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First described by the American dermatologist John T. Bowen in 1912, Bowen disease is a squamous cell carcinoma (SCC) in situ with the potential for significant lateral spread. Larger lesions can reach several centimeters in diameter.

Pathophysiology

Bowen disease is a form of intraepidermal carcinoma, a malignant tumor of keratinocytes. Bowen disease may ultimately progress to an invasive squamous cell carcinoma.

Frequency

United States

Because no national health databases collect the numbers of nonmelanoma skin cancers and because of regional differences in incidence rates, estimating the frequency of Bowen disease is difficult. In 1991, a study from Minnesota reported the annual average rate of Bowen disease as 14.9 cases per 100,000 whites.\textsuperscript{1} In 1994, a study from Hawaii reported a rate 10 times that, 142 cases per 100,000 whites.\textsuperscript{2}

Mortality/Morbidity

The prognosis for Bowen disease is favorable. The majority of studies report a risk of progression to invasive SCC at 3-5%. According to a retrospective case series with multiple
potential biases, of those that become invasive SCC, one third may metastasize. The risk of invasive carcinoma is estimated to be higher for genital Bowen disease or erythroplasia of Queyrat at 10%.³

Much controversy surrounds whether Bowen disease is associated with internal malignancies.⁴, 5,6,7,8 Many early papers reported such an association in 15-70% of cases. Some later reports supported an association of internal malignancies with Bowen disease that was associated with arsenic ingestion but not with Bowen disease from other causes.⁹

In 1989, a meta-analysis of 12 studies showed no significant association. The most recent population-based cohort study of 1147 Bowen disease patients in Denmark demonstrated no statistically significant increased risk of internal cancers. Currently, Bowen disease is not believed to be a paraneoplastic condition.⁸

**Race**

Bowen disease is most commonly reported in sun-exposed sites of whites. Bowen disease rarely occurs in patients with darker-pigmented skin; if it does, it usually affects nonexposed sites.¹⁰

**Sex**

The ratio of Bowen disease is approximately equal between males and females. Bowen disease is more commonly found on the head and neck of men and on the lower limbs and cheeks of women.¹¹

**Age**

Bowen disease occurs in adulthood, with the highest incidence in patients older than 60 years.¹ ²

**Clinical History**

Patients often present with an asymptomatic, slowly enlarging, erythematous, well-demarcated scaly patch or plaque. It may occur anywhere on the mucocutaneous surface. A delay in diagnosis of Bowen disease often is encountered because the lesion is asymptomatic; early skin changes may be subtle and overlap with clinical features seen in many conditions, such as tinea corporis, nummular eczema, seborrheic keratosis, Paget disease, superficial basal cell
carcinoma, actinic keratosis, and psoriasis. A classic clinical history is presentation of a non–steroid-responsive dermatosis.

**Physical**

Bowen disease presents as a single lesion in two thirds of cases. Lesions may appear on sun-exposed or covered skin. The head, neck, and extremities are the most commonly affected anatomic locations in men, while the lower limbs and cheeks are most commonly affected in women. Lesions, as shown in the images below, vary in size from a few millimeters to several centimeters in diameter.

A sharply demarcated, irregular border usually is present. Lesions are erythematous, scaly patches or plaques that may become hyperkeratotic, crusted, fissured, or ulcerated. Rarely, the lesions are pigmented, especially in the genital region and the nails. Lesions in these locations may simulate melanoma. Bowen disease also may occur on mucous membranes. When it arises on the glans penis, it is referred to as erythroplasia of Queyrat and presents as an erythematous, moist, velvety or smooth plaque, as demonstrated in the image below.

**Causes**

Bowen disease may arise de novo or from a preexisting actinic keratosis. The etiology is most likely multifactorial.

- Chronic UV radiation: The age and sun-exposed body distribution of Bowen disease suggests the importance of chronic sun damage as a factor in the carcinogenesis of Bowen disease.  
- Arsenic exposure: The literature supports an association between Bowen disease and arsenic exposure, often occurring after a time lag of 10 years. The main sources of arsenic
exposure include Fowler solution, a medication formerly used to treat psoriasis; Gay solution, a medication formerly used to treat asthma; contaminated well water; and certain pesticides.

- Human papillomavirus: Human papillomavirus type 16 is by far the most common subtype isolated from lesions of Bowen disease, although other subtypes, such as HPV 2, 18, 31, 33, 54, 56, 61, 62, and 73 also have been found. 14,15
- Immunosuppression: Immunosuppressed patients with Bowen disease are more likely to have multiple tumors and more aggressive tumors. 16
- Other possible causes include genetic factors, trauma, other chemical carcinogens, and x-ray radiation

Treatment
Medical Care

Each treatment modality has advantages and disadvantages. Choosing the best therapeutic option involves an analysis of various factors such as lesional size, number, site, degree of functional impairment, modality availability, and cost. Because most treatments have a recurrence risk, follow-up at 6-12 months is recommended to evaluate for recurrence. Factors that dictate a shorter follow-up period include history of past recurrence, presence of multiple lesions, lesions in high-risk locations, and immunosuppression.

- Topical therapy
- 5-Fluorouracil is a topical antineoplastic agent that interferes with DNA synthesis via inhibition of thymidylate synthetase and subsequently cell proliferation. It is used clinically as a 5% cream once or twice daily for a variable period, ranging from 1 week to 3 months. 5-Fluorouracil has also been applied under occlusion, with dinitrochlorobenzene as a vehicle, via iontophoresis or pretreatment with an Er:YAG laser. The main advantage is easy self-application by patients. The main adverse effect is irritation with erosions and ulcerations that may last several weeks. 17,18,19,20 A disadvantage is that it may not be able to penetrate deep enough to treat any deep follicular extension of the tumor cells.

