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Pancreatic Cancer

What is Pancreatic Cancer?

Let us answer some of your questions.

ESMO Patient Guide Series

based on the ESMO Clinical Practice Guidelines

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Pancreatic 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 pancreatic cancer and its treatment. It contains information on the causes of the disease and how it is diagnosed, up-to-date guidance on the types of treatments that may be available and the possible side effects of treatment.

The medical information described in this document is based on the ESMO Clinical Practice Guideline for pancreatic cancer, which is designed to help clinicians with the diagnosis and management of pancreatic 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

Pancreatic cancer: A summary of key information

The following information will be discussed in detail in this guide.

Introduction to pancreatic cancer

- Pancreatic cancer forms in the cells of the **pancreas**. Most pancreatic cancers begin in the **exocrine pancreas**, which is the part of the **pancreas** that produces **digestive enzymes**.
- The exact causes of pancreatic cancer are not known, although several **risk factors** have been identified, including smoking, **mutations** in certain **genes** and a family history of pancreatic cancer.
- Pancreatic cancer is the fourth most common cause of cancer death in men and women worldwide and mostly affects older people – the average age of diagnosis is 71 years for men and 75 years for women..

Diagnosis of pancreatic cancer

- Early pancreatic cancer typically has no symptoms. Symptoms that may appear as the cancer progresses include yellowing of the skin, abdominal pain and weight loss.
- A diagnosis of pancreatic cancer is usually based on the results of a **computed tomography** (**CT**) **scan**, which can show if there is a **tumour** in the **pancreas**. A **biopsy** may also be taken to confirm the type of **tumour** present.
- Further tests and examinations help to determine how advanced the cancer is. For example, **endoscopic ultrasound scans** and/or **magnetic resonance imaging** (**MRI**) may be used to see how far the cancer has spread. Enlarged **lymph nodes** may also be **biopsied** to check if they contain cancer cells.
- Pancreatic cancer is 'staged' according to **tumour** size, whether it has spread to the **lymph nodes** and whether it has spread to other parts of the body. This information is used to help decide the best treatment.

Treatment options for pancreatic cancer

- Treatment for pancreatic cancer depends on the size, location and stage of the **tumour**, and whether it can be surgically removed (**resectable**, **borderline resectable** or **unresectable**).
- Treatment options for pancreatic cancer include surgery, **chemotherapy** and **chemoradiotherapy**.
- Patients should be fully informed and involved in decisions about treatment options.

Localised pancreatic cancer

- If it is considered to be **resectable**, patients with **localised** pancreatic cancer may undergo surgery to remove the **tumour**. The type of surgery depends on the location of the **tumour** – **pancreatoduodenectomy** is typically used to remove **tumours** in the pancreatic head, whereas **distal pancreatectomy** is used to remove **tumours** in the pancreatic body or tail (see section '*What is the pancreas?*' for more information on the anatomy of the pancreas).
- Following surgery, patients may receive **adjuvant chemotherapy**. This is often a drug called **gemcitabine** or **5-fluorouracil** plus **folinic acid (5-FU/FA**), but some patients might receive other **chemotherapy** agents or combinations.
- Patients with **borderline resectable tumours** typically receive **neoadjuvant chemotherapy** with **gemcitabine** or a combination of **5-FU/FA** + **irinotecan** + **oxaliplatin** (commonly known as **FOLFIRINOX**) in an attempt to shrink the **tumour** and change it from **borderline resectable** to **resectable**, and consequently possibly allow surgery to remove it. A course of **chemoradiotherapy** may also be used after the **neoadjuvant chemotherapy**. If the **tumour** remains **borderline resectable**, patients may be offered further **chemotherapy**.

Locally advanced pancreatic cancer

- **Locally advanced** pancreatic cancer usually cannot be surgically removed and is considered to be **unresectable**. It is usually treated with a course of **gemcitabine**, although some patients are considered for enrollment in **clinical trials**.

Metastatic pancreatic cancer

- **Metastatic** pancreatic cancer is treated with **chemotherapy**. Treatment options include **FOLFIRINOX**, ***nab*-paclitaxel** in combination with **gemcitabine**, or **gemcitabine** alone, depending on the general health and fitness of the patient.
- If the cancer continues to progress, then **nanoliposomal irinotecan** (**nal-IRI**) in combination with **5-FU/FA** might be offered to patients who received **gemcitabine** previously.

Supportive interventions

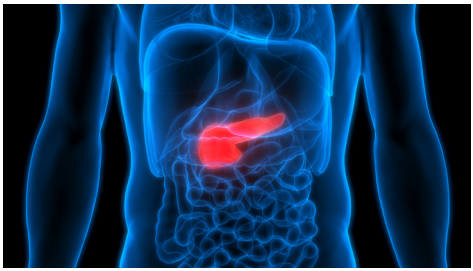
- Patients with pancreatic cancer receive **nutritional support** to prevent weight loss, as well as **enzyme** supplements if the **pancreas** is not producing enough **digestive enzymes**. Some patients develop **diabetes** and have to take **insulin** to control their blood sugar levels.
- **Palliative** care is an important part of the management of pancreatic cancer and **advance care planning** can help to ensure that the patient's wishes about their care are fulfilled.

Follow-up during/after treatment

- The timings of follow-up appointments vary between countries and practices. After surgery, follow-up appointments will include checks on **nutritional support** and any **enzyme** or **insulin** treatment.
- Patients who are experiencing any new symptoms might have a **CT scan** to check if the cancer has progressed, or returned.
- Support groups can help patients and their families to better understand pancreatic cancer, and to learn how to cope with all aspects of the disease, from diagnosis to long-term effects. Pancreatic Cancer Europe provides information on support groups in Europe: https://www.pancreaticcancereurope.eu/

What is the pancreas?

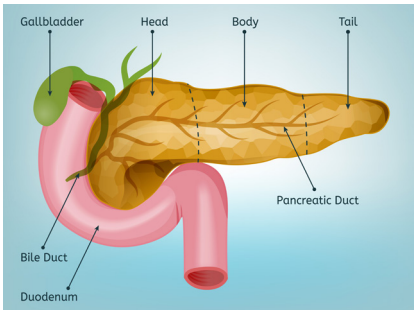
The **pancreas** is a leaf-shaped organ that produces **digestive enzymes** and **hormones** such as **insulin**. It lies high up in the abdomen, just behind the stomach. Major blood vessels that carry blood to the liver, intestines, kidneys and lower part of the body lie very close to the **pancreas**.



