Nursing patients with tumours

Cancer is unfortunately a common disease particularly in dogs with 1 in 4 dogs dying or being put to sleep because of cancer according to the Morris Animal Foundation. Dogs that are aged over 10 approximately 50% of deaths are cancer-related. Like humans, there are many types of cancers and many clinical signs seen. We are going to look at the different types of cancer that can be found within the dog.

The majority of cancers occur in middle-aged and older dogs. Because animals are living longer and enjoying a higher quality of life, it is likely that cancers will be diagnosed with increasing frequency. A routine physical examination can and will detect most cancers. So a patient that is regularly presented to the practice is more likely to have cancer detected at that vital early stage.

Signs of cancer
There are several signs which may point towards cancer, they include:

- Any new lump or bump that has appeared
- A change in size, shape, or consistency of an existing lump.
- A runny nose, especially if it is a bloody discharge
- Dysurea or bloody urine but it is worth remembering that this is also common in urinary tract infections
- Straining to defecate or tenesmus with thin, ribbon-like stools.
- Vomiting and/or diarrhoea
- Limping, change in gait.
- A foul breath, excessive drooling or teeth that have changed position or moved
- Discharge and odour from ears
- Polydipsia and polyurea
- Lethargy, inappetence.
Tumour development

Most tumours develop from a single abnormal cell which continues to divide away from normal mechanisms

- When a tumour first develops the cells divide rapidly and the mass grows quickly
- As the mass increases in size cell division slows down due to the difficulty of supplying an adequate blood supply to the increasingly large cell population

The behaviour of the tumour will depend on the cell from which it first develop and can be classified as either

1) Malignant
2) Benign

Cancers then invade any neighbouring tissue and continue to grow. At some point, malignant cells break away for the primary tumour and enter the lymphatic system or the circulatory system by doing this it enables them to establish new cancer cells in other areas. This process is called metastasizing.

Causes of cancer

Internal cancers are most common found in the following places:

- Spleen
- Liver
- gastrointestinal tract.

Cancers in these areas often become advanced before they are even suspected. Usually the first signs are weight loss, a palpable mass in the abdomen, vomiting diarrhoea or gastrointestinal bleeding.
Cancer is often seen more frequently in certain breeds of dogs. These can include:

- Golden retriever
- Boxer
- Bermese mountain dog
- Greyhound (primarily for osteosarcomas).

Some breeds may carry a genetic susceptibility to certain types of cancers. One example of this is the Bernese Mountain Dogs, they have a high incidence of cancers affecting all body systems. Approximately one in four Bernese Mountain Dogs will develop cancer. Two of the cancer types seen in this breed are histiocytosis and mastocytoma are known to be inherited as polygenic traits.

A number of genes have been identified as causing cancers in people and in some animals but not all individuals with these genes will develop cancer. The reason for this is that there are other specific genes that suppress the cancer genes. There are other genes that inhibit the suppressors. All these genes are turned on and off by external factors. These factors include:

- Diet
- Stress
- Environment.

An example of a cancer caused by external factors is bladder cancer in Scottish Terriers. Scottish terriers have an increased risk of bladder cancer to begin with. If you add in exposure to lawn chemicals that contain 2,4 D, the risk increases four to seven times.

In this case, genes and an environmental exposure work together to cause the cancer.

One type of environmental influence are Carcinogens. Carcinogens are known to increase the likelihood of cancer in direct proportion to the length and intensity of exposure. Carcinogens gain access to tissue cells, cause alterations in genes and chromosomes, and disrupt the system of checks and balances that controls orderly growth.
Examples of carcinogens known to increase the risk of cancer in humans are

- ultraviolet rays
- X-rays
- nuclear radiation
- various chemicals
- cigarettes and coal tars
- viruses
- internal parasites

Injuries are sometimes implicated as causing cancers, but there is rarely a connection. Trauma causes haematomas, bruises, and contusions, but does not cause abnormal cell growth. Some benign tumors, such as warts and papillomas are caused by a virus.