- Imiquimod 5% cream, 21,22,23,24 a topical immune response modifier, applied 3-7 d/wk, appears to possibly be a successful treatment option for Bowen disease. It is often used for larger-diameter lesions, lower leg lesions, and erythroplasia of Queyrat. Two reports indicate sustained clearance with at least 19 months of disease-free follow-up after treatment of perianal Bowen disease with single-agent therapy using imiquimod 5% cream. Topical treatment for perianal Bowen disease may minimize the risk of scarring, poor wound healing, and functional impairment. The ideal dosing regimen is still under investigation, but the most studied regimen at this time is imiquimod 5% cream once daily for 16 weeks. Also note, however, that a
cautionary report describes Bowen disease of the scalp treated with imiquimod that evolved into invasive SCC.

- Consider x-ray or grenz-ray radiation therapy for poor surgical candidates or patients with multiple lesions. It should be avoided for lower extremity lesions due to impaired healing.

- Photodynamic therapy (PDT) has also been used, with variable success, for the treatment of Bowen disease. Photodynamic therapy involves the introduction of a photosensitizing agent into the body, which is retained preferentially by the tumor cells. Then, a light source is used to stimulate the photosensitizing agent, causing the release of toxins and leading to the destruction of the tumor. Topical 5-aminolevulinic acid (ALA) or methyl aminolevulinate (MAL) are the most commonly used photosensitizers. Various illumination sources, wavelengths of light, and dosing schedules have been used. PDT is well-suited for large lesions, multiple lesions, and poor-healing sites. The adverse effects include local phototoxic effects such as burning and stinging and, rarely, erosions, ulceration, and hyperpigmentation hypopigmentation. Treatment guidelines are available from the Norwegian University of Science and Technology.

Surgical Care

- Simple excision with conventional margins
  - This surgery is the most common and preferred treatment for smaller lesions and those not in problematic areas, such as the face and digits. For perianal Bowen disease, excision with wide margin is recommended. Lower leg lesions are often limited by the lack of skin mobility.
  - Although lesions are typically well demarcated, the actual extent of the disease may be well beyond the clinical margins. For this reason, the excision should be made at least 4 mm outside the clinical margin.

- Mohs micrographic surgery
  - This is an excellent method for larger lesions, poorly demarcated lesions, recurrent lesions on the head and neck, or areas where tissue sparing is vital, such as digital or genital lesions. Mohs micrographic surgery uses the systematic surgical removal of skin cancers with very small margins of normal tissue followed by frozen section examination of nearly 100% of the tissue margin.
  - It offers the highest cure rate of all treatment modalities, and, because relatively thin layers are taken only in areas of proven tumor, it is a tissue-sparing procedure.

- Curettage and electrodesiccation, cryotherapy, and laser ablation
  - These are blind surgical methods (no pathologic confirmation of removal) that are established treatment modalities for Bowen disease.
  - As compared with excision and Mohs surgery, they are less likely to remove tumors that are present down adnexal structures.
- Curettage and electrodesiccation is a common and safe modality. Treatment efficacy is largely determined by the skill of the clinician. It is also one of the most cost-effective treatment modalities.
- Cryotherapy is another common therapeutic option, especially for single and small lesions. Suggested regimens in the literature include a single 30-second freeze-thaw cycle, 2 freeze-thaw cycles of 20 seconds with a thaw period, or up to 3 single treatments of 20 seconds at intervals of several weeks. The risk of poor wound healing (eg, hypopigmented scarring) increase with prolonged freezing times. Treatment of broad lesions is often limited because of patient discomfort.
- Case reports and series have shown a benefit of using argon, carbon dioxide, and Nd:YAG lasers in the treatment of some Bowen disease lesions.

**Medication**

The goals of therapy for Bowen disease are to reduce morbidity and to prevent complications.

**Antineoplastic agents**

Topical agents that may be used in the management of Bowen disease.

**5-Fluorouracil (Efudex, Carac, Adrucil, Fluoroplex)**

5-Fluorouracil administered topically under occlusion, following the use of keratolytic or cryotherapy, or by iontophoresis (an electrogradient-driven chemical delivery system), can be used. Interferes with DNA synthesis by blocking methylation of deoxyuridylic acid and inhibits thymidylate synthetase, which subsequently reduces cell proliferation.

**Adult**

Only 5% strength recommended; apply bid, sparingly to cover lesions (minimum 3 wk); therapy may be required for 10-12 wk

**Pediatric**
Administer as in adults

Documented hypersensitivity; potentially serious infections

Pregnancy

X - Contraindicated; benefit does not outweigh risk

Precautions

Incidence of inflammatory reactions may occur with occlusive dressings; porous gauze dressing may be applied for cosmetic reasons without increase in reaction

Imiquimod (Aldara)

Precise mechanism of action for treatment of Bowen disease is unknown. May increase tumor infiltration of lymphocytes, dendritic cells, and macrophages. Indicated when surgical methods are not appropriate.
Apply cream to treatment area (including 1 cm of skin surrounding tumor) 3-7 d/wk for up to 16 wk; leave on for at least 8 h, then wash area

Pediatric

Not established