*The position of the **pancreas** within the abdomen.*

The pancreas lies close to major arteries and veins in the abdomen

The **pancreas** has three parts – the head, the tail and the body. **Digestive enzymes** and **hormones** produced in the **pancreas** travel from the **pancreas** to the **duodenum** (the first part of the small bowel) through a tube called the **pancreatic duct**. The part of the **pancreas** that produces **hormones** is called the **endocrine pancreas**, and the part that produces **digestive enzymes** is called the **exocrine pancreas**.



What is pancreatic cancer?

Pancreatic cancer is a cancer that forms in certain cells of the **pancreas**. Most pancreatic cancers (approximately 95%) begin in the **exocrine pancreas**. **Tumours** can also form in the **endocrine pancreas**, but these are uncommon and often **benign** (not cancerous). This guide provides information on cancers of the **exocrine pancreas**.

Most pancreatic cancers begin in the exocrine cells of the pancreas

What are the different types of pancreatic cancer?

There are three main categories of pancreatic cancer:

- **Adenocarcinoma**: This is the most common type of pancreatic cancer, accounting for around 80% of cases. Almost all of these cancers develop in the cells lining the **ducts** of the **pancreas**.
- Cystic **tumours**: These cause a cyst (fluid-filled sac) to form in the **pancreas**. Most pancreatic cysts are **benign**, but some are cancerous.
- **Acinar cell** cancer: This cancer develops in the **acinar cells** of the **pancreas**, which lie at the ends of the **ducts** that produce **digestive enzymes**.

Pancreatic cancer is classified as follows:

Localised pancreatic cancer

Localised pancreatic cancer means that the cancer is completely contained within the **pancreas** and has not spread anywhere else in the body.

Locally advanced pancreatic cancer

Pancreatic cancer is described as **locally advanced** if the cancer has spread to the tissues around the **pancreas** or nearby **lymph nodes**, or is surrounding or blocking nearby major blood vessels, but has not spread to other parts of the body.

Locally advanced pancreatic cancer has spread outside the tissue of the pancreas, but not to distant sites in the body

Metastatic pancreatic cancer

Metastatic pancreatic cancer means that a cancer that began in the **pancreas** has spread to another part of the body, leading to the formation of **metastases** (cancerous **tumours** at distant sites).

What are the symptoms of pancreatic cancer?

In its early stages, pancreatic cancer often has no symptoms. As the cancer progresses, the symptoms experienced can vary depending on the whether the **tumour** is located in the pancreatic head, body or tail. **Tumours** in the pancreatic head tend to cause more symptoms than those in the body or tail – this is because **tumours** in the pancreatic head may press on the **bile duct** or **pancreatic duct** and cause conditions such as **jaundice**. Symptoms that may be experienced with pancreatic cancer include *(Ducreux et al., 2015)*:

- Yellowing of the skin and whites of the eyes (for pancreatic head **tumours**).
- Abdominal pain.
- Weight loss.
- Fatty stools.
- Symptoms of new-onset **diabetes**, such as thirst, frequent urination and **fatigue**.

Pancreatic cancer usually has few symptoms in its early stages

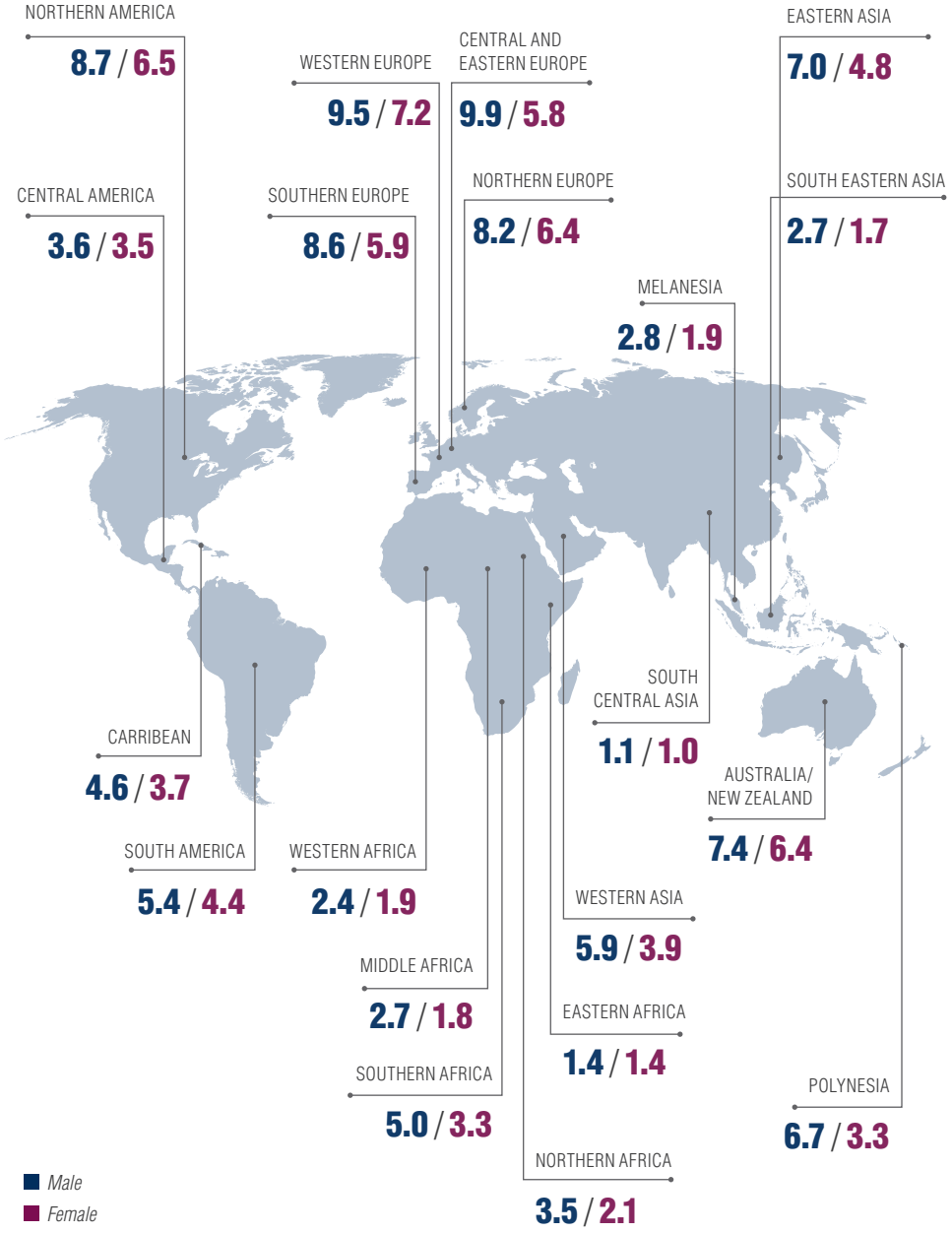
You should see your doctor if you experience any of these symptoms. However, it is important to remember that these symptoms can also be experienced by people who do not have pancreatic cancer; they may also be caused by other conditions.

