This booklet is part of series of publications for patients about neuroendocrine tumours and related conditions, treatments and tests.

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Carcinoid Tumours

Neuroendocrine tumours (NETs) develop from specialised cells that make and release hormones and peptides. (A peptide is a molecule made up of two or more amino acids, the building blocks of proteins). The hormones and peptides released into the bloodstream by these neuroendocrine cells affect the function of different organs in the body.

Each year approximately 2,000 people are diagnosed with NETs in the UK. As these are slow-growing cancers there are thought to be approximately 15,000 patients living with these cancers. This makes it one of the top 5 more common cancers in the UK affecting men and women of all ages. NETs are now twice as common as pancreatic cancer.

Like all cancers, NETs develop when the specialised cells undergo changes causing them to divide uncontrollably and grow into an abnormal tissue mass (tumour).

NETs can be found in several organs of the body but their most common location is the digestive system. They were first identified as a specific type of disease in the mid 1800s, and the name ‘carcinoid’ was given to them in 1907 to describe a tumour that grew much more slowly than usual cancers. However, by the 1950s it became quite clear that these slow-growing tumours could be malignant and spread from one part of the body to another like other forms of cancer.

Nowadays, the description carcinoid tumour has been replaced in medical literature by the term NETs or gastroenteropancreatic tumours (‘gastro’ - stomach, ‘entero’ - intestines and the pancreas), GEPs for short. However, some doctors do still use the term ‘carcinoid tumour’ or just ‘carcinoid’ when they refer to NETs that develop in the stomach, duodenum, small intestine, appendix, colon or rectum. NETs that start in the digestive tract are named according to the site where the tumour started.

Carcinoid Tumours can arise in a multitude of places: e.g. digestive system, oesophagus, stomach, small intestine, duodenum, jejunum, ileum, meckels diverticulum, appendix, colon and rectum, liver, gallbladder, ovary, testes, trachea, bronchi and lung.

There is some evidence to suggest that many people have small carcinoid tumours that cause them no problems throughout their lifetime and may never be discovered.

What is known about these tumours?

They usually grow slowly, and some people can have one or more tumours for years, often without symptoms, before they are diagnosed.

Tumours can be discovered at the time of surgery or investigation for other problems.

- When you are diagnosed with any type of NET your specialist may review a biopsy sample (a small amount of tissue taken from the tumour) and give your tumour a ‘proliferative index’, a measure of the number of cells in the tumour that are dividing (proliferating). A proliferation index of less than 2% means that the tumour is very slow growing, while a value above 10% suggests faster growth.

Classification

Doctors like to describe carcinoid tumours according to the area they are found. You may hear the terms:

- Foregut - the upper part of the digestive tract, including the stomach, duodenum and lung.
- Midgut - the small intestine, appendix, right (upper) colon (the most common area for carcinoid tumours).
- Hindgut - the lower part of the digestive tract, including the left (lower) colon and rectum.
Symptoms
Carcinoid tumours within the digestive tract are often very small. You may have no symptoms at all, or they may be very vague, which is why carcinoids and certain other types of NET are often known as the ‘quiet cancers.’

Early symptoms may include vague tiredness or digestive complaints, whilst you may have been told by your doctor that you may have Irritable Bowel Syndrome (IBS), Chron’s disease, peptic ulcer disease, gastritis or other digestive disorders.

However, if the carcinoid tumour has spread there will be other more obvious symptoms that make up what is known as ‘carcinoid syndrome’.

What is Carcinoid Syndrome?
When carcinoid tumours spread (‘metastasise’), the most common site for metastatic tumours (‘secondaries’) is the liver. Other areas of spread can, more rarely, include the bones, the lungs and the lymphatic system.

The syndrome is caused by an excessive amount of certain hormones circulating in the blood. For example adrenaline, dopamine, histamine, 5-hydroxytryptamine, noradrenalin, serotonin, bradykinin, chromogranin A, gastrin, glucagon and somatostatin.

You are more likely to have this syndrome if you have a midgut carcinoid (that is, of the small intestine, appendix, or right colon) that has spread to the liver.

The symptoms of carcinoid syndrome vary, and can often be highly individual.

Typical carcinoid symptoms include:
- flushing
- diarrhoea
- wheezing
- damage to the heart valves

However, it is by no means certain you will experience carcinoid syndrome. Not everyone with carcinoid tumours will have this collection of symptoms, even if their disease has spread to the liver.

Complications
Carcinoid crisis
Sometimes patients may suffer a particularly bad episode of carcinoid syndrome triggered by stress, general anaesthetic or certain treatments.

