

# Biopsy principles in oncology

While the need for a biopsy is obvious to all veterinarians it is not always to our clients. Diagnosis by biopsy or cytology is frequently the first of the three steps in management of cancer, those being diagnose, stage, treat. In some cases a diagnosis can be reached by cytology, in other cases the diagnosis is determined following definitive treatment with an excisional biopsy and in a few cases such as with lipomas, masses may be diagnosed with a high degree of confidence by clinical examination. In the many cases where a biopsy is indicated prior to treatment, there are recommendations to optimize the chance for a diagnosis and to minimize the risk of exacerbating the disease.

We call these principles and not rules because while we usually adhere to them, there are many circumstances where we don't for medical or financial reasons. The best opportunity not to biopsy is when the disease may be diagnosed by cytology. Cytology is very useful to diagnose round cell tumors such as lymphoma, histiocytoma, plasmacytoma, mast cell tumor, transmissible venereal tumor, and melanoma. We also are able to use cytology to diagnose some cases of osteosarcoma. In other situations cytology is useful to determine if a mass is cancerous even if it cannot specify the type. But in many cases cytology is inadequate to diagnose the type of cancer. In those cases a biopsy is usually indicated.



## Why biopsy?

One of the most important aspect of patient management is to know what the disease is. Without knowledge of the disease, inadequate, inappropriate, or erroneous treatments can be administered. In other words know who the enemy is. Without a proper diagnosis we risk under treating, over treating or incorrectly treating the patient. You do not want to over-treat as it will result in more morbidity to the patient and more cost to the client. You also do not want to under-treat. It has also been demonstrated over years that the 1<sup>st</sup> surgery is best chance for a cure. Under treating in the end means more morbidity to the patient and more cost to the client. A good example is the difference in treatment between a fibromatous epulide and an oral fibrosarcoma. While a fibromatous epulis may be treated by local excision an oral fibrosarcoma requires wide margins and often radical resection.

Another strong indication for a preoperative biopsy is when the type of treatment or extent of treatment is determined by the tumor type and when the owner's willingness to treat would be altered by knowledge of disease process. This is often the case with tumors that carry a grave and short prognosis.

There are also times when biopsies should not be performed such as when the biopsy procedure is as difficult, dangerous, or the same as definitive surgery. Some examples include lung masses, brain masses, testicular masses, splenic masses, adrenal tumors and thyroid tumors. In other cases such as suspected osteosarcoma or hemangiosarcoma we will perform staging first and if cancer is identified in other organs such as the lungs or heart a presumptive diagnosis can be made and a grave prognosis must be offered.

When both a biopsy and advanced diagnostics such as CT or MRI need to be performed then it is best to perform the advanced imaging prior to the biopsy. The two reasons are that the imaging study can help determine best site for biopsy and the biopsy procedure could alter results of imaging study if done first.

