

# Melanoma In Situ

Melanoma in situ (MIS), also referred to as stage 0 melanoma, represents an early form of melanoma where mutated melanocytes are confined to the epidermis, the top-most layer of the skin. While MIS remains localized, if left untreated this condition has a high potential for progression into invasive melanoma if it breaches the dermo-epidermal junction and penetrates into the dermis. Almost all melanomas are believed to originate as melanoma in situ, either as primary lesions or from pre-existing skin conditions, such as nevi (moles) or lentigines (sun spots). Ultraviolet (UV) radiation from sun exposure is the primary environmental risk factor for the development of MIS, although genetic predispositions and skin type also play significant roles in susceptibility.

## Epidemiology and Risk Factors

The incidence of melanoma in situ has been increasing steadily by 5-15% annually, making it the fastest-growing skin cancer type. While the exact cause of this rise is not fully understood, it is believed that increased awareness and improved detection by Dermatologists have contributed to the surge in diagnosed cases. MIS accounts for a substantial proportion of melanoma diagnoses, particularly in Caucasian individuals, who represent over 90% of cases. Additionally, MIS is more commonly diagnosed in older adults, with men accounting for approximately 55% of cases. Unlike other melanoma subtypes, MIS is often located on the head and neck, although it can arise anywhere on the body.

## Clinical Presentation

Melanoma in situ typically presents as an asymmetric, flat, and irregularly pigmented lesion, with multiple colors such as brown, black, or tan. These lesions are generally larger than 6 mm in diameter and may display borders that are uneven or poorly defined. In clinical practice, the ABCDE rule (Asymmetry, Border irregularity, Color variation, Diameter greater than 6 mm, and Evolution or changes over time) is commonly applied to screen for melanoma, and it is also useful for identifying MIS. However, the appearance of MIS can vary significantly from these criteria, and some lesions may not fit the typical pattern. Therefore, regular skin examinations by a board-certified Dermatologist remain essential for early detection, as MIS can present in diverse forms, including non-pigmented lesions.

## Preventive Measures

Prevention of melanoma in situ aligns closely with strategies used for preventing other forms of non-melanoma skin cancers, such as basal cell carcinoma and squamous cell carcinoma. The most

effective preventive measures focus on reducing UV radiation exposure, which is the leading environmental risk factor for MIS. Recommendations include avoiding sun exposure (especially between 10 AM and 4 PM), refraining from the use of tanning beds, applying broad-spectrum sunscreen with SPF 30 or higher, and wearing sun-protective clothing, hats, and sunglasses. Regular full-body skin examinations by a Dermatologist are also crucial for detecting early lesions before they transform into invasive melanoma.

### **Diagnosis and Histological Features**

Evaluation for melanoma in situ is primarily clinical, supported by dermoscopy, which enhances the visualization of skin lesions. When MIS is suspected, an excisional biopsy is the gold standard for diagnosis. Histopathologically, MIS is characterized by melanocytic proliferation confined to the epidermis, with pagetoid spread (upward migration of atypical melanocytes into the upper epidermis) and no evidence of invasion into the dermis. Once the diagnosis of MIS is confirmed, additional treatment to ensure complete excision is required.

### **Treatment Approaches**

The treatment of melanoma in situ involves surgical excision, which is the most effective approach. A wide surgical margin of 5-10 mm is typically recommended to ensure complete removal of the lesion and to minimize the risk of recurrence. The excised tissue is then examined by a Pathologist to verify that the margins are clear. In cosmetically sensitive areas, such as the face, Mohs micrographic surgery may be used to minimize tissue loss and reduce the scar burden while ensuring complete excision of the tumor.

For patients for whom surgery is contraindicated or for those seeking alternative treatments, second-line therapies such as topical imiquimod, intralesional interferon-alfa, radiation therapy, or laser therapy may be considered. While these options are often effective in treating MIS, they are generally associated with higher recurrence rates compared to surgical excision. Imiquimod, an immune-modulating agent, has been used off-label for MIS treatment, though it is not FDA-approved for this indication. Intralesional interferon-alfa has shown some efficacy in reducing the risk of progression but is less commonly used due to its side effects. Radiation and laser therapy are also considered viable options, particularly in cases where excision may be difficult or impractical.

### **Prognosis**

The prognosis for patients with melanoma in situ is generally excellent, as the tumor remains confined to the epidermis and has a low potential for metastasis. However, without treatment, MIS can progress to invasive melanoma, which significantly worsens the prognosis. Timely diagnosis and treatment are essential to prevent this progression. Early-stage MIS is highly treatable with a high cure rate following excisional biopsy and re-excision. Recurrence, though rare, can occur,

particularly when non-surgical treatments are used. Long-term follow-up is recommended for all patients to monitor for potential recurrence or transformation into invasive melanoma.

## Conclusion

Melanoma in situ represents an early, localized form of melanoma with a high risk of progression to invasive melanoma if left untreated. It is primarily caused by UV radiation, although genetic factors also contribute to its development. Early detection through regular dermatological exams and preventive measures can significantly improve outcomes. Prompt treatment with surgical excision has a high cure rate. Emerging therapies for MIS are being explored, though surgery remains the standard of care. Given the increasing incidence of MIS, continued awareness and research are necessary to optimize detection and treatment strategies.

## References

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