Cancer Association of South Africa (CANSA)

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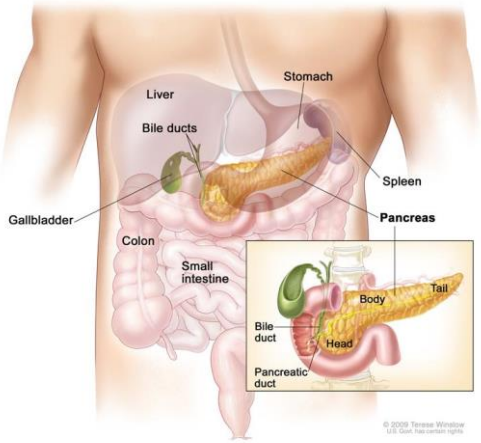
Fact Sheet on Pancreatic Neuroendocrine Tumours

Introduction

The pancreas is a gland about 15cm long that is shaped like a thin pear lying on its side. The wider end of the pancreas is called the head, the middle section is called the body, and the narrow end is called the tail. The pancreas is a soft, lobulated, retroperitoneal organ which lies behind the stomach and in from of lumbar vertebrae 1 & 2 of spine – it is connected to the duodenum (the first part of the small intestine) through a small tube called the pancreatic duct.



[Picture Credit: Pancreatic Neuroendocrine Tumours]

There are two kinds of cells in the pancreas:

- Endocrine pancreas cells make several kinds of hormones (chemicals that control the actions of certain cells or organs in the body), such as insulin to control blood sugar. They cluster together in many small groups (islets) throughout the pancreas. Endocrine pancreas cells are also called islet cells or islets of Langerhans. Tumours that form in islet cells are called islet cell tumours, pancreatic endocrine tumours, or pancreatic neuroendocrine tumours (pancreatic NETs).

- Exocrine pancreas cells make enzymes that are released into the small intestine to help the body digest food. Most of the pancreas is made of ducts with small sacs at the end of the ducts, which are lined with exocrine cells.

Neuroendocrine tumours (NETs) are neoplasms that arise from cells of the endocrine (hormonal) and nervous systems. Many are benign (non-cancerous), while some are malignant (cancerous). The tumours most commonly occur in the intestine, where they are often called carcinoid tumours, but they are also found in the pancreas, lung and the rest of the body.

Although there are many kinds of NETs, they are treated as a group of tissue because the cells of these neoplasms share common features, such as looking similar, having special secretory granules, and often producing biogenic amines and polypeptide hormones.
(National Cancer Institute; Wikipedia; WebMD; Medscape).

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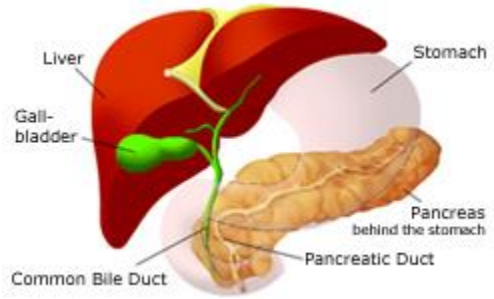
Pancreatic Neuroendocrine Tumours
Pancreatic neuroendocrine tumours (pancreatic NETs or PNETs) account for less than 5% of all pancreatic tumours. They may be benign or malignant and they tend to grow slower than exocrine tumours. They develop from the abnormal growth of endocrine (hormone-producing) cells in the pancreas called islet cells. This is why these tumours are sometimes referred to as “islet cell tumours”.

Some of the hormones islet cells produce include insulin, glucagon and somatostatin. Insulin and glucagon are the two main pancreatic hormones. Insulin lowers blood sugar levels, while glucagon raises blood sugar levels. Together, these two main hormones work to maintain the proper level of sugar in the blood. Somatostatin regulates the levels of a variety of other hormones in the blood.

Pancreatic neuroendocrine tumours are either functional (produce hormones) or non-functional (produce no hormones).

