problems to your doctor and dentist. Denosumab therapy can also potentially lead to osteonecrosis of the jaw, as well as low calcium levels and skin infections. It is crucial that you inform your doctor or nurse well in advance of any planned dental treatments, as bisphosphonates and denosumab therapy will have to be temporarily stopped.

What happens after my treatment has finished?

Follow-up appointments

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

After your treatment has finished, your doctor will arrange follow-up appointments. Typically, these will be every 3 4 months in the first 2 years, every 6 8 months from years 3 5 and once a year thereafter *(Cardoso et al. 2018 [in press])*. During these appointments, your doctor will review your medical history with you, note any treatment-related side effects, and conduct a clinical examination. You will also have a **mamography** every year, and some patients will also have regular **MRI** or **ultrasound** scans. If you are taking **aromatase inhibitors**, you will have your bone density measured regularly. Based on your results, your doctor will let you know how often you need to return for further follow-up appointments.

What if I need more treatment?

Cancer that comes back is called a recurrence. The treatment that you will be offered depends on the extent of the recurrence and the previous treatment(s) you have received. When the **tumour** comes back as a recurrence in the breast or surrounding **lymph nodes**, you may be offered further surgery followed by **radiotherapy** and/or **systemic** therapy. Recurrent **tumours** in distant organs are regarded as metastatic cancers and you can usually have further **systemic** therapy – this may include different drugs to those you were treated with when you were first diagnosed, although some patients may receive the same treatments again, especially if they have been free from breast cancer for an extended period of time.

Looking after your health

After you have had treatment for breast 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 to resume your normal life, including family activities and work or professional roles.

Eating a healthy diet and keeping active can help improve your overall health, fitness and mood. Exercising and maintaining your body weight in a healthy range may also reduce your risk of recurrence *(Cardoso et al. 2018 [in press])*. It is important to start slowly, with gentle walking, and build up as you start to feel better.

Maintaining a healthy lifestyle through a healthy diet and regular exercise will help to keep you healthy and may reduce the risk of recurrence

Long-term effects

After completing treatment for breast cancer, you may experience some long-term side effects, depending on the treatment you have received – for example **radiotherapy** can increase the risk of heart disease and lung cancer and **chemotherapy** can cause **peripheral neuropathy**. These long-term effects can be managed so it is important that you tell your doctor or **specialist nurse** about any persistent or new symptoms.

Notably, treatments for breast cancer can cause an early **menopause** along with all of the symptoms that are associated with the change in hormone levels, including hot flushes, increased sweating, vaginal dryness and a loss of interest in sex. The **menopause** can also contribute to **osteoporosis**. If you have concerns about early **menopause** then you should talk to your doctor or **specialist nurse**. Hormone replacement therapy is not normally recommended after breast cancer as it is thought that it could increase the chances of the cancer coming back.

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 (ESMO 2017) (http://www.esmo.org/Patients/Patient-Guides/Patient-Guide-on-Survivorship).

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

Breast cancer patient advocacy groups help patients and their families to navigate the breast 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.

- **ABC Global Alliance:** www.abcglobalalliance.org
- **Advanced BC:** http://advancedbc.org
- **After Breast Cancer Diagnosis:** www.abcdbreastcancersupport.org
- **Breast Cancer Alliance:** www.breastcanceralliance.org
- **Breast Cancer Care:** www.breastcancercare.org.uk
- **Breast Cancer Network Australia:** www.bcna.org.au
- **EUROPA DONNA:** www.europadonna.org
- **Male Breast Cancer Coalition:** http://malebreastcancercoalition.org
- **Metastatic Breast Cancer Network:** www.mbcn.org
- **Metavivor:** www.metavivor.org
- **National Breast Cancer Coalition:** www.breastcancerdeadline2020.org/homepage.html
- **Susan G. Komen Breast Cancer Foundation:** ww5.komen.org
- **Unión Latinoamericana Contra al Cáncer de la Mujer:** www.ulaccam.org/index.php

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GLOSSARY

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

ABEMACICLIB
A new type of **targeted therapy** which inhibits **CDK4/6** to reduce the proliferation of **tumour** cells

ACCELERATED PARTIAL BREAST IRRADIATION (APBI)
Radiotherapy focused only on a small **margin** of tissue surrounding the site of **resection** of the breast **tumour**

ADJUVANT (TREATMENT)
Additional treatment given after the primary treatment to reduce the chance of the cancer coming back; usually refers to **radiotherapy** and/or **systemic** therapy after surgery

ADRENAL INSUFFICIENCY
A disorder in which the adrenal glands do not make enough of certain hormones