**Benign Tumours**

- Are relatively slow growing
- They do not readily spread to distant sites (Metastasise)

**Examples of Benign tumours include:**

- Adenoma
- Fibromas
- Lipomas
- Melanoma
- Papilloma

A lipoma is one of the most commonly encountered lumps seen by veterinarians during a physical exam. There are soft, rounded, non-painful masses, which usually present just under the skin. They are usually benign and do not invade surrounding tissues and do no metastasize to other areas of the body.
We do not routinely remove a lipoma unless they continue to grow into large fat deposits that may restrict a patient's movement or cause discomfort.

Cysts
Cysts are common non-cancerous tumours that can occur anywhere on or in a dog's body. Sebaceous cysts are benign tumours and are filled with dead skin cells and sebum that produces the cheesy substance seen when the cyst is ruptured, either surgically or accidentally. Although these cysts are benign they may require drainage or removal to prevent infection. Sebaceous cysts are common in Cocker Spaniels.

Histiocytomas
Histiocytomas are very red, dome-shaped growths that appear on the ears, face and feet of younger dogs, most often those under age two.

Histiocytomas are often painful to the touch, but are generally benign tumours. Their exact cause is unknown, but a viral cause is suspected.

Most histiocytomas resolve on their own within three months, but because they can be itchy a topical steroid may be prescribed. If the growth is causing pain or intense scratching that doesn't resolve with topical steroids, surgical removal is warranted.

Histiocytomas are common in

- Boxers
- Dachshunds
- Labrador Retrievers
- Staffordshire Terriers.
Perianal Gland Tumours

Perianal gland tumours, or perianal adenomas, are most common in un-neutered male dogs. Perianal gland tumours occur in the cells of the oil glands at the base of the tail around the anus.

Most perianal gland tumours are non-cancerous (adenoma). It may be necessary to perform a biopsy to rule out a cancerous form of perianal gland tumour called adenocarcinoma. Perianal gland tumours can cause pain or become infected as their location makes infection quite likely.

Because perianal adenomas are stimulated by the hormone testosterone, it is recommended that dogs are neutered.

Other Non-Cancerous Tumours

A number of other non-cancerous tumours affect dogs. These include:

- **Warts** are generally harmless. Warts can be caused by a papilloma virus or by an irritant. Warts caused by a papilloma virus can be contagious to other dogs and often affect younger dogs. Papilloma usually produces a large number of warts on the face, neck and/or limbs.
- **Skin tags** are benign growths that stick out from the skin. They usually occur in older dogs and are usually only removed if they become irritated or bleed.
- A **haematoma** is a collection of blood under the skin caused by physical trauma. They usually resolve by themselves. A large haematoma may require drainage.
Non-Cancerous Tumours or Malignant Growths?
While most non-cancerous tumours are safe, there is always the slim possibility that apparently benign tumours will become malignant.

Malignant tumours

- May be locally invasive, spread through the Lymphatic system or blood stream into lymph nodes or distant sites
- They are more likely to cause systemic disease and signs of ill health

Examples of malignant tumours can include:

- Carcinomas (e.g. Squamous Cell Carcinoma)
- Sarcomas (Lymphosarcoma or haemangiosarcoma)

Mast cell tumors (MCT) are cancerous proliferations of mast cells.

Although they can and will spread throughout the body, the danger from mast cell tumours arises from the secondary damage caused by the release of chemicals that they produce. These chemicals can cause systemic problems that include:

- gastric ulcers
- internal bleeding,
- range of allergic manifestations.

Mast cell tumours affect both lifespan and quality of life. Mast cell tumours can vary in their size, shape, appearance, texture, and location.

Mast cells are specialized cells that are found distributed throughout the body and help an animal respond to inflammation and allergies. Mast cells can release several biologically active chemicals when stimulated, these include:

- histamine
- heparin
- serotonin
• prostaglandins
• proteolytic enzymes

Although these chemicals are vital to normal bodily function, especially immune response, they can be very damaging to the body when released in chronic excess.