How common is pancreatic cancer?

Pancreatic is a leading cause of cancer deaths

Pancreatic cancer is the fourth most common cause of cancer death in both men and women *(Malvezzi et al., 2017)*. It mostly affects older people – the average age of diagnosis is 71 years for men and 75 years for women *(Ducreux et al., 2015)*. The highest incidences of pancreatic cancer are reported in Europe and North America. The lowest incidences are in Eastern Africa and South Central Asia *(Ferlay et al., 2018)*.

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



What causes pancreatic cancer?

The causes of pancreatic cancer are not very well understood, but several **risk factors** 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.

The precise causes of pancreatic cancer are not known

FACTORS THAT MAY INCREASE RISK

Increasing age
Smoking
Obesity
History of **diabetes**
History of **pancreatitis**
Excessive alcohol intake
Infection with *Helicobacter pylori*, hepatitis B virus or human immunodeficiency virus
High intake of butter, saturated fat, red meat and processed foods
Low intake of fruit and vegetables
Exposure to certain chemicals
Mutations in certain **genes**
Family history of pancreatic cancer
Certain inherited conditions such as **hereditary pancreatitis**

*There are various **risk factors** associated with developing pancreatic cancer although each factor may not apply to every person who develops the disease (Ducreux et al., 2015).*

How is pancreatic cancer diagnosed?

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

Clinical examination

If you have symptoms of pancreatic cancer, your doctor may look at your skin and eyes and ask for a urine sample to check for signs of **jaundice**. He/she may also do a physical examination to **palpate** your abdomen for any abnormalities.

Imaging scans

Your doctor may recommend that you have a **computed tomography** (**CT**) **scan**. This is a type of imaging technique that allows doctors to see your internal organs in cross-section. A **CT scan** can show if there is a **tumour** in the **pancreas** and is the most common way to diagnose pancreatic cancer. Sometimes, other imaging scans might be used, including **ultrasound**, which uses high-frequency sound waves to create an image of the inside of the body, and **magnetic resonance imaging** (**MRI**), which uses magnetic fields and radio waves to produce images.

A CT scan is usually carried out to confirm the presence of pancreatic cancer

How will my treatment be decided?

Your treatment will largely depend on the stage of your cancer.

Staging

Staging of the cancer is used to describe its size and position and whether it has spread from the **pancreas** itself. To gather this information, you may have a **CT scan**, an **endoscopic ultrasound scan** and/or **MRI** *(Ducreux et al., 2015)*.

- **CT scan**: This can show where the **tumour** is located, and if the cancer has spread into the **lymph nodes** or nearby organs, such as the lungs or liver.
- **Endoscopic ultrasound scan**: This is a type of **ultrasound** scan in which the **ultrasound** scanner is attached to the end of an **endoscope**, which is passed into the stomach through the mouth. This means that images can be taken from inside the body. Patients are usually given a **sedative** before the procedure to ensure they are comfortable and relaxed. Samples of tissue (**biopsies**) can also be taken during an **endoscopic ultrasound scan** by passing a needle down the **endoscope**. This can be useful to test **lymph nodes** for the presence of cancer cells.
- **MRI**: This may be used for staging pancreatic cancer in some patients – for example, it can help to identify abnormal areas of liver that **CT scans** might miss.

After diagnosis, additional imaging scans can show how far advanced the pancreatic cancer is

Tests to measure the levels of certain **biomarkers** can also guide treatment decisions. Some pancreatic cancers produce a protein called **cancer antigen 19-9** (**CA 19-9**), and the levels of this protein in the blood can give doctors helpful information about the cancer and how best to treat it *(Ducreux et al., 2015)*. However, other medical conditions can also produce **CA 19-9** and some pancreatic **tumours** do not produce **CA 19-9**. Therefore, **CA 19-9** measurements are not used on their own to make therapy decisions, but may be used alongside other test results to help determine the best possible treatment.

Staging to determine the size and spread of the cancer is described using a sequence of letters and numbers. For pancreatic cancer, there are four stages designated with Roman numerals I 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 nearby **lymph nodes** (N).
- Whether it has spread to distant sites, or **metastases** (M).

Staging helps to determine the most appropriate treatment for pancreatic cancer

The staging criteria for pancreatic cancer is described in the table below *(Ducreux et al., 2015; Cancer Research UK, 2017)*. This may seem complicated but your doctor will be able to explain which parts of this table correspond to your cancer, and how the stage of your cancer impacts on treatment choice.

Stage IA. **Cancer is contained within the pancreas and is smaller than 2 cm; there is no cancer in the lymph nodes (T1-N0-M0)**	**T**	• **Tumour** is limited to the **pancreas** and ≤2 cm in greatest dimension (T1)
	N	• No regional **lymph node metastasis** (N0)
	M	• No distant **metastasis** (M0)
Stage IB. **Cancer is contained within the pancreas and is larger than 2 cm but no bigger than 4 cm; there is no cancer in the lymph nodes (T2-N0-M0)**	**T**	• **Tumour** is limited to the **pancreas** and >2 cm in greatest dimension (T2)
	N	• No regional **lymph node metastasis** (N0)
	M	• No distant **metastasis** (M0)
Stage IIA. **Cancer has started to grow into nearby tissues, such as the duodenum or bile duct, but there is no cancer in the nearby large blood vessels or lymph nodes (T3-N0-M0)**	**T**	• **Tumour** extends beyond the **pancreas** but without involvement of the **coeliac axis** or the **superior mesenteric artery** (T3)
	N	• No regional **lymph node metastasis** (N0)
	M	• No distant **metastasis** (M0)
Stage IIB. **Cancer may have grown into the tissues surrounding the pancreas; cancer is in the nearby lymph nodes but not the large blood vessels (T1-N1-M0 or T2-N1-M0 or T3-N1-M0)**	**T**	• **Tumour** is limited to the **pancreas** and ≤2 cm in greatest dimension (T1) or >2 cm in greatest dimension (T2) • **Tumour** extends beyond the **pancreas** but without involvement of the **coeliac axis** or the **superior mesenteric artery** (T3)
	N	• Regional **lymph node metastasis** (N1)
	M	• No distant **metastasis** (M0)
Stage III. **Cancer has spread into nearby large blood vessels and may have spread to the lymph nodes (T4-any N-M0)**	**T**	• **Tumour** involves the **coeliac axis** or the **superior mesenteric artery** (T4)
	N	• No regional **lymph node metastasis** (N0) • Regional **lymph node metastasis** (N1)
	M	• No distant **metastasis** (M0)
Stage IV. **Cancer has spread to other parts of the body (Any T-any N-M1)**	**T**	• **Tumour** is limited to the **pancreas** and ≤2 cm in greatest dimension (T1) or >2 cm in greatest dimension (T2) • **Tumour** extends beyond the **pancreas** but without involvement of the **coeliac axis** or the **superior mesenteric artery** (T3) • **Tumour** involves the **coeliac axis** or the **superior mesenteric artery** (T4)
	N	• No regional **lymph node metastasis** (N0) • Regional **lymph node metastasis** (N1)
	M	• Distant **metastasis** (M1)

Stage grouping system for pancreatic cancer.

