

Refractory Field Cancerization Progressing to Multifocal Bowen's Disease Successfully Treated with Fractional CO₂ Laser: A Case Report

Kashika Sareen

University of British Columbia, Canada

Dusan Sajic

University of British Columbia, Canada

Abstract:

Actinic keratoses (AKs) represent manifestations of ultraviolet-induced field cancerization characterized by genetically altered keratinocyte populations extending beyond clinically visible lesions.¹ In patients with extensive or biologically active disease, conventional lesion- and field-directed therapies may provide incomplete control, permitting persistence of subclinical dysplasia and progression to keratinocyte carcinoma.¹⁻⁵ Durable treatment strategies for advanced field cancerization progressing to multifocal Bowen's disease remain limited. Ablative fractional CO₂ (AFCO₂) laser resurfacing creates microscopic columns of ablation extending through the epidermis into the superficial dermis, enabling disruption of dysplastic keratinocyte reservoirs within the broader diseased field.³⁻⁵

A 60 year old male with chronic ultraviolet exposure and prior cutaneous squamous cell carcinoma presented with extensive treatment-refractory scalp field cancerization. Between 2020 and 2023, serial biopsies demonstrated recurrent AKs, including hypertrophic variants, despite repeated treatment with cryotherapy, topical fluorouracil, diclofenac sodium, serial shave excisions with electrodesiccation and curettage, and adjunctive topical therapies. In December 2023, extensive shave biopsies revealed multifocal Bowen's disease involving the frontal, medial, and posterior scalp. Given progressive disease despite prolonged multimodal therapy, the patient underwent field-directed AFCO₂ laser resurfacing over three sessions between February and May 2024 using high-density multi-pass ablative settings. The final session incorporated adjunctive methyl aminolevulinate photodynamic therapy.

Treatment was well tolerated with expected transient erythema, edema, and procedural recovery. Progressive clinical improvement was observed throughout follow-up, with resolution of previously identified lesions and marked reduction in background actinic change. At approximately two-year follow-up following AFCO₂ resurfacing, there was no clinical evidence of recurrent Bowen's disease. Residual disease burden was limited to a small number of isolated AKs managed with focal cryotherapy.

This case highlights the limitations of repeated superficial therapies in advanced field cancerization and supports AFCO₂ resurfacing as a potential field-modifying intervention capable of restructuring the diseased cutaneous field and achieving durable disease control in refractory actinic disease.