Skin cancer

Skin cancer is the most common form of cancer in dogs and is six times more common in dogs than in cats.
One cause is overexposure to the sun especially in short haired dogs and or white eared dogs and cats.
Common skin cancers include:
• squamous cell carcinomas
• hemangiosarcoma,
• fibrosarcoma
• mast cell tumours.

Squamous Cell Carcinoma is most often seen in areas of little pigment or thinly furred areas such as ears, face and the forehead area. They start as non-healing sores or lumps and without treatment, eventually metastasize to the internal organs.

Hemangiosarcomas are usually associated with the spleen, however, they can develop as skin cancer. They begin as red or black spots on the skin.

Fibrosarcoma begins in the connective tissue in the skull, spine, ribs and pelvis. Over time, it will wrap around the tissues, inhibiting movement.
Mammary tumors are the most common form of cancer in unneutered female dogs with over half being malignant tumours. Spaying a female dog before her first heat cycle is thought to reduce the risk of a mammary tumour developing. Symptoms include small lumps in the mammary tissue and prognosis is dependent on how quickly treatment is administered.

Oral tumors in dogs are most often malignant. Unfortunately, by the time they are found, quite often they are far advanced and little can be done for the dog. The surgery to remove the tumour is difficult if the tumour has spread into the nasal cavity or eye area.

Nasal Tumors
Indications of a nasal tumour include:
- Sneezing
- difficulty breathing
- nosebleeds
- discharge from the nose
They are rare but almost exclusively malignant and treatment is difficult, much like oral tumours.

Bone cancer is unfortunately common in large and giant breeds and usually starts at the site of a previous injury or vaccination. Pain, heat in the area, limping, swelling, and lethargy are the most common symptoms.

Cancer of the lymph system in dogs is common. There are two types: lymphoma that affects the entire body and another that involves the alimentary, thymic, and cutaneous glands. It can include a variety of body systems and symptoms include enlargement of the lymph glands, depression, weight loss, and anorexia.

Abdominal tumors are uncommon but are usually malignant and early diagnosis is rare. Symptoms include weight loss, diarrhoea or constipation, vomiting blood, bloody stools, pain or discomfort when moving, difficulty getting comfortable when lying down and stiffness of movement.

Lung cancer is not common in dogs except as a secondary cancer from another form of cancer that metastasized to the lungs.
Stage and Grade

Stage and grade are two words that are used to describe a tumour.

Stage describes where the particular tumour is at in regards to growth. So for example an early stage or stage I tumour is small and unlikely to spread where as a grade IV tumour is big, may be part of a cluster of tumours, and has invaded another part of the body. Stage I tumours have a far better prognosis then stage III or IV tumours.

The term grade refers to the aggressiveness of the tumour. A grade I tumour means the tumour is not aggressive so the likelihood of it spreading is rare. A grade IV tumour is extremely aggressive, making treatment far more difficult.
**Signs**

There are a number of different signs for neoplasia

- Visible mass often first noticed by the owner
- Physical effects e.g. large abdominal mass may cause abdominal distension or a thoracic mass may cause coughing
- Effects of the mass e.g. rupture of a splenic tumour which causes collapse and haemorrhage
- Distance effects e.g. polydipsia associated with hypercalcaemia in dogs with anal gland adenocarcinomas. This effect is known as Paraneoplastic syndrome

**Paraneoplastic Disease**

Tumours can cause signs of illness apart from the physiological effects of the mass itself.

Some tumours' secrete biologically active hormones that may cause generalised non-specific ill health or they may cause defined syndromes of disease.

Sometimes the paraneoplastic syndrome is more acutely life threatening than the tumour itself.