Functional neuroendocrine tumours cause the pancreas to overproduce hormones consequently causing hormone-related symptoms. The majority of PNETs are non-functional tumours. Non-functional tumours do not produce any hormones so they do not cause any hormone-related symptoms. As a result, these tumours are typically diagnosed once the tumour is advanced and is causing symptoms such as pain or jaundice.

[Picture Credit: Pancreatic Tumours]



Endocrine tumours of the pancreas are rare tumours that include insulinomas, gastrinomas, VIPomas and non-functioning pancreatic endocrine tumours. Tumours that are small in size and usually benign – such as insulinomas – can frequently be excised through a laparoscopic approach.
(Pancreatic Cancer Action Network; Weill Cornell Medical College).

Incidence of Pancreatic Neuroendocrine Tumours in South Africa
The National Cancer Registry (2011) does not provide any information on the incidence of Pancreatic Neuroendocrine Tumours.

Signs and Symptoms of Pancreatic Neuroendocrine Tumours
When one has neuroendocrine tumours (NETs), one can get a lot of different symptoms, from shortness of breath to headaches to cramps in one’s belly. Why the variety? It is all about location. The tumours can show up in lots of places, and where they are growing makes a big difference to how one feels.

The trouble with finding NETs is they often do not cause symptoms at first. Because some of these tumours can be so slow growing, they may actually not cause problems for a long time. If something grows slowly, the other tissues and cells around it have time to accommodate it.

Even if one does feel like something is not right, one might not connect it with NETs. The symptoms can be vague, so the tumour is often missed for a long time.

Pain of pancreatic origin in acute pancreatitis, chronic pancreatitis, and pancreatic cancer is felt in the epigastrium and bores into the back; it is aggravated when lying down and may be relieved by sitting and bending forwards. Transmitted aortic pulsations can be seen and felt in pancreatic masses (tumours and cysts) as the pancreas lies on the aorta.
(WebMD; Medscape).

Diagnosis of Pancreatic Neuroendocrine Tumours
Because the recognition of hormonal hypersecretion syndrome requires considerable clinical experience and the symptoms of non-functioning PNETs are nonspecific, the diagnosis of PNET is often delayed. Endocrine testing, imaging, and histological evidence are all required to accurately diagnose PNETs. A complete diagnosis should establish the PNET nature, assess the tumour grade, identify the primary and metastatic loci, and determine whether the tumour is functioning. If hormonal hypersecretion syndrome is suspected, appropriate biochemical testing is performed to determine hormonal hypersecretion and followed by imaging, endoscopy, and biopsy.

Fasting levels of pancreatic polypeptide (PP), gastrin, proinsulin, insulin, glucagon, and vasoactive intestinal peptide (VIP) are worth measuring because they are the hormones most frequently produced by functioning PNETs. False positive results are common, especially for CGA, because it is often elevated in patients taking anti-acids or in those with atrophic gastritis.

Anatomical computed tomography (CT) or magnetic resonance imaging (MRI) of the abdomen and pelvis is important to evaluate the pancreatic, liver, lymph node, and peritoneal metastases. Nuclear imaging with octreotide should be performed at least once to determine if the tumours have a high affinity for somatostatin and if there are occult tumours not detected by anatomical imaging.

FDG-PET is not usually indicated because most PNETs are negative; however, FDG-PET can ascertain the overall tumour burden in high-grade PNETs. Recently, PET with gallium 68–labelled octreotide has been demonstrated to be extremely sensitive at detecting small and extra-hepatic PNET metastases but is not widely available.

Liver masses are typically biopsied transcutaneously with ultrasound or CT guidance, and pancreatic masses are biopsied with endoscopic ultrasound guidance. Tumour biopsy is critical for PNET diagnosis, not only to demonstrate the neuroendocrine nature of the tumour but also to preliminarily grade the tumour and to perform immunocytochemical staining for hormones and islet markers, which is useful for determining the pancreatic origin of liver metastases. Currently, the best predictor of PNET behaviour is tumour grade; therefore, the cytologic examination of the biopsied tumour sample should classify the tumour as a well-differentiated endocrine tumour (low grade of malignancy), a well-differentiated endocrine carcinoma (intermediate grade), or a poorly differentiated endocrine carcinoma (high grade).
(Ro, *et al.* 2013).