What are the treatment options for pancreatic cancer?

Your treatment will depend upon the size, location and stage of the **tumour**, as well as your general health and level of fitness. The choice of treatments will be discussed with you and your preferences will be taken into account. Your treatment may be discussed by a **multidisciplinary team**, which means that experts in different areas of cancer treatment (e.g. surgeons, medical oncologists, radiologists, radiotherapists and nurses) come together to share their expertise in order to provide the best patient care.

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

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

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

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

Your doctor may recommend one or more of the following approaches for managing pancreatic cancer.

Surgery

Surgery to remove the **tumour** (**resection**) is the only **curative** treatment for pancreatic cancer. The aim of **resection** is to remove the cancer along with a healthy **margin** of tissue to help stop it from coming back. However, it is important to understand that **resection** is possible in fewer than 20% of patients *(Ducreux et al., 2015)*. This is because the cancer has usually already spread to other parts of the body or is affecting major blood vessels by the time it is diagnosed. **Resection** of tumours that have grown around major blood vessels is rarely possible as complete removal of the **tumour** would cause too much damage to the blood vessels.

Surgery to remove the tumour is currently the only way to cure pancreatic cancer

Pancreatic cancer is classified as **resectable**, **borderline resectable** or **unresectable**:

Resectable	• Usually confined to the **pancreas** and surrounding regions such as the small bowel, **bile duct** or stomach • Not affecting any of the major blood vessels • These **tumours** are suitable for **resection**
Borderline resectable	• Usually confined to the **pancreas** area, but are affecting the blood vessels – this can make it difficult for the **tumour** to be resected effectively, and some cancer cells may be left behind • It is not always clear whether the **tumour** can be resected or not • Detailed scans may be used to check the exact positioning of the **tumour** in relation to the blood vessels before a decision on **resection** can be reached
Unresectable	• Blocking or completely surrounding major blood vessels, or have spread so far that **resection** is not possible • **Locally advanced** and **metastatic** pancreatic cancers are **unresectable**

Resectability of pancreatic cancer.

Chemotherapy

Chemotherapy can destroy or slow down the growth of cancer cells and is widely used in the treatment of pancreatic cancer. In some patients, **chemotherapy** may be given as an **adjuvant** treatment (after **resection**) or as a **neoadjuvant** treatment (before **resection**) *(Ducreux et al., 2015)*.

Chemotherapy agents used in the treatment of pancreatic cancer include:

- **Gemcitabine**
- A combination of **5-fluorouracil** plus **folinic acid** (**5-FU/FA**)
- A combination of **5-FU/FA** + **irinotecan** + **oxaliplatin** (commonly known as **FOLFIRINOX**)
- A combination of ***nab*-paclitaxel** plus **gemcitabine**
- A combination of **liposomal irinotecan** (**nal-IRI**) plus **5-FU/FA**

It is important to understand that not all of these agents are suitable for all patients. Some patients may not be well enough to tolerate treatment with certain **chemotherapy regimens**, so your doctor will take your general health and fitness into consideration when deciding on the best treatment for you. You may have heard of new drugs for pancreatic cancer – ask your doctor about these and about participating in **clinical trials** (see section '*Clinical trials*' for more information).

Chemotherapy is widely used in the treatment of pancreatic cancer

Chemoradiotherapy

Chemoradiotherapy is a combination of **chemotherapy** and **radiotherapy**. **Radiotherapy** uses **ionising radiation** to damage the **DNA** of cancerous cells, causing them to die. **Chemoradiotherapy** for pancreatic cancer usually consists of **radiotherapy** in combination with the **chemotherapy** agent **capecitabine**, which is a **pro-drug** of **5-FU** *(Ducreux et al., 2015)*.

What are the treatment options for resectable pancreatic cancer?

Treatment for **resectable** pancreatic cancer typically involves **resection** of the **tumour**, followed by **adjuvant chemotherapy**.

Surgery

The aim of surgical **resection** is to remove the cancer as well as a healthy **margin** of tissue around it. After the operation, the removed tissue is examined under a microscope to check that all of the cancer was removed.

The type of surgery depends on the location and size of the **tumour**. **Tumours** in the pancreatic head are removed using a technique called a **pancreatoduodenectomy** (also known as the Whipple procedure). In a **pancreatoduodenectomy**, the head of the **pancreas** is removed along with the **duodenum**, gallbladder, part of the stomach and part of the **bile duct**. **Tumours** in the pancreatic body or tail are removed by **distal pancreatectomy**, which involves **resection** of the body and tail of the **pancreas** as well as the **spleen** *(Ducreux et al., 2015)*.

During **resection** of the **tumour**, **lymphadenectomy** (removal of nearby **lymph nodes**) is also carried out. A minimum of 15 **lymph nodes** are removed and examined after the operation to see if the cancer has spread *(Ducreux et al., 2015)*.

The type of surgical procedure used depends on the location of the tumour within the pancreas

Chemotherapy

After surgical **resection**, patients usually receive **adjuvant chemotherapy** with either **gemcitabine** or **5-FU/FA** *(Ducreux et al., 2015)*. However, treatment standards are continually evolving, and some patients might receive a different **chemotherapy regimen** – for example, a **clinical trial** has recently shown that **adjuvant chemotherapy** with a modified version of **FOLFIRINOX** is more effective than **gemcitabine** for patients after **resection**, although there are more side effects seen with this **regimen** compared with **gemcitabine** *(Conroy et al., 2018)*. Another **clinical trial** has also indicated that **adjuvant** treatment with **gemcitabine** in combination with **capecitabine** might be more effective than **gemcitabine** alone *(Neoptolemos et al., 2017)*. Your doctor will explain all of the **adjuvant** therapy options available to you.

What are the treatment options for borderline resectable pancreatic cancer?

Treatment for **borderline resectable** pancreatic cancer aims to reduce the size of the **tumour** using **chemotherapy** and **chemoradiotherapy**, potentially making **resection** possible.

