Criteria for the Diagnosis of Melanoma

27.1 Introduction

Despite the introduction of molecular techniques, the diagnosis of melanoma is still mainly achieved through the recognition of particular histological details (criteria) that, when taken together, should allow us to reach the correct diagnosis. Unfortunately, this procedure is hampered by the low specificity and sensitivity of many criteria, by personal bias, and the presence of conflicting criteria in the same lesion.

For these reasons, two precautions must always be observed in using the system of criteria:

• The criteria must be used in groups. After a systematic study, the lesion is recognized as malignant if it meets the criteria considered reasonably sufficient in number and “weight” for the diagnosis of a melanoma and if, at the same time, it is lacking of significant criteria that would suggest a benign nature.

• The criteria must be applied within precise histotypes. The diagnostic system based on criteria is more effective if applied to differential diagnoses between pairs of well-defined histological entities. For example, a differential diagnosis is less effective if attempted between a generic nevus and a melanoma but rather between, a spitzoid melanoma and a Spitz nevus, a nevoid melanoma and an Unna nevus, and a desmoplastic Spitz nevus and a desmoplastic melanoma.

27.2 Clinical and Dermoscopic Features

Clinical information is an important filter for the histological diagnostic pathway. For each entity, we report the typical clinical appearance and course in the respective chapters.

27.3 Large Dimensions of the Lesion

All melanocytic lesions which either have a lateral diameter greater than 6 mm or reach the deep portion of the dermis must be evaluated even more carefully than usual. In fact, with only few exceptions (congenital nevi, Spitz nevi, some blue nevi, and deep penetrating nevus), lesions which are larger than 1 cm in their lateral diameter and which reach the subcutis are probably melanomas (Fig. 31.2). On the contrary, lesions which are smaller than 0.6 cm in diameter and are restricted to the junction or to the papillary dermis are vastly nevi. The large size of a lesion is a useful clue in those cases where the diagnosis proves to be very difficult.

For instance, lesions that contain contradictory criteria are probably malignant if they are of large dimensions and of notable depth and are probably benign if small and superficial. Situations in which the size is an extremely useful criterion are in the diagnosis of lentigo maligna and of melanomas on the volar surface of acral skin.

27.4 Asymmetry of the Silhouette

The easiest way to appreciate the symmetry of a nevus or the asymmetry of a melanoma is to consider the silhouette, namely, the lesion’s external profile. If a lesion is divided by an imaginary vertical line and the resulting two hemi-silhouettes do not match, the lesion may be malignant (Figs. 33.4, 33.6, and 37.3). If, on other hand, the resulting external profiles are symmetric and the two hemi-silhouettes can be superimposed, then the lesion is most probably benign. Important exceptions are metastases of melanoma to the skin and spitzoid melanomas in children.

27.5 Asymmetry of the Lateral Junctional Borders

It is always useful to carefully check the two lateral junctional extremes of a melanocytic lesion. In a melanoma, the distribution of cells’ nests will be different at the two ends, whereas a symmetrical distribution of cells and nests is expected in a nevus. For example, it is frequent to find a lentiginous disposition of the melanocytes at one edge of a melanoma, while melanocytes aggregate mostly in nests on the other. In a nevus, both “shoulders” will show the same pattern (generally in regular nests).
These considerations concerning the symmetrical aspect of the “shoulders” are not only valid for the architecture but also for the cytological details. In a melanoma, the cells can be large and epithelioid at one end and small or spindled at the other end. On the contrary, in a nevus, the cytology is usually uniform throughout the junction.

27.6 Asymmetry in the Distribution of Melanocytes and Nests at the Junction

It is easy to assess that in a melanoma, nests and single melanocytes are asymmetrically distributed at the junction by dividing the lesion in two halves (Figs. 28.9 and 28.10). Moreover, nests vary in size, shape, and location with respect to rete ridges. “Skip areas” devoid of melanocytes irregularly alternate at the junction with overcrowded tracts.

27.7 Asymmetry of Pigment Distribution Within the Lesion

This is a very important detail that is rather simple to assess. In a melanoma, the pigment distribution can be strikingly asymmetric, with zones of the lesion containing dense accumulations of pigment which alternate with achromatic zones (Figs. 31.2, 31.3, and 38.6). The asymmetric distribution of the pigment is one of the most important clues to melanoma and it is one of the easiest to evaluate. Exceptions do exist: achromic melanomas are homogeneously depigmented; pigment is uniformly distributed in most metastatic melanomas and is asymmetric in combined nevi.

27.8 Asymmetry in the Distribution of the Inflammatory Response

The lymphocytic infiltrate (Figs. 44.5 and 50.5) is mostly asymmetric in melanomas, whereas it is uniformly distributed in inflamed or regressing nevi. An exception is combined nevi, in which a lymphocytic infiltrate may be associated with only one component (usually a spitzoid or deep penetrating nevic portion). The presence of plasma cells should prompt one to think of melanoma if a lesion is not ulcerated.

27.9 Asymmetry of Epidermal Alteration

Epidermal changes occur in all melanocytic lesions. In a melanoma, such modifications are irregular with irregularly distributed epidermal hyperplasia and atrophy (Figs. 32.1 and 43.1). To the contrary, in benign lesions such as Spitz nevus, the epidermis is hyperplastic in a symmetrical, harmonious way (slightly at the edges, most pronouncedly in the center) and the two hemi-silhouettes resemble each other. In combined nevi, there are two different arrangements of epidermal change. In one, comprising cases in which there is a predominant pattern of one type of nevus and a minor one of another or in which there is a central nodule of one type of cell, the epidermis is symmetrically altered. In the other form, the two populations are “side by side” and the epidermal changes can be asymmetrical, simulating melanoma.

27.10 Asymmetry of Cytological Details

Heterogeneous cytological features (pleomorphism) are a constant finding in malignant melanomas. A practical way to appreciate cytological symmetry type is to draw a series of parallel transverse lines through the lesion. In a melanoma, the cytological details inside each strip are patently different. In contrast, in a benign nevus, with the exception of combined nevi, the same cytological pattern is found throughout the entire level.

Therefore, cellular heterogeneity within a particular tier of a lesion is always a hint of its malignant nature. The pleomorphism should always be carefully evaluated by checking the cell and nuclear size, the thickness of the nuclear membrane, and the type, color, and number of the nucleoli (Fig. 35.3). Although the presence of asymmetry in a melanocytic lesion favors malignancy, almost perfectly symmetrical melanomas exist. Striking examples include metastatic (both epidermotropic and dermotropic) melanomas.

27.11 Poor Delimitation of the Lesion

With few exceptions, the lateral margins of a melanoma with an intraepidermal component are blurred and asymmetric, e.g., one margin shows a nested pattern, while the other edge has melanocytes in a lentiginous array (Fig. 34.1). Another very useful clue of the malignant nature of a lesion is the presence of single melanocytes scattered in the spinous layer of the epidermis at a lateral border of the lesion. This important clue is not present in melanomas with a nodular pattern and in metastatic melanoma. Some benign lesions can have single cells unevenly dispersed in the basal layer at their edges, especially small and presumably growing pigmented spindle cell (Reed) nevi.

27.12 Large Confluent Nests

In an “ordinary” nevus, nests are small, discrete, roundish, and evenly positioned along the dermoeipidermal junction. On the other hand, in melanomas, nests are often quite large, irregularly shaped, and confluent with one another (Figs. 32.1, 33.1, and 33.2). Moreover, in melanomas, nests