Grading and Staging of Pancreatic Neuroendocrine Tumours
When you and your doctor make a plan to treat your neuroendocrine tumour (NET), a key part of the strategy is figuring out whether the NET is advanced or just starting. To do that, one needs to understand two important words: stage and grade.

The stage tells whether the disease has spread from its original spot, and where in the body it has moved to.

The grade describes how it looks under a microscope compared to normal cells. That is important because it can show whether it is likely to spread slowly or quickly.

There are many different types of NETs, and doctors have come up with a separate system of staging for each one.

Pancreatic NETs - the stages for this type are the same as the ones for pancreatic cancer. It is based on where the tumour is located.

Stage 0. It is only in the top layers of the duct cells of the pancreas - a gland in the belly - and not any deeper.

Stage I. It is just in the pancreas - not in the lymph nodes or other sites.

Stage II. It is now growing outside of the pancreas, but not in major blood vessels or nerves.

Stage III. It has moved outside of the pancreas and into the major blood vessels and nerves.

Stage IV. The cancer has spread to other parts of the body.

Four categories simplify the staging system and help with decisions about whether surgery can be done to remove the pancreatic NET.

The following words may be used to describe them:

- Resectable. This means one may be able to get an operation to take out the tumour, since it is mainly or entirely in the pancreas.
- Borderline resectable. One may need chemotherapy or radiation to shrink the tumour before the doctor can remove it with surgery.
- Locally advanced. The cancer has moved into veins or organs near the pancreas, but has not spread to organs in other parts of the body. Doctors cannot remove the tumour in an operation.
- Metastatic. The cancer has spread to organs like the liver or stomach, and surgery is not an option to remove it.

(WebMD).

Treatment of Neuroendocrine Tumours and Pancreatic Neuroendocrine Tumours

In caring for a person with a tumour, different types of doctors often work together to create a patient's overall treatment plan that combines different types of treatments. This is called a multidisciplinary approach. Cancer care teams also include a variety of other health care professionals, including physician assistants, oncology nurses, social workers, pharmacists, counsellors, dietitians, and others.

Descriptions of the most common treatment options for a neuroendocrine tumour are listed below. Treatment options and recommendations depend on several factors, including:

- The type of neuroendocrine tumour
- If it is cancerous and the stage
- Possible side effects
- The patient's preferences and overall health

The prognosis of these neuroendocrine tumours is often much better than for pancreatic adenocarcinoma with good cure rates depending on the type of tumour. There is an association of neuroendocrine tumours with genetic mutations which can cause several members of the same family to have these types of tumours.

The rarity of these tumours makes the care of these patients challenging and a multidisciplinary approach by experts in the field is important for patients to obtain the best care and treatment possible. The Multidisciplinary Endocrine Tumour Program is composed of endocrinologists, endocrine surgeons, radiologists, nuclear medicine specialists and oncologists who specialise in the diagnosis and treatment of these rare pancreatic endocrine tumours.

Types of pancreatic neuroendocrine tumours:

Insulinoma - insulin is produced by beta cells which are organised into islands of cells in the pancreas. The primary function of insulin is to regulate the metabolism and storage of sugar in the body. Insulinomas are neuroendocrine tumours which produce insulin and are the most common type of functional neuroendocrine tumours. As these tumours grow they produce large amounts of insulin which can cause low blood sugar. When the blood sugar gets too low patients can experience symptoms which include dizziness, confusion, abnormal behaviour and even loss of consciousness. Several tests are required to confirm the diagnosis of an insulinoma because there are several other reasons for low blood sugar. Once the diagnosis is confirmed with blood tests, imaging studies such as CT scan or ultrasound are used to localise the tumour. The primary treatment is surgical removal of the insulinoma which provides excellent cure rates.