Chemotherapy

Borderline resectable pancreatic cancer may be initially treated with **neoadjuvant chemotherapy**. **Gemcitabine** or **FOLFIRINOX** are most commonly used in this setting. However, patients with **borderline resectable tumours** are included in **clinical trials** whenever possible, so other **neoadjuvant** treatments may be offered (see section '*Clinical trials*' for more information) *(Ducreux et al., 2015)*.

Chemoradiotherapy

Following the period of **neoadjuvant chemotherapy**, patients may have a course of **chemoradiotherapy** to help try to convert the **tumour** from **borderline resectable** to **resectable** *(Ducreux et al., 2015)*.

Initial treatment for borderline resectable pancreatic cancer aims to reduce the size of the tumour and make it resectable

Surgery

After **neoadjuvant** treatment with **chemotherapy** and **chemoradiotherapy**, the **tumour** will be reassessed to see if it is now **resectable**. Patients with **tumours** that are **resectable** will undergo surgery, possibly followed by **adjuvant chemotherapy** (see section '*What are the treatment options for resectable pancreatic cancer?*' for more information). Patients whose **tumours** remain **unresectable** may be offered further **chemotherapy**.

What are the treatment options for locally advanced pancreatic cancer?

Locally advanced pancreatic cancer is **unresectable** and is usually treated with **chemotherapy**.

Chemotherapy

The usual treatment for **locally advanced** pancreatic cancer is **gemcitabine** *(Ducreux et al., 2015)*. Other treatments might be offered in **clinical trials** (see section '*Clinical trials*' for more information).

Chemoradiotherapy

Chemoradiotherapy may be offered to some patients with **locally advanced** pancreatic cancer, but this is less common in Europe *(Ducreux et al., 2015)*.

Locally advanced pancreatic cancer is usually treated with chemotherapy

What are the treatment options for metastatic pancreatic cancer?

The aim of treatment for **metastatic** pancreatic cancer is to relieve symptoms and improve quality of life.

Chemotherapy

The choice of **chemotherapy** for **metastatic** pancreatic cancer varies depending on the general health status of the patient. Patients who are fit enough to withstand treatment with multiple agents are typically offered **FOLFIRINOX** or ***nab*-paclitaxel** in combination with **gemcitabine**. Patients who are less fit may be offered **gemcitabine** alone, or ***nab*-paclitaxel** plus **gemcitabine** if their poor health status is due to their cancer. If the cancer progresses after **gemcitabine**-based treatment, patients might then be treated with **nal-IRI** in combination with **5-FU/FA** *(Ducreux et al., 2015)*. Other treatments might be offered in **clinical trials** (see section '*Clinical trials*' for more information).

Chemotherapy is the standard treatment for metastatic pancreatic cancer, but not all drugs are suitable for all patients

Some patients will be unable to tolerate treatment with **chemotherapy**, and these patients will be offered supportive care rather than **chemotherapy** (see section '*Supplementary interventions*' for more information).

Clinical trials

Unfortunately, the chances of curing pancreatic cancer are relatively low. Research is ongoing to identify new drugs, or different combinations of existing drugs, to improve the **prognosis** for patients. 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 and find out how they work.
- 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.

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

Several new drugs for the treatment of **pancreatic** cancer are now entering **clinical trials**, including **immunotherapy** agents, which stimulate the body's immune system to fight cancer cells.

Pembrolizumab, an **immunotherapy** drug which blocks a protein called **programmed cell death protein 1** (**PD-1**) on the surface of some immune cells, has shown encouraging results in some patients with **metastatic** pancreatic cancer *(Weiss et al., 2018)*.

PARP inhibitors block the actions of an **enzyme** involved in **DNA** repair. **Rucaparib** is a **PARP** inhibitor that has shown promise in patients with **locally advanced** or **metastatic** pancreatic cancer who have **mutations** in **genes** called **BRCA1** and **BRCA2** *(Shroff et al., 2018)*. **Olaparib** is another **PARP** inhibitor that is already used to treat some types of cancer, especially those that have **BRCA1** and **BRCA2 mutations**. **Olaparib** is currently being studied in patients with **metastatic** pancreatic cancer who have **BRCA1** and **BRCA2 mutations** *(Golan et al., 2017)*.

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). You can also find details of ongoing **clinical trials** at the European Organisation for Research and Treatment of Cancer (EORTC) website: http://www.eortc.org/clinical-trials/ongoing-clinical-trials/.

Supportive interventions

Over the course of disease, anti-cancer treatments should be supported with supplementary interventions that aim to prevent or reduce the complications of disease and treatment, and maximise your quality of life. These interventions may include supportive, **palliative**, survivorship and end-of-life care, which should all be coordinated by a **multidisciplinary team** *(Jordan et al., 2018)*.

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

Supportive care

Supportive care involves the management of cancer symptoms and the side effects of therapy. An important element of supportive care in patients with pancreatic cancer is **nutritional support** – many people with pancreatic cancer lose weight as the **tumour**, or effects from surgery, can have an impact on the stomach and bowel. A **dietician** will be able to advise you on your diet and any supplements that you might need. You may find it easier to have small, high-calorie snacks throughout the day rather than large meals, and your **dietician** may also recommend nutritional supplements tailored to your needs.

Patients with pancreatic cancer may also be unable to absorb fats and proteins from their food – this is because the **pancreas** is not producing enough **digestive enzymes**, either because of the cancer itself, or because parts of the **pancreas** have been removed during treatment. This is called **pancreatic exocrine insufficiency** and you may need to take **enzyme** supplements before each meal to help your body digest food properly *(Vujasinovic et al., 2017)*.

Supportive care includes help with diet and nutrition

Tumours in the **pancreas**, or surgery for pancreatic cancer, can also affect the production of **insulin**, which is a **hormone** that regulates blood sugar levels. Your blood sugar will be monitored to make sure you don't develop **diabetes**. Some patients will have to test their own blood sugar levels and have **insulin** injections. This can be easily learned and a trained specialist nurse should be available to support you.

Palliative care

Palliative care is a term used to describe care interventions, including the management of symptoms throughout the course of disease, as well as support for coping with **prognosis**. **Palliative** care in pancreatic cancer can often include a procedure to relieve the symptoms of a **tumour** obstructing the **bile duct** or **duodenum**. This is usually done by inserting a specially-designed expandable tube (or **stent**) under **general anaesthetic** to keep the **bile duct** or **duodenum** open *(Ducreux et al., 2015)*. Pain relief is also an important part of **palliative** care in patients with pancreatic cancer. There are a number of pain relief options available to patients with pancreatic cancer, which your doctor will discuss with you. In addition to standard painkillers such as paracetamol and ibuprofen, drugs called opioids are often used, and some anti-depressants or anti-convulsant drugs are used alongside other painkillers to control nerve pain. A procedure called **coeliac plexus block** is sometimes used to relieve pain in the abdomen – this involves an injection of **local anaesthetic** around a group of nerves called the **coeliac plexus**, and can provide pain relief for up to 3 months *(Ducreux et al., 2015)*.