Symptoms include intense flushing, diarrhoea, abdominal pain, wheezing, palpitations, low or high blood pressure, an altered mental state and, in extreme cases, coma.

Without treatment the complication can be life threatening, but if you are having any procedures your NET specialist will ensure you are monitored and may give you an infusion of a somatostatin analogue as a preventative measure. Your NET specialist will also liaise with any other team, for example a surgical team, and pass on the guidelines that are available as a preventative measure for patients at risk.

Carcinoid Heart Disease
The hormones released by the tumours into the bloodstream can affect the heart by causing fibrotic plaques to build up on both the cardiac valves and muscle. This can eventually impair the function of the heart muscle and cause the valves to become leaky. This may cause symptoms such as breathlessness and swollen ankles, which can progressively worsen if untreated. There are successful treatments available, however.

For further information see the NET Patient Foundation booklet on Carcinoid Heart Disease.
How is carcinoid diagnosed?

Like all NET patients you can expect to face numerous tests and scans that will provide your doctor with information about the disease, its spread and the rate of growth. (To find out about tests and scans in more detail please look at the website www.netpatientfoundation.com under Patient Journey).

**Biopsy** - this involves taking a piece of tissue from the suspect tumour and having it analysed in the laboratory by a specialist called a histopathologist.

**Blood tests** - you will be asked to have a fasting gut hormone blood test, and blood will also be collected for a range of other tests. Doctors will be looking for certain NET markers, particularly chromogranin A and B, and for evidence of a rise in certain peptides and hormones in the blood, as well as checking how well your kidneys and liver are functioning.

### Other biochemical tests include:
- Full blood count
- Kidney function tests (urea and electrolytes)
- Liver function tests
- Thyroid function tests
- Pituitary hormone screen e.g adrenocorticotropic hormone (ACTH), prolactin, growth hormones and cortisol
- Serum calcium, parathyroid hormone levels (in all pancreatic NET patients, as a simple screening test for MEN-1 syndrome)

**Urine tests** - when certain hormones are broken down by the liver, it is excreted as a substance called 5-hydroxyindoleacetic acid (5HIAA) in the urine. Higher than normal levels of serotonin produced by carcinoid patients show up as raised levels of 5HIAA in their urine. You may be asked to do a urine collection over a 24 hour period so that your 5HIAA levels can be checked.

You will be asked to avoid certain foods prior to and during the test including chocolate, olives, bananas, pineapple and its juice, all tomato products, plums, aubergine, avocado, kiwi fruit, walnuts, brazil nuts, cashew nuts, tea, coffee and alcohol. You will also be asked to avoid certain cough, cold and flu remedies 3 to 7 days prior to the test. This is because they contain substances that might artificially raise your serotonin levels and give a false test result.

**Endoscopy** - this is a way of examining your digestive tract using a flexible fibre optic tube called an endoscope. The tube can either be inserted down the back of the throat, a procedure called a gastroscopy, or into the colon via the rectum (back passage), a procedure known as a colonoscopy. You will be offered sedation before either of the procedures, and the doctor may remove samples of any suspect areas of tissue for analysis.

**There are a number of scans you may be asked to have. They will determine the exact site and size of the tumours**

**Octreotide scan** - this is a useful diagnostic test that can help reveal the site of tumours. Some carcinoid tumours have special receptors on their surfaces called somatostatin receptors. Octreotide is a somatostatin analogue, a substance that copies or mimics the action of somatostatin. When octreotide is combined with a mildly radioactive agent and then injected via a vein in the arm, it sticks to somatostatin receptors on the tumour surface and the tumours light up on the screen as radioactive 'hot spots'.

**MIBG scan** - this is a similar type of scan to the OctreoScan, except a different radioactive labelled substance is used. A radioactive MIBG scan will show up those tumours which have receptors for meta iodo benzyl guanidine (MIBG) on the surface.

**Endoscopic ultrasound** - this is usually done under sedation and involves looking at the digestive tract with a flexible camera. The test can help pick up small tumours that might not be clearly visible on a scan.

**CT scan** - a computerised tomography (CT) scan provides a three dimensional picture of the inside of the body. It can be used to determine the position and size of carcinoid tumours, and regular scans are useful to find out the rate of tumour growth.
MRI scan - this ‘whole body’ magnetic resonance imaging (MRI) scan can help reveal where the tumours are positioned. It uses magnetism rather than X-rays to take pictures of the inside of the body.