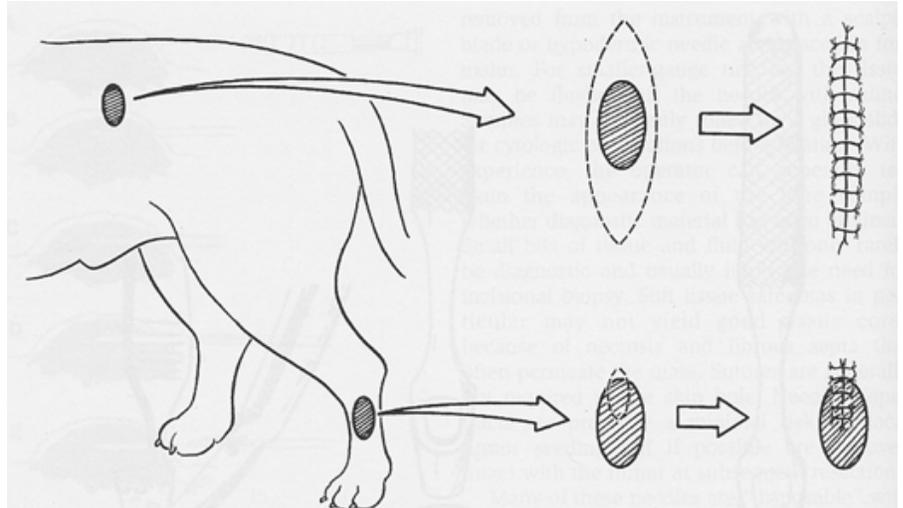
## Types of biopsies

When discussing biopsies with pet owners we explain the difference between incisional and excisional biopsies.

**Incisional:** biopsy that involves incision into the tumor to remove a section with minimal disruption of the remainder of the tumor or the surrounding tissue.

**Excisional:** entire suspected tumor mass is excised with no attempt made to obtain generous margins of adjacent normal tissue.

An excisional biopsy can be both diagnostic and therapeutic if the tumor is benign but it may compromise the chance of a cure if the tumor is malignant. When considering an excisional biopsy we always ask ourselves: If I perform an excisional biopsy, will I compromise the chance for a cure if I need to perform a more aggressive surgery in the event that this is a malignancy? If the answer is no then we may perform an excisional biopsy. If the answer is yes then we perform an incisional biopsy.



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There are several principles of the biopsy procedure itself. When determining where to perform a biopsy it is important to keep in mind that the biopsy tract needs to be removed at time of definitive surgery or included in radiation treatment field. It is also important to pay close attention to hemostasis and dead space; however, drains are usually a bad idea for biopsies due to the risk of infection, seeding, and other complications. When using a scalpel blade to perform a biopsy on a leg or tail make the incision in the longitudinal plane versus the transverse plane to make the incision easier to close and reduce skin tension. When possible, try to include a small amount of normal tissue with the biopsy except when performing bone biopsies. The larger the sample, the more likely it is to be diagnostic; take several samples if possible. Do not use electrocautery to obtain the sample; use it for hemostasis after obtaining a sample. Do not traumatize the sample while handling it. If indicated, acquire other samples at the same time such as for culture and sensitivity. Use non-contaminated instruments when closing a biopsy tract (i.e. change instruments).

When performing an excisional biopsy (or when performing definitive surgery on a skin tumor) we stain the edges with colored paint so that the pathologist can say where if anywhere tumor extends to the margins of the sample.

Once the biopsy is obtained and stained if necessary the sample is placed in 10% buffered formalin; if it is a large sample, we slice it like a loaf of bread to allow the formalin to penetrate leaving ink margins intact. It is important on the submission form to provide a signalment and an accurate history; as they say: "garbage in, garbage out".

## Methods of obtaining a biopsy

### Needle Core biopsy

A needle core biopsy or tru-cut is designed to capture a high quality sample of tissue with minimal morbidity. There are numerous designs of needle core biopsy instruments available with common diameters from 14gauge to 18 gauge. The instrument consists of an inner notched rod to capture the sample and an outer cannula with a surgical edge to cut the sample. Tissues commonly biopsied include skin and connective tissue masses and in some cases lymph node or liver masses. Biopsies may be obtained with or without ultrasound guidance. These instruments are sterile and disposable and should not be reused as the blade becomes dull and the rod can easily bend. When using a needle core biopsy instrument it is important to be familiar with how it works and the distance the needle will travel. It is of particular importance to assess the potential vascularity of the mass as the instrument can easily lacerate vessels deep within the tumor.



### Punch biopsy

A punch biopsy tool cuts a circle of tissue of diameters from 2 to 5mm. This instrument is used most commonly on skin lesions or other superficial tissues. Surgically we may use it for small biopsies of the liver or intestine. These instruments come sterile and should also be disposed of after use. Reuse of a dull punch biopsy will result in damage to the specimen and the surrounding tissues and may result in complications. A punch biopsy instrument will only cut the sides of the specimen so a scissor or blade will be necessary to free the biopsy from the surrounding tissues.