Your doctor may discuss **advance care planning** with you. This is a process that helps patients to understand the course of cancer, provides counselling and encourages them to consider their wishes for their care. The overall aim of **advance care planning** is to enable patients to make informed decisions that will allow them to receive the best care suited to their personal, cultural, spiritual and moral wishes *(Agarwal and Epstein, 2017)*.

Palliative care can help to manage the symptoms of pancreatic cancer

End-of-life care

End-of-life care for patients with incurable cancer primarily focuses on making the patient comfortable and providing adequate relief of physical and psychological symptoms. **Advance care planning** can help to achieve the appropriate end-of-life care for each individual patient. Discussions about end-of-life care can be very distressing, but support should always be available to you and your family at this time.

Advance care planning ensures that the patient's wishes for their care are taken into consideration

Survivorship care

Support for patients surviving cancer includes social support, education about the disease and rehabilitation. For example, psychological support can help you to cope with any worries, fears and psychosocial problems impacting your quality of life. Patients often find that social support is essential for coping with the cancer diagnosis, treatment and the emotional consequences. A survivor care plan can help you to recover wellbeing in your personal, professional and social life. For further information and advice on survivorship, see ESMO's patient guide on survivorship (https://www.esmo.org/for-patients/patient-guides/survivorship).

What are the possible side effects of treatment?

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

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

It is important to talk to your health care professional 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 health care professional can provide you with strategies to limit the impact of **fatigue**, including getting enough sleep, eating healthily and staying active *(Cancer.Net, 2017)*. Loss of appetite and weight loss can also arise due to the cancer itself or the treatments. Significant weight loss, involving loss of both fat and muscle tissue, can lead to weakness, reduced mobility and loss of independence, as well as anxiety and depression *(Escamilla and Jarrett, 2016)*. Your health care professional may refer you to a **dietician**, who can look at your nutritional needs and advise you on your diet and any supplements that you might need (see section '*Supportive interventions*' for more information).

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Surgery

Surgery for pancreatic cancer is a major operation and it will take some time to recover. Hospitalisation may be required for up to 2 weeks. Depending on how well your **pancreas** functions after the operation, you may have trouble eating and absorbing nutrients from food. **Nutritional support** and **enzyme** replacement can help to ensure you get the nutrition you need (see section '*Supportive interventions*' for more information). Sometimes surgery to remove part of the **pancreas** can stop the **pancreas** producing enough **insulin**, and you may need to have **insulin** injections to regulate your blood sugar levels (see section '*Supportive interventions*' for more information).

Surgery for pancreatic cancer is a major operation with long-term health problems

Radiotherapy

The immediate side effects of **radiotherapy** are usually due to the effects of radiation on the skin and the organs surrounding the **pancreas**. Common side effects of **radiotherapy** include **fatigue**, nausea, diarrhoea and indigestion. It is important to look after your skin during **radiotherapy** treatment to prevent infection and reduce pain. Let your doctor or nurse know of any symptoms as he/she will be helpful.

Chemotherapy

Side effects from **chemotherapy** vary depending upon the drugs and the doses used – you may get some of those listed below but you are very unlikely to get all of them. You may also experience some side effects that are not listed below.

Most side effects of **chemotherapy** are temporary and can be controlled with drugs or lifestyle changes – your health care professional will help you to manage them *(Macmillan, 2016)*. There are also steps you can take yourself at home to deal with some of the common side effects – for further information and advice regarding how to cope with the effects of **chemotherapy**, see the Pancreatic Cancer Action guide entitled '*Chemotherapy and how it is given*' (https://pancreaticcanceraction.org/booklets/understanding-pancreatic-cancer/book4), or request a brochure from your local cancer society.

The table below lists the most common side effects of **chemotherapy** drugs that may be used in the treatment of pancreatic cancer.

continued overleaf

CHEMOTHERAPY DRUG	POSSIBLE SIDE EFFECT	HOW THE SIDE EFFECTS MAY BE MANAGED
5-fluorouracil (5-FU) (Fluorouracil SPC, 2017	• **Agranulocytosis** • **Alopecia** • **Anaemia** • **Anorexia** • **Asthenia** • **Bronchospasm** • Cardiac effects • Diarrhoea • **Fatigue** • **Hand-foot syndrome** • **Hyperuricemia** • **Immunosuppression** • **Leukopenia** • **Mucositis** • Nausea • **Neutropenia** • Nose bleeds • **Pancytopenia** • **Thrombocytopenia** • Vomiting	• Your blood cell counts will be monitored frequently throughout your treatment in order to detect any **neutropenia**, **anaemia**, **leukopenia**, **agranulocytosis**, **thrombocytopenia** or **pancytopenia** – 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) and **mucositis** 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 **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 • Your cardiac function will be monitored before and during treatment to minimise the risk of cardiac impairment • **Alopecia** can be upsetting for many patients; your doctor will provide you with information on how to cope with this side effect. • Let your doctor know if you experience nose bleeds or breathlessness, so that they can decide how to manage these.
Capecitabine (Xeloda SPC, 2018)	• Abdominal pain • **Anorexia** • **Asthenia** • Diarrhoea • **Fatigue** • **Hand-foot syndrome** • Nausea • **Stomatitis** • Vomiting	• Effects on the **gastrointestinal system** (nausea, vomiting, diarrhoea, abdominal pain) may result in loss of appetite (**anorexia**) or feelings of weakness (**asthenia**). Your doctor or nurse 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 • 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

