Skin Biopsies: Why, what, where and when

Skin biopsy is a common procedure used for both diagnostic and therapeutic purposes. The choice of biopsy technique is crucial in maximizing the information yield, and optimizing the pathologist’s chances of rendering either a definitive diagnosis, or a meaningful differential. There are inherent strengths and weaknesses to all of the standard techniques. The decision as to which to use should be based on experience and careful consideration of the circumstances relating to each case, while keeping in mind the aim of providing the best specimen for histopathologic evaluation. A suboptimal biopsy may introduce artifacts or include insufficient diagnostic material, both of which can, in some cases, preclude meaningful interpretation.

The most commonly used techniques and their variations are outlined below:

**Punch Biopsy**

Punch biopsy remains the standard technique for evaluating inflammatory conditions of the skin and is also useful for many suspected neoplastic lesions. Deeper biopsies which include the subcutaneous fat both improve the diagnostic result and ensure faster healing and less prominent scarring. The recommended ideal biopsy size for inflammatory dermatoses is 4mm, although the diameter may be varied depending on clinical considerations, e.g. in regions where cosmesis is of concern.

When provision of subcutaneous tissue is vital, as in cases of suspected panniculitis, a 6mm punch (or similar sized incisional biopsy - see below) is recommended. In biopsies for investigation of alopecia, two punches of at least 4mm diameter are preferred. The temptation to use a 2mm punch should be resisted if at all possible, as this often yields insufficient tissue to allow accurate diagnosis. Multiple punch biopsies may be useful in certain circumstances, such as mapping the extent of a subclinical melanocytic proliferation, or sampling multiple lesions in a diffuse inflammatory dermatosis to maximize diagnostic information.

**Shave Biopsy**

Shave biopsy remains one of the most commonly used techniques as it is easy, low cost and gives good cosmetic results. The main drawback is that it risks providing insufficient material for proper histopathologic diagnosis. It should therefore be reserved primarily for diseases in which the pathology lies in the epidermis or papillary dermis. In acral locations or extremely hyperkeratotic lesions, due to the thick stratum corneum a shave biopsy may not provide an adequate sample of epidermis and papillary dermis.

Whilst excision is typically preferable for lesions in which there is a high clinical index of suspicion for melanoma, shave biopsy may be very useful for evaluating broad pigmented lesions in cosmetically sensitive sun damaged skin (such as the face) as it provides better sampling than does punch biopsy.

(continued over.)
The removal of at least 50% of any such lesion has been recommended to reduce the risk of unsampled melanoma and ideally, when possible, the entire lesion should be shaved for diagnosis (see shave excision / saucerisation below). It is not recommended for nodular dermal lesions and most inflammatory dermatoses.

**Curettage**

Many of the caveats relating to shave biopsy are also applicable to this technique, although it may be useful for both diagnosing and treating certain superficial lesions. By its very nature the procedure tends to severely disrupt architectural features, and therefore is contraindicated in suspected melanocytic neoplasms.

**Shave Excision/Saucerisation**

A procedure which is finding increasing usage in specific scenarios, this attempts to combine the advantages of both shave and excisional biopsy techniques. It involves the sampling of a lesion using a deep shave or “scoop”, with 1-2mm of surrounding normal skin laterally, and extending into the deep dermis or even the superficial subcutaneous layer. For thin, small-diameter melanocytic lesions, this can potentially remove the entire lesion. In such cases, immediately placing the specimen on a piece of cardboard or filter paper prior to immersion in formalin can avoid curling and folding which may otherwise occur and lead to cross cutting in the laboratory, and subsequent difficulty with accurate margin assessment.

**Incisional Biopsy**

This technique is used to partially sample lesions by cutting deep into the subcutaneous tissue while preserving the lateral margins. It is most applicable to large or deep lesions, and annular rashes. In these cases the biopsy should be taken radially through the edge of the lesion, to include subcutis and at least 1mm of normal tissue peripherally. It is the preferred technique for investigation of suspected cases of panniculitis and large vessel vasculitides. It is important when submitting such specimens to specify on the accompanying request form that it is intended as an incisional biopsy, since this determines how it is handled by the laboratory (such specimens are sectioned longitudinally rather than transversely, as is the case for excisions).

**Excision Biopsy**

This is the best technique for suspected melanoma and non-melanoma skin cancer, as it allows assessment of the entire lesion for diagnosis and prognostication.

It also allows assessment of clearance from specific margins if the specimen is first oriented by use of a marking suture or nick. The former tends to be more reliable, as a marking nick may be difficult to identify at the time of macroscopic dissection in friable or small specimens due to changes induced by the fixative solution.