Gastrinoma - a gastrinoma is a neuroendocrine tumour which produces the hormone gastrin. The function of gastrin is to stimulate the stomach to produce acid to aid in the digestion of food. Normally when there is enough acid in the stomach to digest a meal the production of gastrin is turned down and the stomach acid level slowly returns to a level needed for an empty stomach. Gastrinomas continuously produce gastrin which leads to very high levels of stomach acid which can then lead to ulcer formation in the stomach and small intestine (also called Zollinger-Ellison Syndrome). Patients may complain of abdominal pain from these ulcers which may improve with antacid medications. Blood tests to measure the level of gastrin can be falsely elevated if patients are taking antacid medications during the test and these should be discontinued prior to testing. After the diagnosis of gastrinoma is confirmed with blood tests, imaging studies including CT scan and ultrasound can help to localise the tumour prior to surgical removal.

Glucagonoma - the alpha cells of the pancreas produce the hormone glucagon which acts to counter the effects of insulin. Normally when a person has not eaten for several hours, the blood sugar drops and glucagon is released. This causes breakdown of sugar stored in the form of glucagon which quickly brings the blood sugar back up to normal. Glucagonomas continuously produce glucagon which can cause continuously elevated blood sugar and

symptoms typically seen with diabetes. Surgical removal of the tumour is the primary treatment after imaging studies are completed.

VIPoma - Vasoactive Intestinal Polypeptide (VIP) is a hormone produced in the pancreas and in other locations throughout the body. Neuroendocrine tumours called VIPomas will cause symptoms including profuse watery diarrhoea, dehydration and electrolyte disturbances. These tumours are extremely rare and blood tests and imaging studies are needed to confirm the diagnosis. Patients are treated with medication to decrease symptoms and often require intravenous fluid to treat dehydration before proceeding to surgery.

Non-functional neuroendocrine tumours - some tumours that arise from endocrine cells of the pancreas do not produce hormones and, therefore, do not produce any of the symptoms which are described above. These types of tumours are often detected incidentally on CT scan or other imaging studies obtained to work-up another medical problem. Some of these tumours may grow quite large and cause upper abdominal discomfort as they compress surrounding structures. The challenge in the diagnosis of these types of tumours is to distinguish them from pancreatic adenocarcinoma which has a worse prognosis. Surgery is the primary treatment for non-functional neuroendocrine tumours after blood tests and imaging studies are complete.
(Cancer.Net; Comprehensive Cancer Center).

Prognosis of Pancreatic Cancers
Pancreatic cancer prognosis depends a great deal on the cancer's stage at the time of diagnosis. Advanced stages of pancreatic cancer are generally more fatal than early stages. Many cases of pancreatic cancer are not detected until the cancer has progressed and spread to other parts of the body.

Pancreatic Cancer Survival Rates

Stage	5-year Survival Rate
Stage 1A	14%
Stage 1B	12%
Stage 2A	7%
Stage 2B	5%
Stage 3	3%
Stage 4	1%

*Neuroendocrine tumour pancreatic cancer is a rare type of pancreatic cancer that develops in the cells responsible for creating insulin and glucagon. Survival rates for this type of pancreatic cancer are different than the more common type of pancreatic cancer, exocrine pancreatic cancer.

Survival Rates for People Treated with Surgery

Stage	5-year Survival Rate
Stage 1	61%
Stage 2	52%
Stage 3	41%
Stage 4	16%

*The five-year survival rate of a person with a neuroendocrine tumour who did not have surgery is 16 percent.

It is important to know that prognosis numbers are based on technologies and treatments that were used years ago. Treatments are advancing greatly every year. This is good news for people undergoing treatment for pancreatic cancer today.
(Healthline).

About Clinical Trials
Clinical trials are research studies that involve people. These studies test new ways to prevent, detect, diagnose, or treat diseases. People who take part in cancer clinical trials have an opportunity to contribute to scientists' knowledge about cancer and to help in the development of improved cancer treatments. They also receive state-of-the-art care from cancer experts.