**Hypercalcaemia**

- Anal adenocarcinoma and lymphosarcoma
- Polydipsia, polyuria and renal failure

**Hypoglycaemia**

- Insulinomas secrete active insulin
**Histamine**

- Mast cell tumours secrete histamine causing generalized or local acute inflammatory responses

**Thyroxine**

- Thyroid adenomas secrete excess thyroxine

**Tumours can also cause:**

- Pyrexias
- Cachexia
- Poor nutrition

The animal will require a full examination when a tumour is suspected. Early detection of metastasis and biopsy of local lymph nodes may give indication of tumour spread.

**Tests**

There are 3 steps to follow when investigating any mass

1) Establish what the mass is
2) Identify if it is localized or has spread and if so where
3) Rule out any other underlying disease or pre-existing conditions that may complicate the management

It is much better to identify the mass using a biopsy rather than removing the whole mass straight away. This will ensure that the appropriate treatment has been identified and that appropriate surgical margins have been identified.
**Fine needle aspiration**

- The removal of cells from a tumour for cytological staining and examination
- Simple and cheap to perform
- The needle is inserted into the mass and then removed
- The needle is then attached to a syringe filled with air which is blown through the needle
- This forces cells to be blown over the microscope slide
- It is sometimes difficult to get cells from some tumours

**Core Biopsy**

- Provides a small number of cells for examination
- A Tru-cut needle or biopsy gun is used
- The needle is pushed into the mass cutting an inside core from the tumour
- This is then preserved in formalin but this can delay diagnosis so it is advised to roll the sample onto a slide before fixing which can be sent away at the same time for cytology
Incisional Biopsy

- Taking a small sample of the mass during a surgical procedure
- Often necessary in the examination of masses in accessible areas where radical surgery would be necessary e.g. nasal tumours

Excisional Biopsy

- Commonly used in practice in the management of small skin lumps
- In cases of malignant tumours more radical surgery is often required and the delay between first surgery and follow up treatment may allow the tumour to spread

Diagnosis

Below are the most common methods of finding out "what it is" ... 

Impression Smears
Some ulcerated masses can have cells easily collected and identified by having a glass microscope slide pressed against the surface of the mass. The collected cells are dried and sent for histopathology

Needle Biopsy
Many lumps can be analyzed by performing a needle biopsy rather than by total excision. A needle biopsy is performed by inserting a sterile needle into the lump, pulling back on the plunger, and "vacuuming" in cells from the lump. The collected cells are smeared onto a glass slide for pathological examination.

CT Scans
Superficial lumps and bumps do not require that CT Scans be done, so this procedure is usually reserved for internal organ analysis. If a superficial malignant tumour is diagnosed, however, a CT Scan can be helpful in determining if metastasis to deeper areas of the body has occurred.
Radiography
As with CT Scans, X-ray evaluation is generally reserved for collecting evidence of internal masses. Most lipomas are superficial and reside under the skin or skeletal muscles. There are other lumps that can be palpated by the veterinarian via manual examination; however, the extent and origin of that mass will often be best revealed via CT Scanning.

Treatment
There are three options for treatment

1) Surgical removal
   - Depends upon the tumour type and health of the patient
   - If complete surgical resection is an option this is often the best form of treatment
   - Total removal can often result in a cure however in many case it is often not possible to remove or ensure removal of the whole tumour because it is too extensive, exists in multiple sites or involves vital organs which cannot be removed

The best possible treatment option is surgical removal of the tumour that has not spread. To prevent recurrence, a surrounding margin of normal tissue should also be removed.

A cancer that spreads only to local lymph nodes may still be cured if all the involved nodes can be removed along with the primary tumour. Even when a cancer is widespread, removing a bleeding or infected mass, or
simply a large one that is interfering with a normal physical function, can provide relief and temporarily improve the quality of life.

Electrocautery and cryosurgery are two techniques by which we can remove surface tumours. Electrocautery means burning off the tumour using electricity, cryosurgery involves freezing the tumour to remove it.