**Punch Excision**

This variation on the excision technique uses a punch tool to remove a small lesion in its entirety. Depending on the size of both the lesion and the punch tool used, accurate assessment of margin clearance may be less reliable than in a standard elliptical/fusiform excision specimen. (Chang et al. J Am Acad Dermatol. 2009 Jun;60(6):990-3)
Specific Scenarios

Inflammatory Dermatoses

Cutaneous biopsy is of proven value in diagnosing inflammatory conditions of the skin. Rajaratnam et al (Am J Dermatopathol. 2009 Jun;31(4):350-3) found that in 55% of cases, histology was able to provide a pre-history specific diagnosis, and in an additional 25% a diagnosis was reached with the aid of clinical data. Inflammatory skin diseases evolve over time, and histologic findings vary according to the phase when the biopsy is performed, often being non-specific very early or late in the course of the process. Several biopsies may therefore be required before a precise diagnosis can be made. Wherever possible, the practitioner should take samples from several representative sites on the trunk and proximal extremities.

The lower limbs should be avoided if clinically feasible, for several reasons: skin on the distal lower extremities often shows background inflammatory changes and alterations related to stasis; biopsies for immunofluorescence studies originating from these sites often return false negative results; and skin from the distal lower extremities tends to heal more slowly. Annular lesions should be sampled from their active border, to include both lesional and healthy skin. A similar approach should be adopted for large lesions in pigmentary disorders, so that comparison may be performed within the same specimen.

Lesions in vesiculobullous diseases should be biopsied early to avoid sampling blisters showing re-epithelialization. Ideally, healthy skin bordering the lesion (<5mm) should also be sampled, and it is this which usually provides the best direct immunofluorescence results. In contrast, immunofluorescence samples of non-bullous dermatoses should generally be taken from involved areas. Biopsies for investigation of alopecia ideally should comprise two punch specimens at least 4mm in diameter, extending deeply into the subcutis. This is to permit appropriate horizontal and vertical sectioning for accurate assessment of follicular counts. When scalp diseases manifest with pustules, a separate sample for microbiology may be helpful. In cases of suspected panniculitis or large vessel vasculitis, a deep incisional biopsy incorporating a generous amount of subcutis is the preferred method.

Melanocytic Lesions

Selection of the appropriate biopsy technique is crucial in the accurate diagnosis and management of melanocytic lesions, especially melanoma. As diagnosis is dependent on assessment of multiple architectural and cytologic features which may be quite heterogeneous in a single lesion, in cases where the index of suspicion...
for melanoma is high complete excision is the recommended treatment. Due to the risk of sampling error with partial biopsies, every effort should be made to sample the region with the most pigment, or the thickest portion of the lesion.

While shave excisions of small superficial lesions may be used on occasion, in general superficial shave specimens should be avoided in suspected cases of invasive melanoma, as they may not be representative, and cause difficulty with accurate assessment of the Breslow thickness in the subsequent excision specimen. If complete excision in the first instance cannot be performed, a study by Pariser et al. indicated that a deep shave to at least the mid dermal level was the most effective of the non-excisional techniques in providing accurate diagnosis (Dermatol Online J 1999; 5:4). Punch specimens may be used to sample multiple areas of a larger pigmented lesion or delineate its margins. In cases where there is a particular area of clinical concern within a large melanocytic lesion, lightly scoring this area with a punch tool may allow its recognition in histological sections permitting clinicopathological correlation and ensuring that the area of concern is fully assessed.

Nail matrix biopsies for longitudinal melanonychia are necessary to diagnose subungual melanoma. Excisional biopsies are preferred when possible, to avoid sampling error. For pigmented bands less than 3mm wide originating in the distal matrix, full-thickness 3mm punch biopsies are appropriate. For wider, laterally located longitudinal melanonychia, lateral longitudinal excisions are indicated. In lesions of the proximal nail matrix, due to risk of permanent nail dystrophy from the punch technique, a shave biopsy of the nail matrix (tangential matrix excision) as described by Haneke and Baran (Dermatol Surg 2001; 27:580-4) may be preferable.

The Importance of Clinico-Pathological Correlation

Skin biopsy is a common procedure used for both diagnostic and therapeutic purposes. The choice of biopsy technique is crucial in maximizing the information yield, and optimizing the pathologist’s chances of rendering either a definitive diagnosis, or a meaningful differential. There are inherent strengths and weakness to all of the standard techniques. The decision as to which to use should be based on experience and careful consideration of the circumstances relating to each case, while keeping in mind the aim of providing the best specimen for histopathologic evaluation. Independent of all of the foregoing considerations, clinical pathologic correlation may be the most important factor in accurate biopsy interpretation, especially when dealing with inflammatory dermatoses and melanocytic lesions. Medlab pathology strives to provide personalised service that allows careful clinico-pathological correlation and quality improvement with clinical audits and electronic resources as well as usage of up-to-date auxiliary testing methods such as immunohistochemistry and genetic testing.