PET scan - This type of scan can show how body tissues are working, as well as what they look like. PET scanners are very expensive and only a few hospitals in the UK have one. This means that you may have to travel to another hospital for your scan. Not everybody who has cancer will need to have a PET scan. Other types of tests and scans may be more suitable.

Bone scan - You will be given a small injection of radioactive tracer which over time will be absorbed into your skeleton. It takes about 3 hours for this to occur. Pictures of your skeleton are taken in order to help your doctor determine whether there are any problems associated with it. These pictures take about 10 minutes, and you will be asked to return for the second set of pictures 3 hours later. For this second set of pictures you will again be asked to lie or sit in front of the gamma camera. The scan will take approximately 30-45 minutes.

Ultrasound scan - Ultrasound imaging, also called ultrasound scanning or sonography, involves exposing part of the body to high-frequency sound waves to produce pictures of the inside of the body. Ultrasound exams do not use ionizing radiation (as used in x-rays). Because ultrasound images are captured in real-time, they can show the structure and movement of the body’s internal organs, as well as blood flowing through blood vessels.

Further testing
There are further tests that you may need to have, for example:

- Endoscopic Ultrasound
- Barium Enema
- Wireless capsule enteroscopy
- Bronchoscopy for lung NETs

For further information see the NET Patient Foundation booklet on Lung Carcinoid.

Treatments
Each patient will have an individualised treatment plan: there are a number of options available.

Surgery - If the tumour is contained in one area (localised), or if there has been only limited spread, surgery is usually the first choice of treatment. If it is possible to remove the tumour completely, no other treatment may be necessary.

If the tumour has spread to other parts of the body (metastatic), surgery may still be possible to remove the part of the tumour that is producing too many hormones. This is often referred to as tumour debulking.

If a GEP or NET is blocking an organ, such as the bowel, surgery may be helpful to relieve the blockage (obstruction).

If the tumour has spread to the liver, surgery can be used to remove the parts of the liver containing the tumour. Very occasionally, a liver transplant may be considered.

Surgery may be used throughout the patient journey for many reasons, including in combination with other therapies.

Somatostatin Analogues - Daily, fortnightly or monthly injections of somatostatin analogues are available to control some of the unpleasant symptoms caused by the tumours. Somatostatin analogues are synthetic versions of somatostatin, a naturally occurring hormone produced in the brain and digestive tract that inhibits the release of other several hormones and chemicals from our internal organs.

Injections of these analogues can stop the overproduction of hormones that cause symptoms such as flushing and diarrhoea.
Other treatments:

- Interferon
- Peptide receptor radionuclide therapy (PRRT or magic bullet)
- Transcatheter arterial chemoembolisation (TACE)
- Chemotherapy
- Radiofrequency ablation
- Cryoablation
- Percutaneous alcohol injection

Further information is available on all treatments. Please refer to the “Patient Handbook” which can be downloaded from the website, or contact us to order one.

[www.netpatientfoundation.com](http://www.netpatientfoundation.com)

An afterthought

Diagnosis and treatment of carcinoid may appear to be complicated, which is why you should seek guidance from a NET specialist who understands the condition and the full range of treatment options open to you. NET specialists understand that each patient is different and that treatments need to be tailored to individuals.

It is possible to live well and for a long time with a good quality of life after diagnosis with carcinoid. Many carcinoid patients continue to live very fulfilled lives, managing to work around the regular monitoring and monthly treatments such as injections that being a patient involves.

About Us

The NET Patient Foundation incorporating Living with Carcinoid was formed at the start of 2006 and has Charity Commission status. The collaboration with Living with Carcinoid meant that the charity could spread its wings to include patients with all types of neuroendocrine tumour.

The Foundation has 5 main aims:

1. To provide accurate and up-to-date information for people living with, or affected by, neuroendocrine tumours. We do this through information and forums provided on the website (and links to other sources of information on the web).

2. To provide support for patients and others affected by neuroendocrine tumours. We offer a support line which is manned by an experienced healthcare professional; and organise patient support groups around the UK and Ireland.

3. To improve the quality of life for patients and their families. We can do this by providing support and information about services and treatments available, as well as by funding and publicising research and existing medical initiatives.

4. To raise funds, which will help to support research around the UK.

5. To raise awareness of neuroendocrine tumours throughout the UK and Ireland, within the medical community and the general public.

There is much campaigning work to be done. We don’t have the funding that breast or bowel cancer attracts, but our patients deserve exactly the same attention and research support.

IF you found this booklet useful and would like to make a donation to the NET Patient Foundation, please contact us.