

When a Burn Scar Invades the Brain: A Case Report of Advanced Marjolin Ulcer of the Scalp

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Abstract

Marjolin ulcer is a malignancy arising in a chronic wound or scar, usually a squamous cell carcinoma. Spread from the scalp into the brain is uncommon and makes treatment difficult. We report a case of a 38-year-old female with a scalp scar from a childhood thermal burn. An ulcer appeared about 33 years after the injury and grew over two years, faster during the last three months before presentation. A persistent foul odor led her to seek care. Examination showed a large ulcerated, exophytic scalp tumor, but she was fully conscious and had no focal neurological deficit. Computed tomography showed extensive destruction of the skull and herniation of brain tissue through the bone defect. A dural biopsy showed a well-differentiated, infiltrating, keratinizing squamous cell carcinoma. Magnetic resonance imaging two weeks later confirmed invasion of the dura and the adjacent brain, with marked edema and an intraparenchymal hematoma. There were no regional or distant metastases. The tumor was judged unresectable. The multidisciplinary team proposed definitive radiotherapy to 66 Gy in 33 fractions with weekly cisplatin, but the patient declined. Immunotherapy was not available. Two months later, she developed symptoms of intracranial hypertension. She received corticosteroids and palliative radiotherapy to 30 Gy in 10 fractions. She completed all fractions and tolerated them well at first, but her symptoms did not improve. She died about one month after radiotherapy. This case shows that progressive changes in an old burn scar should be biopsied, and that extensive intracranial spread can be present before any neurological deficit appears.

Categories: Radiation Oncology, Oncology, Dermatology

Keywords: burn scar, cutaneous squamous cell carcinoma, intracranial invasion, marjolin ulcer, scalp, transcalvarial extension

Introduction

Marjolin ulcer is a malignant tumor that develops in a chronic wound or scar, most often after a burn. Malignant change is estimated to occur in about 0.77%-2% of burn scars. Squamous cell carcinoma accounts for about 71% of reported burn-scar tumors, and basal cell carcinoma for about 12% [1,2].

How this transformation happens is not fully understood. Proposed factors include chronic inflammation, repeated injury, changes in local blood and lymphatic flow, and reduced immune surveillance. The cancer often appears decades after the injury, but once it develops, it can grow quickly [1,3].

On the scalp, the proximity of the skin to the calvarium and dura may facilitate tumor extension into deeper structures. Intracranial involvement has been reported in only a few cases, and it makes both resection and reconstruction more difficult [4-8]. We report a scalp Marjolin ulcer with extensive bone destruction, dural involvement proven on histology, and brain invasion confirmed on magnetic resonance imaging (MRI). The patient had no focal neurological deficit at presentation.

Case Presentation

A 38-year-old female presented with a growing lesion in an old scalp scar. Her only notable history was a thermal burn at the age of three. The burn was reportedly second-degree; medical records from that time and details of the initial treatment were not available. Healing had been slow and left a large area of scarring alopecia with pigment changes.

About 33 years after the burn, and two years before presentation, an ulcer appeared within the scar. It grew slowly at first, and she did not seek medical advice. Growth then accelerated during the last three months. She finally consulted because of a persistent foul odor.

Examination showed a large, multilobulated, ulcerated, and exophytic tumor covering much of the right scalp. The tumor was friable, fixed to the underlying tissues, and covered with fibrinous exudate and areas of necrosis (Figure 1). The patient was independent, with a World Health Organization performance status of 1 and a Glasgow Coma Scale score of 15/15. No focal neurological deficit was found.