CHEMOTHERAPY DRUG	POSSIBLE SIDE EFFECT	HOW THE SIDE EFFECTS MAY BE MANAGED
Gemcitabine (Gemcitabine SPC, 2017)	• **Alopecia** • **Anaemia** • Blood in urine • **Dyspnoea** • Flu-like symptoms • Increased liver **enzymes** • **Leukopenia** • Nausea • **Oedema** • Protein in urine • Rash • **Thrombocytopenia** • Vomiting	• Your blood cell counts will be monitored frequently throughout your treatment in order to detect any **anaemia**, **leukopenia** or **thrombocytopenia** – your doctor may adjust your treatment according to test results and will advise you on how to prevent infections • Your doctor will be able to help you to prevent or manage effects on the **gastrointestinal system** such as nausea and vomiting • **Dyspnoea** is usually mild and passes rapidly without 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 • Your liver and kidney function will be monitored during treatment • Let your doctor know if you experience swelling, rash or flu-like symptoms, so that they can decide how to manage these
Irinotecan (Irinotecan SPC, 2018)	• **Alopecia** • **Anaemia** • Diarrhoea • Fever • Increased infections • Increased liver **enzymes** • Nausea • **Neutropenia** • **Thrombocytopenia** • Vomiting	• Your blood cell counts will be monitored frequently throughout your treatment in order to detect any **anaemia**, **neutropenia** 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 to prevent or manage effects on the **gastrointestinal system** such as nausea, vomiting and diarrhoea • **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 • Your liver function will be monitored during treatment
Liposomal irinotecan (nal-IRI) (Onivyde SPC, 2016)	• Abdominal pain • **Alopecia** • **Anaemia** • **Anorexia** • **Asthenia** • Decreased weight • Dehydration • Diarrhoea • Dizziness • **Fatigue** • Fever • **Leukopenia** • Low blood potassium and magnesium levels • Nausea • **Neutropenia** • **Peripheral oedema** • **Stomatitis** • **Thrombocytopenia** • Vomiting	• Your blood cell counts will be monitored frequently throughout your treatment in order to detect any **anaemia**, **neutropenia**, **leukopenia** 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, abdominal pain) may result in loss of appetite (**anorexia**) or feelings of weakness (**asthenia**). Your doctor or nurse 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 • **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 dizziness or swelling, so that they can decide how to manage these

continued overleaf

CHEMOTHERAPY DRUG	POSSIBLE SIDE EFFECT	HOW THE SIDE EFFECTS MAY BE MANAGED
***nab*-paclitaxel** (Abraxane SPC, 2018)	• **Alopecia** • **Anaemia** • **Anorexia** • **Arthralgia** • **Asthenia** • Constipation • Diarrhoea • **Fatigue** • Fever • **Leukopenia** • **Lymphopenia** • **Myalgia** • Nausea • **Neutropenia** • **Peripheral neuropathy** • Rash • **Stomatitis** • **Thrombocytopenia** • Vomiting	• Your blood cell counts will be monitored frequently throughout your treatment in order to detect any **anaemia**, **neutropenia**, **leukopenia**, **lymphopenia** 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, constipation) may result in loss of appetite (**anorexia**) or feelings of weakness (**asthenia**). Your doctor or nurse 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 or nurse, who will help you to manage this side effect • 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 • **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 joint or muscle pain, so that they can decide how to manage it

CHEMOTHERAPY DRUG	POSSIBLE SIDE EFFECT	HOW THE SIDE EFFECTS MAY BE MANAGED
Oxaliplatin (Oxaliplatin SPC, 2017)	• Abdominal pain • Allergic reaction • **Alopecia** • **Anaemia** • **Anorexia** • **Asthenia** • Back pain • Constipation • Cough • Diarrhoea • **Dyspnoea** • **Fatigue** • Fever • Headache • High blood glucose and sodium • Increased infections • Increased liver **enzymes** • Injection site reactions • **Leukopenia** • Low blood potassium levels • **Lymphopenia** • Nausea • **Neutropenia** • Nose bleeds • **Peripheral neuropathy** • Skin disorders • **Stomatitis** • Taste changes • **Thrombocytopenia** • Vomiting	• Your blood cell counts will be monitored frequently throughout your treatment in order to detect any **anaemia**, **neutropenia**, **leukopenia**, **lymphopenia** 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, abdominal pain, constipation) and taste changes may result in loss of appetite (**anorexia**) or feelings of weakness (**asthenia**). Your doctor or nurse will be able to help you to prevent or manage these side effects • Let your doctor or nurse 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)* • Report any signs of **peripheral neuropathy** (tingling or numbness in your hands or feet) to your doctor or nurse, who will help you to manage this side effect • 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 or nurse know if you experience any burning or skin changes at the injection site, nose bleeds, pain or headaches so that they can decide how to manage these • Your liver function will be monitored during treatment

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

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. During these appointments, your doctor will ask you about any symptoms you are experiencing, and make sure you are receiving enough nutritional and psychosocial support. You may also have a blood test for **CA 19-9**. If your **CA 19-9** levels are rising, it could be a sign that your cancer has come back, or is growing. Your doctor might recommend a **CT scan** if you have any new symptoms or if there are signs of your cancer growing.

What if I need more treatment?

Despite the best possible treatment at diagnosis, there is a possibility that your cancer may return. Cancer that comes back is called a **recurrence**. Unfortunately, **recurrence** of pancreatic cancer after **resection** is very common. The treatment that you will be offered depends on the extent of the **recurrence**. Your doctor will discuss all of the treatment options with you.

Looking after your health

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

- **Take plenty of rest when you need it**: Give your body time to recover. Complementary methods, such as yoga, relaxation exercises, music or art therapy, may help you relax and cope better with side effects. Your hospital may offer complementary therapy; ask your doctor for details, as some such methods or products could interfere with the effectiveness of your medications.
- **Eat well and keep active**: Eating a healthy diet and keeping active can help improve your fitness. It is important to start slowly, with gentle walking, and build up as you start to feel better.

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

Regular exercise is an important part of a healthy lifestyle, helping you to keep physically fit and avoid weight gain. It is very important that you listen carefully to the recommendations of your doctor or nurse, and talk to them about any difficulties you have with exercise.

Long-term effects

The long-term effects of pancreatic cancer and its treatment can be managed so it is important that you tell your doctor or nurse about any persistent or new symptoms. Your doctor or nurse will also work with you to develop a personalised survivorship care plan. The effects of surgery on reducing the production of **digestive enzymes** and **insulin** are permanent, therefore **nutritional support** and any **enzyme** or **insulin** treatment will be needed for the rest of your life (see section '*Supportive interventions*' for more information).

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

Emotional support

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

Support groups

In Europe, there are patient advocacy groups, which help patients and their families to navigate the pancreatic 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.

Pancreatic Cancer Europe is a platform that brings together patient groups, experts, politicians and journalists with a common interest in improving care for patients with pancreatic cancer. You can find out more from your national or local cancer society.