These methods provide an alternative to surgical removal and are suitable for benign tumours such as Papillomas.

Chemotherapy
Chemotherapy is used to prevent and control the metastatic spread of cancer cells. However, most canine cancers are only moderately sensitive to chemotherapy. When used as the only form of treatment, chemotherapy usually does not extend survival. Lymphosarcoma and leukemia are exceptions.

Chemotherapy drugs, even when their use is tightly controlled, can have major side effects. In humans, chemotherapy is aimed at achieving a cure. Due to their lesser efficacy in dogs, chemotherapy is aimed at controlling the disease and giving the dog a period of remission. Lower dosages are generally used and many dogs do not have the severe reactions to chemotherapy that people do:

- The use of drugs to kill cells (Cytotoxic drugs)
- The tumour needs to be identified first as some tumours have a natural resistance or develop a resistance to the drugs
- Most cytotoxic drugs act against cells which are dividing so rapidly dividing cells are most affected
- Normal cells are also affected such as cells in the G.I Tract and bone marrow making them the most at risk
- Side effects are most commonly seen in these organs e.g. diarrhoea or low WBC count due to the bone marrow suppression
Cytotoxic drugs are most effectively used in the early stages of tumour development as this is when the cells are rapidly dividing.

The administration of chemotherapy to animals carries a certain stigma.

Comparisons with human experiences with chemotherapy lead to a natural suspicion that pets might likewise endure severe side effects from their treatment.

It is therefore important to emphasise that chemotherapy is only used in pets when the cancer in question has a high probability of sensitivity to the treatment.

**Quality of Life First and Foremost**

The goal of veterinary cancer therapy is:

1) Restoration or improvement of quality of life
2) Prolongation of a good quality of life second

All patients receiving chemotherapy are potentially at risk of developing side effects and therefore health assessments need to be made prior to calculation of dosages and institution of therapy.

Blood tests and physical examination findings can highlight important issues such as kidney problems or low white blood cell numbers.

These might necessitate chemotherapy dose adjustments.
**Informed Consent**

All medical and surgical procedures carry an element of risk for the patient.

For this reason it is important that the patient or their carer is given all the information they need to make an informed decision about whether or not to pursue the treatments offered.

Chemotherapy is no different in this respect. For this reason, time is always made for owners to discuss their concerns about chemotherapy prior to instituting a course of treatment.

During this appointment owners will discuss general concerns associated with both chemotherapy and cancer and specific matters related to the disease and treatments in question.

Owners will be equipped to recognise chemotherapy induced side effects, should they occur, and will be educated in how to manage them.

**Cancers Sensitive to Chemotherapy**

Cancers of the white blood cells (lymphoma and leukaemia) are particularly sensitive to chemotherapy in most instances. Therefore, chemotherapy is the main form of treatment for these conditions.

The chemosensitive forms of canine lymphoma will go into complete remission for long periods of time following appropriate management. Some forms of lymphoma and leukaemia in dogs and cats can remain in complete remission for years.

Other conditions primarily managed by chemotherapy alone include multiple myeloma, which is related to lymphoma.
**Adjuvant** Chemotherapy

Sometimes chemotherapy is used following surgery when it is assumed that a metastatic cancer is left behind that the surgery could not remove.

- This is called adjuvant chemotherapy

Tumours in which this approach is regularly used include osteosarcoma, haemangiosarcoma and feline injection site sarcoma.

- Under some circumstances this approach is also used in mammary, thyroid, anal sac, bladder and tonsillar cancers.

**Palliative Chemotherapy**

Chemotherapy can be used to enhance quality of life without there being a strong likelihood that the tumour would ever go into complete remission as a consequence of therapy.

- The quality of life improvements that are seen in this context can be marked.

This approach to the management of veterinary cancer is used in particular in the management of:

- Inoperable mast cell tumours
- anal sac tumours
- bladder cancer
- osteosarcoma (in conjunction with radiotherapy)
- feline injection site sarcomas.
“Neoadjuvant” Chemotherapy

A relatively recent innovation in chemotherapy is the administration of treatment prior to surgical intervention.