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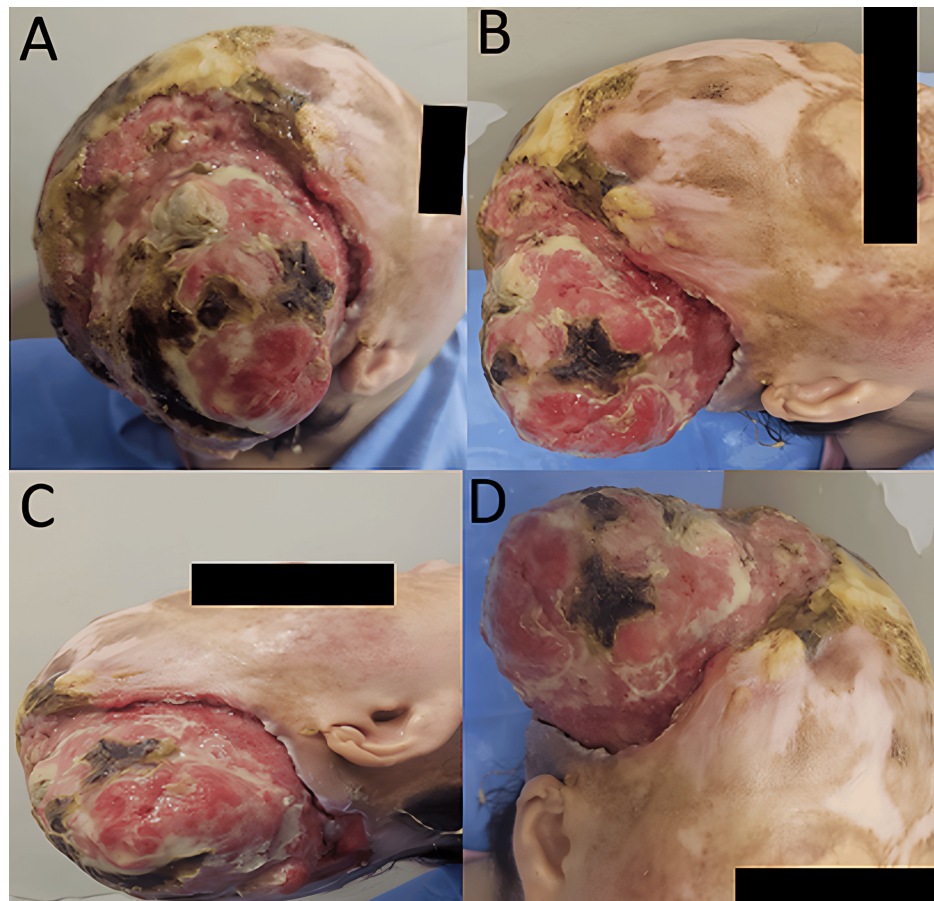


FIGURE 1: (A) Superior view showing a large ulcerated, exophytic mass with partial necrosis and fibrinous exudate. (B) Lateral view showing the tumor extending over a dyspigmented, alopecic burn scar. (C) Contralateral view showing the exophytic component and the extent of scalp involvement. (D) Oblique view showing the tumor bulk and its broad attachment to the scarred tissue.

Blood tests showed neutrophilic leukocytosis and a C-reactive protein level of 130 mg/L. Renal function, liver tests, and serum electrolytes were normal. A wound swab grew *Staphylococcus aureus*, which was sensitive to all antibiotics tested. The superinfected lesion was treated with amoxicillin-clavulanate for 10 days, together with local wound care.

The initial brain computed tomography (CT) scan showed a large right-sided scalp mass with extensive destruction of the skull, thickening of the underlying dura, and herniation of brain tissue outward through the bone defect (Figure 2).