Types of Clinical Trials
Cancer clinical trials differ according to their primary purpose. They include the following types:

Treatment - these trials test the effectiveness of new treatments or new ways of using current treatments in people who have cancer. The treatments tested may include new drugs or new combinations of currently used drugs, new surgery or radiation therapy techniques, and vaccines or other treatments that stimulate a person's immune system to fight cancer. Combinations of different treatment types may also be tested in these trials.

Prevention - these trials test new interventions that may lower the risk of developing certain types of cancer. Most cancer prevention trials involve healthy people who have not had cancer; however, they often only include people who have a higher than average risk of developing a specific type of cancer. Some cancer prevention trials involve people who have had cancer in the past; these trials test interventions that may help prevent the return (recurrence) of the original cancer or reduce the chance of developing a new type of cancer

Screening - these trials test new ways of finding cancer early. When cancer is found early, it may be easier to treat and there may be a better chance of long-term survival. Cancer screening trials usually involve people who do not have any signs or symptoms of cancer. However, participation in these trials is often limited to people who have a higher than average risk of developing a certain type of cancer because they have a family history of that type of cancer or they have a history of exposure to cancer-causing substances (e.g., cigarette smoke).

Diagnostic - these trials study new tests or procedures that may help identify, or diagnose, cancer more accurately. Diagnostic trials usually involve people who have some signs or symptoms of cancer.

Quality of life or supportive care - these trials focus on the comfort and quality of life of cancer patients and cancer survivors. New ways to decrease the number or severity of side effects of cancer or its treatment are often studied in these trials. How a specific type of cancer or its treatment affects a person's everyday life may also be studied.

Where Clinical Trials are Conducted

Cancer clinical trials take place in cities and towns in doctors' offices, cancer centres and other medical centres, community hospitals and clinics. A single trial may take place at one or two specialised medical centres only or at hundreds of offices, hospitals, and centres.
Each clinical trial is managed by a research team that can include doctors, nurses, research assistants, data analysts, and other specialists. The research team works closely with other health professionals, including other doctors and nurses, laboratory technicians, pharmacists, dieticians, and social workers, to provide medical and supportive care to people who take part in a clinical trial.

Research Team

The research team closely monitors the health of people taking part in the clinical trial and gives them specific instructions when necessary. To ensure the reliability of the trial's results, it is important for the participants to follow the research team's instructions. The instructions may include keeping logs or answering questionnaires. The research team may also seek to contact the participants regularly after the trial ends to get updates on their health.

Clinical Trial Protocol

Every clinical trial has a protocol, or action plan, that describes what will be done in the trial, how the trial will be conducted, and why each part of the trial is necessary. The protocol also includes guidelines for who can and cannot participate in the trial. These guidelines, called eligibility criteria, describe the characteristics that all interested people must have before they can take part in the trial. Eligibility criteria can include age, sex, medical history, and current health status. Eligibility criteria for cancer treatment trials often include the type and stage of cancer, as well as the type(s) of cancer treatment already received.

Enrolling people who have similar characteristics helps ensure that the outcome of a trial is due to the intervention being tested and not to other factors. In this way, eligibility criteria help researchers obtain the most accurate and meaningful results possible.

National and International Regulations

National and international regulations and policies have been developed to help ensure that research involving people is conducted according to strict scientific and ethical principles. In these regulations and policies, people who participate in research are usually referred to as "human subjects."

Informed Consent

Informed consent is a process through which people learn the important facts about a clinical trial to help them decide whether or not to take part in it, and continue to learn new information about the trial that helps them decide whether or not to continue participating in it.

During the first part of the informed consent process, people are given detailed information about a trial, including information about the purpose of the trial, the tests and other procedures that will be required, and the possible benefits and harms of taking part in the trial. Besides talking with a doctor or nurse, potential trial participants are given a form, called an informed consent form, that provides information about the trial in writing. People who agree to take part in the trial are asked to sign the form. However, signing this form

does not mean that a person must remain in the trial. Anyone can choose to leave a trial at any time—either before it starts or at any time during the trial or during the follow-up period. It is important for people who decide to leave a trial to get information from the research team about how to leave the trial safely.