It is supposed that this reduces the size and invasiveness of a primary tumour, increasing the surgical cure rate. This is called neoadjuvant therapy.

This approach is currently used primarily in the management of:

- canine lung tumours
- mast cell tumours
- feline injection site sarcomas.

Chemotherapy Safety

Chemotherapy is cytotoxic. This means that it can cause birth defects, genetic mutations and even cancer.

For that reason appropriate precautions must be taken when handling chemotherapy and treatment should only be administered to appropriate patients.

Chemotherapy metabolites are excreted in the urine and Faeces and care must therefore be taken when handling body waste.

All owners of patients receiving chemotherapy should be educated in matters relating to waste management.

Personnel involved in the purchase, storage, preparation and administration of chemotherapy must be adequately trained. Employers have a legal obligation to provide adequate training and safety equipment under the Control of Substances Hazardous to Health (CoSHH) Regulations 2002.
Radiotherapy

Radiation - Radiation uses specially calibrated X-rays to damage cancer tissues with the least amount of damage possible to normal tissues. Side effects include tissue sloughing, lowered immunity, and damage to normal tissue. Anaesthesia is required. This treatment is only available at veterinary referral clinics. Not all cancers are susceptible to radiation and location of the cancer may make this impossible.
Radiotherapy means the administration of radiation typically xrays to achieve a medical benefit.

In the veterinary world this is almost entirely restricted to the use of radiation in the management of cancerous lesions.

How does it Work?

Radiotherapy is believed to work by causing modest amounts of damage to the tiny proteins and DNA molecules inside living cells.

Normal living tissues can tolerate a certain amount of this damage e.g we do need a certain amount of radiation from the sun

While cancer may be effective at growing, many cancers are not very good at tolerating radiation which is why radiation seems to preferentially damage the cancerous cells.

However, some damage inevitably happens to the non-cancerous cells and following radiotherapy, there is often evidence of changes to the skin making it look older in the treated field and potentially making it more susceptible to subsequent injury.
Radiotherapy Side Effects

- some fur loss in the area that receives treatment
- skin may lose elasticity
- extra pigmentation.

These include:

- Dermatitis resembling sunburn which can last up to two weeks in severe cases.

This happens in the immediate post-treatment period to approximately 5% of cases.

Late side effects can also occur months or years after therapy. These include:

- Development of non healing wounds (5%),
- Pathological fractures 1%
- New tumours in irradiated site (<1%).

For these reasons cases are selected carefully for radiotherapy and while these problems are clearly unusual, they must be considered fully in any treatment decision making process.

Sensitive to Radiotherapy

Tumour types that are particularly sensitive include:

- Mast cell tumours
- Squamous cell carcinomas of the dog’s mouth or the cat’s nose,
- Meningioma (a certain type of brain tumour),
- Thyroid tumours

Cancers of the white blood cells (lymphoma, plasmacytoma) are also sensitive to radiotherapy. However, they are usually responsive to chemotherapy and since they are often multifocal, chemotherapy is usually more appropriate.
“Adjuvant” Radiotherapy

- The use of radiation after surgery is called adjuvant radiotherapy.

This is applied in particular to:

- Sarcomas (spindle cell sarcoma, haemangiopericytoma, soft tissue sarcoma)
- Mast cell tumours, after presumed incomplete surgical removal, whether that incomplete removal was anticipated or otherwise.

What is Palliative Radiotherapy

The aim of therapy is to alleviate the clinical signs associated with the disease to restore a normal quality of life with minimal risk to the patient.

Thus palliative radiotherapy is used in the management of:

- Brain tumours
- Nasal tumours
- Oral melanoma,
- Some inoperable soft tissue sarcomas
- To relieve pain in primary bone tumours (osteosarcoma).