For further information about Pancreatic Cancer Europe visit: https://www.pancreaticcancereurope.eu/

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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

ACINAR CELL
Pancreatic cell that synthesises, stores and secretes **digestive enzymes**

ADENOCARCINOMA
Cancer that begins in glandular (secretory) cells

ADJUVANT (TREATMENT)
Additional treatment given after the primary treatment to reduce the chance of the cancer coming back

ADVANCE CARE PLANNING
A voluntary discussion about future care between a patient and their care providers

AGRANULOCYTOSIS
Severe deficiency of white blood cells, usually neutrophils

ALOPECIA
Hair loss

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

ANOREXIA
A lack or loss of appetite

ARTHRALGIA
Joint pain

ASTHENIA
Abnormal feeling of weakness or lack of energy

BENIGN
Not cancerous

BILE DUCT
The tube through which bile passes in and out of the liver

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

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

BORDERLINE RESECTABLE (TUMOUR)
A **tumour** that is neither clearly **resectable**, nor clearly **unresectable**

BRCA1
A **gene** that normally controls **tumour** growth but when **mutated** has the opposite effect

BRCA2
A **gene** that normally controls **tumour** growth but when **mutated** has the opposite effect

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

CANCER ANTIGEN 19-9 (CA 19-9)
A protein released into the bloodstream by both cancer cells and normal cells. High levels of **CA 19-9** can be a sign of pancreatic cancer. **CA 19-9** levels can be used to help keep track of how well cancer treatments are working or if the cancer has come back

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

CHEMORADIOTHERAPY
Chemotherapy and **radiotherapy** given together

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

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

COELIAC AXIS
A major artery in the abdomen

COELIAC PLEXUS
A bundle of nerves in the upper back

COELIAC PLEXUS BLOCK
A procedure to inject **local anaesthetic** around the **coeliac plexus** for pain relief

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

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

CURATIVE (TREATMENT)
A treatment that is intended to cure the cancer

GLOSSARY

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

DIETICIAN
A qualified health professional who is an expert on diet and nutrition

DIGESTIVE ENZYMES
A group of **enzymes** that break food down into smaller components for the body to absorb the nutrients

DISTAL PANCREATECTOMY
Surgery to remove the body and the tail of the **pancreas**

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

DUCTS
Tubes or vessels in the body that fluids pass through

DUODENUM
The first part of the small intestine

DYSPNOEA
Shortness of breath

ENDOCRINE PANCREAS
Cells of the **pancreas** that produce **hormones**

ENDOSCOPE
A thin, tube-like instrument used to look at tissues inside the body

ENDOSCOPIC ULTRASOUND SCAN
A procedure in which an **endoscope** with an **ultrasound probe** and **biopsy needle** is inserted into the body to create an image by **ultrasound** and take a **biopsy**

ENZYME
A protein that speeds up chemical reactions in the body

EXOCRINE PANCREAS
Cells of the **pancreas** that produce **digestive enzymes**

FATIGUE
Overwhelming tiredness

FOLFIRINOX
A **chemotherapy regimen** consisting of **5-FU/FA** + **irinotecan** + **oxaliplatin**

FOLINIC ACID
A form of folic acid used to lessen the toxic effects of some anti-cancer drugs

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

GENERAL ANAESTHETIC
A medication that causes a reversible loss of consciousness

GENES
Pieces of **DNA** responsible for making substances that the body needs to function

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

HEREDITARY PANCREATITIS
A genetic condition in which there are recurrent episodes of inflammation of the **pancreas**

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

HYPERURICEMIA
A build-up of uric acid (a by-product of metabolism) in the blood

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**)

IMMUNOSUPPRESSION
Suppression of the body's immune system and its ability to fight infections and other diseases

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

INSULIN
A **hormone** made by the **endocrine pancreas** that controls the amount of sugar in the blood

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

GLOSSARY

JAUNDICE
A condition in which the skin and the whites of the eyes become yellow, urine darkens and stools becomes lighter than normal. Occurs when the liver is not working properly or a **bile duct** is blocked

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

LOCAL ANAESTHETIC
A medication that causes reversible absence of pain sensation around the site of administration

LOCALISED (PANCREATIC CANCER)
Cancer that is completely contained within the **pancreas** and has not spread anywhere else in the body

LOCALLY ADVANCED (PANCREATIC CANCER)
Cancer that has spread from where it started to nearby tissue or **lymph nodes**

LYMPHADENECTOMY
Surgery to remove **lymph nodes**

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

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

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

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

METASTATIC (PANCREATIC CANCER)
A cancer that has spread from its (primary) site of origin to different parts of the body

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

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

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

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

MYALGIA
Muscular pain

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

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

NEOADJUVANT (TREATMENT)
Treatment given as a first step to shrink a **tumour** before the main treatment is given

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

NUTRITIONAL SUPPORT
A process by which a health professional helps patients ensure they are eating the correct foods to meet their nutritional needs

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

OLAPARIB
A drug used to treat some types of cancer caused by **mutations** in the **BRCA1** and **BRCA2 genes**

GLOSSARY

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

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

PALPATE
Pressing on the surface of the body to feel the organs or tissues underneath

PANCREAS
An organ in the abdomen that produces **digestive enzymes** and **hormones**

PANCREATIC DUCT
Tubes through which pancreatic juices flow into the small intestine

PANCREATIC EXOCRINE INSUFFICIENCY
A condition in which the **pancreas** does not produce enough of the **digestive enzymes** required to break down food and absorb nutrients

PANCREATITIS
Inflammation of the **pancreas**

PANCREATODUODENECTOMY
Surgery to remove the head of the **pancreas** along with the **duodenum** and part of the stomach

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

PARP
Poly(ADP-ribose) polymerase, an **enzyme** involved in repairing **DNA**

PEMBROLIZUMAB
A type of **immunotherapy** that blocks a protein called **PD-1** on the surface of certain immune cells called T-cells; this activates the T-cells to find and kill cancer cells. It is administered through a drip into a vein in your arm or chest

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

PERIPHERAL OEDEMA
A build-up of fluid in the lower legs and ankles which causes the affected tissues to become swollen

PRO-DRUG
An inactive drug that is converted in the body to an active form

PROGNOSIS
The likely outcome of a medical condition

PROGRAMMED CELL DEATH PROTEIN 1 (PD-1)
A cellular protein thought to be involved in helping the **tumour** to evade detection by the body's immune system

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

RECURRENCE
Return of a cancer

REGIMEN
Treatment plan

RESECTABLE
Able to be removed (resected) by surgery

RESECTION
Surgery to remove tissue

RISK FACTOR
Something that increases the chance of developing a disease

RUCAPARIB
A **PARP** inhibitor in clinical development for types of cancer caused by **mutations** in the **BRCA1** and **BRCA2 genes**

SEDATIVE
A drug used to calm a person down, relieve anxiety or help a person sleep

SPLEEN
An organ that makes lymphocytes, filters the blood, stores blood cells and destroys old blood cells

STENT
A small tube that is used to keep an airway or artery open

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

STOMATITIS
Inflammation of the inside of the mouth

GLOSSARY

SUPERIOR MESENTERIC ARTERY
A major artery in the abdomen that supplies blood to the intestines

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

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

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

UNRESECTABLE
Unable to be removed (resected) by surgery

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 pancreatic 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 pancreatic 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 pancreatic 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 pancreatic 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**