AGRANULOCYTOSIS
Severe deficiency of white blood cells, usually **neutrophils**

ALOPECIA
Hair loss

ANAEMIA
A condition characterised by the shortage of red blood cells or haemoglobin (a protein in red blood cells that carries oxygen throughout the body)

ANASTROZOLE
A type of **aromatase inhibitor**

ANDROGEN
Hormone that helps to develop and maintain the male sex characteristics

ANOREXIA
A lack or loss of appetite

ANTHRACYCLINE
A class of **chemotherapy** that includes **epirubicin** and **doxorubicin**

AROMATASE INHIBITOR
A type of **endocrine therapy** that prevents the formation of **oestrogen**

ARTHRALGIA
Joint pain

ASTHENIA
Abnormal feeling of weakness or lack of energy

AXILLARY LYMPH NODES
Lymph nodes in the armpit

BEVACIZUMAB
A type of **targeted therapy** used to treat some cancers, including advanced breast cancer. It is a monoclonal antibody that targets **vascular endothelial growth factor (VEGF)** and prevents the cancer cells from developing their own blood supply, thus helping to slow down **tumour** growth

BIOMARKERS
Biological molecules found in tissues, blood or other body fluids that are 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

BISPHOSPHONATES
Drugs that help prevent, or slow down, **osteoporosis**, and prevent broken bones and other bone problems caused by bone **metastases**; also used in **adjuvant** treatment

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 the red blood cells, white blood cells or platelets

BRCA1
A **gene** which, when mutated (not functioning properly), is associated with a very high risk of breast and ovarian cancer

BRCA2
A **gene** which, when mutated (not functioning properly), is associated with a very high risk of breast and ovarian cancer

BREAST-CONSERVING SURGERY
Surgery to remove a **tumour** and the surrounding breast tissue while retaining as much of the breast as possible

BRONCHOSPASM
Tightening of the muscles that line the airways in the lungs

CAPECITABINE
A type of **chemotherapy** that is administered orally

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

GLOSSARY

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

CHRONOLOGICAL AGE
Age based on the actual passage of time

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

CLINICAL TRIAL
A study that compares the effects of one treatment with another

CMF
A type of **chemotherapy** (combination of **cyclophosphamide**, **methotrexate** and **5 fluorouracil**) that is administered through a drip into a vein in your arm or chest, or sometimes orally

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

COMORBIDITIES
Additional diseases or disorders experienced by the patient at the same time

COMPUTED TOMOGRAPHY (CT) SCAN
A scan using **x-rays** and a computer to create detailed images of the inside of your body

CONJUNCTIVITIS
Inflammation of the membrane that covers the eyeball and lines the eyelid

CONTRACEPTIVE
An intervention to prevent pregnancy, e.g. **contraceptive** pill

CUSHING'S SYNDROME
A condition in which there is too much cortisol (a hormone made by the adrenal gland) in the body; symptoms include a round face, thin arms and legs, severe **fatigue** and muscle weakness, high blood pressure, high blood sugar, purple or pink stretch marks on the skin and weight gain

CYCLIN-DEPENDENT KINASES 4/6 (CDK4/6)
Enzymes that drive cell proliferation

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

DENOSUMAB
A drug used to treat **osteoporosis** and prevent broken bones and other bone problems caused by bone **metastases**

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

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

DUCTS (BREAST)
Tubes that carry milk to the nipple

DYSARTHRIA
Difficult or unclear articulation of speech (e.g. slurred, nasal-sounding, hoarse or excessively loud or quiet)

DYSGEUSIA
A change in the sense of taste

DYSPEPSIA
The medical term for indigestion

DYSPNOEA
Shortness of breath

ENDOCRINE THERAPY
A type of anticancer therapy that reduces the supply of hormones to hormone receptor-dependent breast cancers

ENDOCRINE RESISTANCE
When a **tumour** stops responding to **endocrine therapy**

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

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

EVEROLIMUS
A type of **targeted therapy** used to treat advanced breast cancer. It inhibits **mTOR** to reduce the growth and proliferation of **tumour** cells

EXEMESTANE
A type of **aromatase inhibitor**

GLOSSARY

EXTRAVASATION
Leakage of fluid, such as an anticancer drug, from a blood vessel or tube into the tissue around it

FATIGUE
Overwhelming tiredness

FIRST-LINE (TREATMENT)
The initial treatment given to a patient

FULVESTRANT
A type of **endocrine therapy** that blocks **oestrogen receptors** and reduces the number of them

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

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

GENE
Genes are pieces of DNA responsible for making substances that your body needs to function