How is radiotherapy given

- A course of four treatment on a once a week basis
- Dogs receive their radiation under general anaesthesia
- Cats receive theirs under sedation.
- The duration of the whole treatment episode, including anaesthesia/sedation induction and recovery, is typically only 25-30 minutes
Other forms of treatment include:

- Diet - Diet has been shown to be helpful in controlling cancer. The goal is a diet with limited simple sugars, moderate amounts of complex sugars such as carbohydrates, highly digestible protein in moderate amounts, and set amounts of certain types of fats. These dietary guidelines tend to “starve” the cancer cells and help the normal cells stay healthy. There is a commercial cancer diet called n/d from Hill’s, or you can make a homemade diet that fits these criteria.
<table>
<thead>
<tr>
<th>Disease</th>
<th>Cause</th>
<th>Signs</th>
<th>Diagnosis</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lymphosarcoma</td>
<td>Malignant tumour of the bone</td>
<td>Enlargement of multiple lymph nodes, occasional single mass in lymph nodes or skin</td>
<td>FNA</td>
<td>Radiotherapy isn’t usually effective</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Biopsy</td>
<td>Chemoth</td>
</tr>
<tr>
<td>Osteosarcoma</td>
<td>Malignant tumour of the bone</td>
<td>Lameness, Pain or swelling specifically affecting common sites e.g. proximal humerus</td>
<td>Xrays</td>
<td>Radical surgery</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>showing new none formation</td>
<td>(amputation of limb)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fracture at the site</td>
<td>Metastasis will usually appear within a year</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Chemotherapy can prolong survival times</td>
</tr>
<tr>
<td>Anal Gland carcinoma</td>
<td>Primary tumour in the anal gland</td>
<td>Swelling of the anal gland</td>
<td>FNA</td>
<td>Dependant on the amount of tumours</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Biopsy may</td>
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</table>
For patients with small (less than 3cm diameter) primary tumours and no evidence of spread of the tumour, local surgical excision can be the most appropriate therapy. Radiotherapy is used post-operatively to improve the tumour control. The average life expectancy for these patients in our clinic is three years and three months.
## Drugs commonly used in the treatment of Neoplastic disease

<table>
<thead>
<tr>
<th>Drug</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cyclophosphamide</strong></td>
<td>- One of the most commonly used cytotoxic drugs especially for the treatment of sarcoma</td>
</tr>
<tr>
<td></td>
<td>- Normally given orally</td>
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<tr>
<td></td>
<td>- Side effects are not normally severe but bone marrow suppression can occur</td>
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<tr>
<td></td>
<td>- Accurate dosing can be difficult due to the large tablets, it may be necessary to administer larger doses less frequently</td>
</tr>
<tr>
<td></td>
<td>- Vomiting and diarrhoea is likely</td>
</tr>
<tr>
<td></td>
<td>- Serious complication is haemorrhagic cystitis and if this develops the drug should be stopped immediately</td>
</tr>
<tr>
<td><strong>Doxorubicin</strong></td>
<td>- Used in the management of Lymphosarcomas, osteosarcomas and soft tissue sarcomas but perivascular injected should be avoided so placement of an IV catheter is essential</td>
</tr>
<tr>
<td></td>
<td>- Bone marrow suppression occurs after injection with a drop in the WBC which recovers after 3 weeks</td>
</tr>
<tr>
<td></td>
<td>- GI reactions can occur</td>
</tr>
<tr>
<td></td>
<td>- The drug has a cardiotoxic effect which builds up after a number of doses so cardiac ultrasound should be monitored on a regular basis</td>
</tr>
<tr>
<td><strong>Vincristine</strong></td>
<td>- Used for the treatment of leukaemia and lymphosarcoma</td>
</tr>
<tr>
<td></td>
<td>- This drug causes little bone marrow</td>
</tr>
</tbody>
</table>
suppression and can be used in combination with other drugs

- It is administered intravenously and is irritant perivascularly so IV catheter must be placed

References:


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