The informed consent process continues throughout a trial. If new benefits, risks, or side effects are discovered during the course of a trial, the researchers must inform the participants so they can decide whether or not they want to continue to take part in the trial. In some cases, participants who want to continue to take part in a trial may be asked to sign a new informed consent form.

New interventions are often studied in a stepwise fashion, with each step representing a different "phase" in the clinical research process. The following phases are used for cancer treatment trials:

Phases of a Clinical Trial

Phase 0. These trials represent the earliest step in testing new treatments in humans. In a phase 0 trial, a very small dose of a chemical or biologic agent is given to a small number of people (approximately 10-15) to gather preliminary information about how the agent is processed by the body (pharmacokinetics) and how the agent affects the body (pharmacodynamics). Because the agents are given in such small amounts, no information is obtained about their safety or effectiveness in treating cancer. Phase 0 trials are also called micro-dosing studies, exploratory Investigational New Drug (IND) trials, or early phase I trials. The people who take part in these trials usually have advanced disease, and no known, effective treatment options are available to them.

Phase I (also called phase 1). These trials are conducted mainly to evaluate the safety of chemical or biologic agents or other types of interventions (e.g., a new radiation therapy technique). They help determine the maximum dose that can be given safely (also known as the maximum tolerated dose) and whether an intervention causes harmful side effects. Phase I trials enrol small numbers of people (20 or more) who have advanced cancer that cannot be treated effectively with standard (usual) treatments or for which no standard treatment exists. Although evaluating the effectiveness of interventions is not a primary goal of these trials, doctors do look for evidence that the interventions might be useful as treatments.

Phase II (also called phase 2). These trials test the effectiveness of interventions in people who have a specific type of cancer or related cancers. They also continue to look at the safety of interventions. Phase II trials usually enrol fewer than 100 people but may include as many as 300. The people who participate in phase II trials may or may not have been treated previously with standard therapy for their type of cancer. If a person has been treated previously, their eligibility to participate in a specific trial may depend on the type and amount of prior treatment they received. Although phase II trials can give some indication of whether or not an intervention works, they are almost never designed to show whether an intervention is better than standard therapy.

Phase III (also called phase 3). These trials compare the effectiveness of a new intervention, or new use of an existing intervention, with the current standard of care (usual treatment) for a particular type of cancer. Phase III trials also examine how the side effects of the new

intervention compare with those of the usual treatment. If the new intervention is more effective than the usual treatment and/or is easier to tolerate, it may become the new standard of care.

Phase III trials usually involve large groups of people (100 to several thousand), who are randomly assigned to one of two treatment groups, or "trial arms": (1) a control group, in which everyone in the group receives usual treatment for their type of cancer, or 2) an investigational or experimental group, in which everyone in the group receives the new intervention or new use of an existing intervention. The trial participants are assigned to their individual groups by random assignment, or randomisation. Randomisation helps ensure that the groups have similar characteristics. This balance is necessary so the researchers can have confidence that any differences they observe in how the two groups respond to the treatments they receive are due to the treatments and not to other differences between the groups.

Randomisation is usually done by a computer program to ensure that human choices do not influence the assignment to groups. The trial participants cannot request to be in a particular group, and the researchers cannot influence how people are assigned to the groups. Usually, neither the participants nor their doctors know what treatment the participants are receiving.

People who participate in phase III trials may or may not have been treated previously. If they have been treated previously, their eligibility to participate in a specific trial may depend on the type and the amount of prior treatment they received.

In most cases, an intervention will move into phase III testing only after it has shown promise in phase I and phase II trials.

Phase IV (also called phase 4). These trials further evaluate the effectiveness and long-term safety of drugs or other interventions. They usually take place after a drug or intervention has been approved by the medicine regulatory office for standard use. Several hundred to several thousand people may take part in a phase IV trial. These trials are also known as post-marketing surveillance trials. They are generally sponsored by drug companies.