GONADOTROPIN-RELEASING HORMONE ANALOGUES
Treatment that stop the testicles and ovaries from making sex hormones. In women, they cause the ovaries to stop making **oestrogen** and **progesterone**

GRADE
Cancer **grade** is based on how different **tumour** cells look from normal cells under a microscope, and on how quickly they grow. The **grade** will be a value between one and three and reflects the aggressiveness of **tumour** cells; the higher the **grade**, the more aggressive the **tumour**

HAIR FOLLICLE
A small sac in the skin from which hair grows

HAND-FOOT SYNDROME
A condition marked by pain, swelling, numbness, tingling, desquamation and formation of blisters, or redness of the hands or feet. It sometimes occurs as a side effect of certain anticancer drugs

HEPATIC
Relating to the liver

HER2
A protein involved in cell growth, which is found on some types of cancer cells, including breast

HYPERCHOLESTEROLAEMIA
An increase in the level of cholesterol in the blood

HYPERGLYCAEMIA
An increase in the level of glucose (sugar) in the blood

IMMUNOHISTOCHEMISTRY
A laboratory test that uses antibodies to test for certain markers in tissue sample

***IN SITU* HYBRIDISATION**
A laboratory method to detect and localise specific **genes** in tissue samples

INTRAVENOUS
Administered into a vein

INVASIVE (BREAST CANCER)
Cancer that has spread outside the **ducts** or **lobules**

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**)

IPSILATERAL
Occurring on the same side of the body

KI67
A protein found in cells when they are dividing but not when they rest

LAPATINIB
A type of **targeted therapy** used to treat **HER2**-positive breast cancer

LETROZOLE
A type of **aromatase inhibitor**

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

LOBULES (BREAST)
Glands that make milk

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

LYMPHOEDEMA
Swelling caused by a build-up of lymph fluid in the tissues of the body. This may result from damage to the lymphatic system because of surgery or **radiotherapy** to the **lymph nodes** under the arm and surrounding area

GLOSSARY

LYMPHOPENIA
An abnormally low level of lymphocytes (a type of white blood cell) in the blood, which places individuals at increased risk of infection

MAGNETIC RESONANCE IMAGING (MRI) SCAN
A type of scan that uses strong magnetic fields and radio waves to produce detailed images of the inside of the body

MAINTENANCE TREATMENT
Treatment given after the initial cycles of **chemotherapy** with the aim of keeping the cancer under control

MAMMOGRAPHY
An **x-ray** of the breasts that can detect early breast cancers

MARGIN
The edge or border of the tissue removed in cancer surgery. The **margin** is described as negative or clean when no cancer cells are found at the edge of the tissue, suggesting that all of the cancer has been removed. The **margin** is described as positive or involved when cancer cells are found at the edge of the tissue, suggesting that all of the cancer has not been removed

MASTECTOMY
Surgery to remove a breast

MECHANISTIC TARGET OF RAPAMYCIN (MTOR)
A protein involved in cell division and survival, which may be more active in some types of cancer cells than in normal cells

MEGESTROL ACETATE
A type of **endocrine therapy** that reduces the effects of **oestrogen**

MENOPAUSE
The **menopause** is when a woman stops having periods and is no longer able to get pregnant naturally

MENSTRUATION
This is also known as a period or monthly, and is the regular discharge (usually monthly) of blood and tissue from the inner lining of the uterus through the vagina

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

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

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

MUTATION
A permanent alteration in the DNA sequence that makes up a **gene**, such that the sequence differs from what is found in most people and alters the function of the related protein

MYALGIA
Muscular pain

NASOPHARYNGITIS
Swelling and inflammation of the nasal passages and the back of the throat

NEOADJUVANT (TREATMENT)
Treatment given as a first step to shrink a **tumour** before the main treatment (usually surgery) is given. Examples of **neoadjuvant** therapy include **chemotherapy**, **radiotherapy** and **endocrine therapy**

NERATINIB
A new type of **targeted therapy** for **HER2**-positive breast cancer

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

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

NON-INVASIVE (BREAST CANCER)
Cancer that has not spread into healthy breast tissue

NURSE SPECIALIST
A nurse specialised in the care of patients with a certain condition (e.g. cancer)

OBESITY
Abnormal or excessive fat accumulation that may impair health

OEDEMA
A build-up of fluid in the body which causes the affected tissues to become swollen

OESTROGEN
Hormone that helps to develop and maintain female sex characteristics

OESTROGEN RECEPTOR (ER)-POSITIVE
Cells that have a receptor protein that binds **oestrogen**. Cancer cells that are **ER-positive** need **oestrogen** to grow