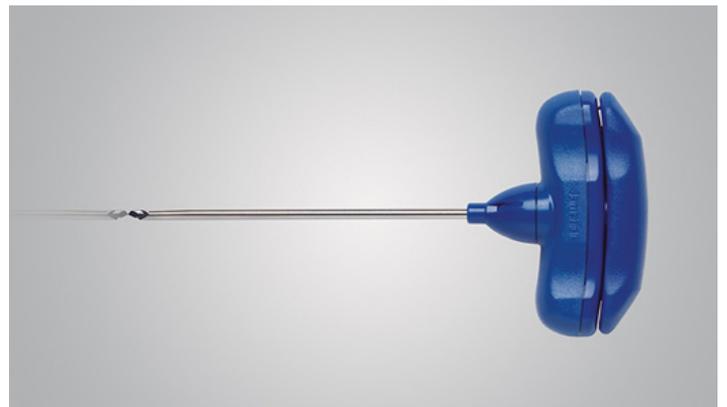


### Wedge biopsy

A wedge biopsy is performed with a scalpel blade and can take biopsies of varying sizes. An adequate sample should always be obtained (minimum of 2mm diameter) and it is helpful to the pathologist if the biopsy is obtained at the edge of the mass and includes some normal tissue. As with any biopsy it is important to obtain it so that the biopsy can be entirely removed at the time of definitive surgery.

### Jamshidi

A Jamshidi is an instrument for aspiration of bone marrow and may also be used to biopsy soft bone lesions. The Jamshidi instrument consists of a large sharp needle ranging from 8 to 13 gauge with a plastic handle and an obturator. The plastic end of the needle is designed for attachment of a syringe for the aspiration of bone marrow but the Jamshidi may also be used to obtain a core biopsy of bone marrow or cortical bone if it is soft enough. Bone biopsies should generally be obtained from the center of the lesion as a biopsy from the periphery may result in a diagnosis of reactive bone.



## Trephine

Bone trephines are cylindrical saws designed to obtain core biopsies of bone or to make holes in bone for other medical reasons. Trephines are measured in mm diameter and have aggressive cutting teeth on them and can obtain large biopsies. Trephines are very useful in obtaining large biopsies on harder bone but can increase the risk of fracture of bone weakened by cancer.



## Other biopsy techniques

Other biopsy methods employ endoscopy, laparoscopy, thoracoscopy and image assisted (radiographic, fluoroscopic and CT guided) techniques. Endoscopic biopsies are widely used because they are less invasive although they cannot be used to obtain full thickness biopsies due to the inability to close the biopsy site. Laparoscopic and thoracoscopic techniques are gaining popularity in veterinary oncology but require specialized equipment and skills.

## Goals of the histopathology examination

While it may seem obvious, it is important to consider what the goals of our histopathologic examination are. Initially we want to know if the mass is neoplastic or not. If it is neoplastic, is it benign or malignant? Naturally the histologic type is of critical importance to understanding the likely future behavior of the tumor but equally important is the grading which is often associated with the mitotic index. Finally it is of critical importance to determine the status of the margins on excisional biopsies.

## What do you do when you question the diagnosis

Pathologists have a challenging job. A clear diagnosis of a tumor is not always easy particularly when it comes to bone biopsies. When we are not comfortable with a histopathology report the first thing we do is to call the pathologist and discuss it with them. In some cases we can provide more information that aids in their diagnosis.

In most cases of biopsies there is adequate tissue for re-sectioning. We have recently requested this on two bone biopsies and the pathologists were more than happy to do this. They may see characteristics in additional sections that aid in their diagnosis.

More and more pathologists may recommend special stains or immunohistochemistry to identify specific types of cancer. The processing times for these techniques vary but they can be very useful in making a definitive diagnosis.

Finally you can always request a second opinion. Most laboratories will do this in house at no extra charge. We find this is often helpful in difficult cases.