Sometimes clinical trial phases may be combined (e.g., phase I/II or phase II/III trials) to minimize the risks to participants and/or to allow faster development of a new intervention.

Although treatment trials are always assigned a phase, other clinical trials (e.g., screening, prevention, diagnostic, and quality-of-life trials) may not be labelled this way.

<u>Use of Placebos</u>

The use of placebos as comparison or "control" interventions in cancer treatment trials is rare. If a placebo is used by itself, it is because no standard treatment exists. In this case, a trial would compare the effects of a new treatment with the effects of a placebo. More often, however, placebos are given along with a standard treatment. For example, a trial might compare the effects of a standard treatment plus a new treatment with the effects of the same standard treatment plus a placebo.

<u>Possible benefits of taking part in a clinical trial</u>

The benefits of participating in a clinical trial include the following:

- Trial participants have access to promising new interventions that are generally not available outside of a clinical trial.
- The intervention being studied may be more effective than standard therapy. If it is more effective, trial participants may be the first to benefit from it.
- Trial participants receive regular and careful medical attention from a research team that includes doctors, nurses, and other health professionals.
- The results of the trial may help other people who need cancer treatment in the future.
- Trial participants are helping scientists learn more about cancer (e.g., how it grows, how it acts, and what influences its growth and spread).

Potential harms associated with taking part in a clinical trial

The potential harms of participating in a clinical trial include the following:

- The new intervention being studied may not be better than standard therapy, or it may have harmful side effects that doctors do not expect or that are worse than those associated with standard therapy.
- Trial participants may be required to make more visits to the doctor than they would if they were not in a clinical trial and/or may need to travel farther for those visits.

Correlative research studies, and how they are related to clinical trials

In addition to answering questions about the effectiveness of new interventions, clinical trials provide the opportunity for additional research. These additional research studies, called correlative or ancillary studies, may use blood, tumour, or other tissue specimens (also known as 'biospecimens') obtained from trial participants before, during, or after treatment.

For example, the molecular characteristics of tumour specimens collected during a trial might be analysed to see if there is a relationship between the presence of a certain gene mutation or the amount of a specific protein and how trial participants responded to the treatment they received. Information obtained from these types of studies could lead to more accurate predictions about how individual patients will respond to certain cancer treatments, improved ways of finding cancer earlier, new methods of identifying people who have an increased risk of cancer, and new approaches to try to prevent cancer.

Clinical trial participants must give their permission before biospecimens obtained from them can be used for research purposes.

When a clinical trial is over

After a clinical trial is completed, the researchers look carefully at the data collected during the trial to understand the meaning of the findings and to plan further research. After a phase I or phase II trial, the researchers decide whether or not to move on to the next phase or stop testing the intervention because it was not safe or effective. When a phase III trial is completed, the researchers analyse the data to determine whether the results have medical importance and, if so, whether the tested intervention could become the new standard of care.

The results of clinical trials are often published in peer-reviewed scientific journals. Peer review is a process by which cancer research experts not associated with a trial review the study report before it is published to make sure that the data are sound, the data analysis was performed correctly, and the conclusions are appropriate. If the results are particularly

important, they may be reported by the media and discussed at a scientific meeting and by patient advocacy groups before they are published in a journal. Once a new intervention has proven safe and effective in a clinical trial, it may become a new standard of care.
(National Cancer Institute).

Medical Disclaimer

This Fact Sheet is intended to provide general information only and, as such, should not be considered as a substitute for advice, medically or otherwise, covering any specific condition or situation. Readers of this document should seek appropriate medical advice prior to taking or refraining from taking any action resulting from the contents of this Fact Sheet. As far as permissible by South African law, the Cancer Association of South Africa (CASNA) accepts no responsibility or liability to any person (or his/her dependants/estate/heirs) as a result of using any information contained in this Fact Sheet.

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