GLOSSARY

OLAPARIB
A new type of **targeted therapy** which inhibits **PARP**

ORCHIECTOMY
Surgery to remove one or both testicles

OSTEONECROSIS
Loss of blood flow to bone tissue, causing the bone to die

OSTEOPOROSIS
A decrease in the amount and thickness of bone tissue, which causes the bones to become weak and break more easily

OVARIAN FUNCTION SUPPRESSION
Treatment that stops or lowers the amount of **oestrogen** made by the ovaries

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

PALBOCICLIB
A type of **targeted therapy** used to treat advanced breast cancer. It inhibits **CDK4/6** to reduce the proliferation of **tumour** cells

PANCYTOPENIA
Low levels of red cells, white cells and platelets in the blood

PARAESTHESIA
Pricking, tingling or numbing sensation usually felt in the arms, legs, hands or feet

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

PERTUZUMAB
A type of **targeted therapy** used to treat **HER2**-positive breast cancer

POLY ADP-RIBOSE POLYMERASE (PARP)
An enzyme involved in many cell functions, including the repair of DNA damage

POSITRON EMISSION TOMOGRAPHY (PET)
An imaging test that uses a dye with radioactive tracers, which is injected into a vein in your arm

PLATINUM
A metal that is an important component of some anticancer drugs, such as **carboplatin**

PNEUMONITIS
Inflammation of the lungs

PROGESTERONE
Hormone that plays a role in the menstrual cycle and pregnancy

PROGESTERONE RECEPTOR (PgR)
A receptor protein that binds **progesterone**

PROGNOSIS
The likely outcome of a medical condition

PROTEINURIA
An abnormally high level of protein in the urine; may indicate kidney dysfunction

PRURITUS
Severe itching of the skin

RADIOEMBOLISM
A type of internal **radiotherapy** used to treat liver **metastases**. Tiny beads containing a radioactive substance are injected into the main blood vessel that carries blood to the liver. The beads collect in the **tumour** and in blood vessels near the **tumour**, destroying the blood vessels that the **tumour** needs to grow and killing the cancer cells

RADIOFREQUENCY ABLATION
A procedure in which radio waves travel through electrodes to heat and destroy cancer cells

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

RENAL
Relating to the kidneys

RESECTION
Surgery to remove tissue

RHINITIS
Inflammation of the lining inside the nose

RIBOCICLIB
A type of **targeted therapy** used to treat advanced breast cancer. It inhibits **CDK4/6** to reduce the proliferation of **tumour** cells

SALPINGO-OOPHORECTOMY
Surgery to remove the ovaries and fallopian tubes

GLOSSARY

SEQUENTIALLY
Treatment given one after the other

STEREOTACTIC RADIOTHERAPY
A type of external **radiotherapy** that uses special equipment to position the patient and precisely deliver radiation to a **tumour**

STOMATITIS
Inflammation of the inside of the mouth

SUBCUTANEOUS
Beneath the skin

SYSTEMIC (TREATMENT)
Drugs that spread throughout the body to treat cancer cells wherever they may be. They include **chemotherapy**, hormonal therapy and **targeted therapy**

TALAZOPARIB
A new type of **targeted therapy** which inhibits **PARP**

TAMOXIFEN
A type of **endocrine therapy** that blocks the effects of **oestrogen** in the breast

TARGETED THERAPY
A newer type of drug that works by blocking the signals that tell cancer cells to grow or by interfering with their ability to obtain nutrients for growth

TAXANE
A class of **chemotherapy** that includes **paclitaxel** and **docetaxel**

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

THROMBOPHLEBITIS
Inflammation of a vein when a blood clot forms

THROMBOSIS
The formation of a blood clot inside a blood vessel, obstructing the flow of blood through the blood system

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

TRASTUZUMAB
A type of **targeted therapy** used to treat **HER2**-positive breast cancer

TRASTUZUMAB EMTANSINE (T-DM1)
Combination of **trastuzumab** and a **chemotherapy** drug called emtansine

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

VASCULAR ENDOTHELIAL GROWTH FACTOR (VEGF)
A protein produced by cells that stimulates the growth of new blood vessels

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

WHOLE BREAST RADIOTHERAPY (WBRT)
Radiotherapy delivered to the entire breast

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

This guide has been prepared to help you, your friends and your family better understand the nature of breast 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 early and advanced breast 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 breast cancer.

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

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GOOD SCIENCE
BETTER MEDICINE
BEST PRACTICE

We can help you understand breast 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**