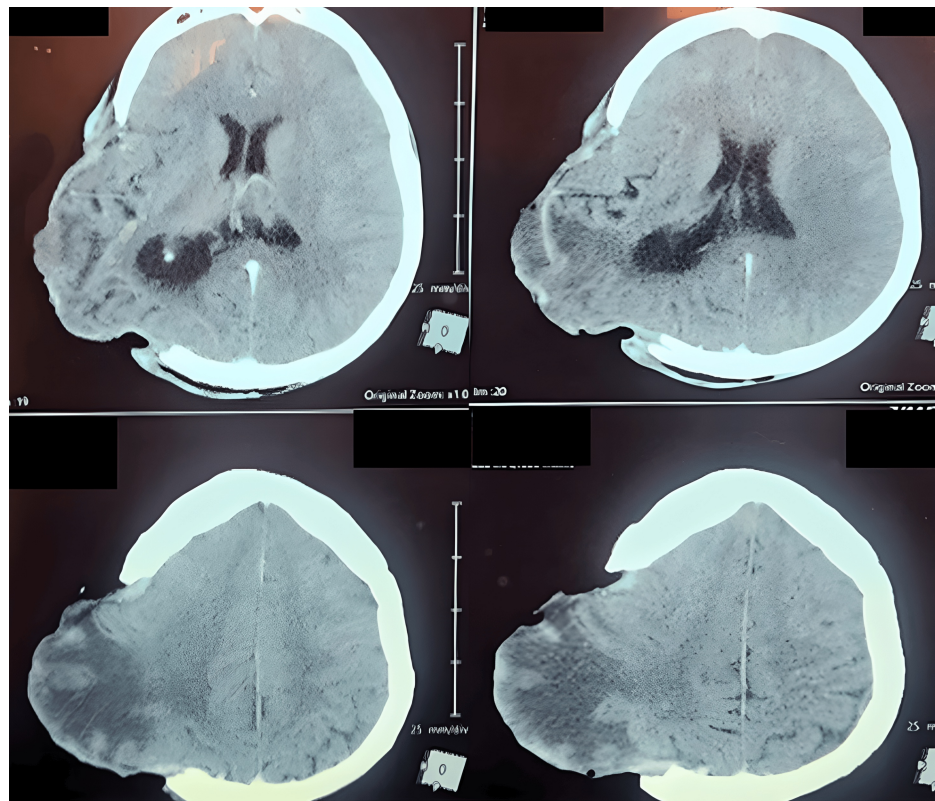


FIGURE 2: Axial CT images showing a large soft-tissue mass of the scalp with extensive skull destruction, thickening of the underlying dura mater, and transcalvarial herniation of the brain parenchyma.

The neurosurgical team performed a biopsy of the involved dura mater, as recorded in the operative report. Histopathology showed a well-differentiated, infiltrating, keratinizing squamous cell carcinoma with keratin pearls and areas of tumor necrosis (Figure 3). No lymphovascular or perineural invasion was seen in the sample. Together with the history of an old burn scar, these findings supported the diagnosis of Marjolin ulcer and confirmed dural involvement.

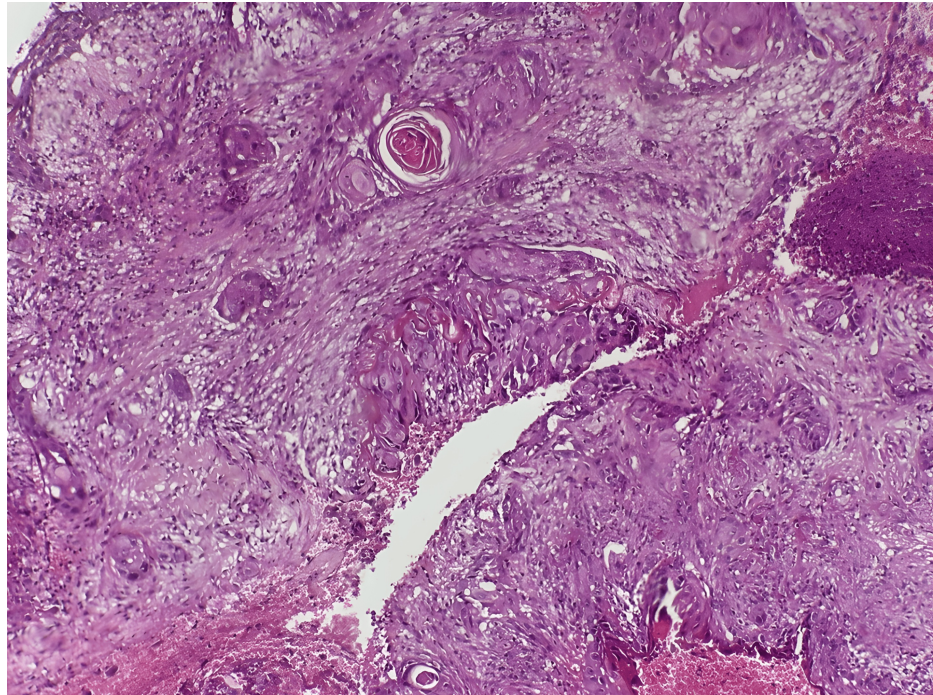


FIGURE 3: Histopathologic examination of the dural biopsy showing well-differentiated keratinizing squamous cell carcinoma arranged in infiltrating tumor nests with keratin pearl formation (hematoxylin and eosin staining; original magnification ×10).

Brain MRI, performed two weeks after the dural biopsy, showed a right temporoparieto-occipital scalp tumor extending over 11.5 cm, with a maximum thickness of 12 mm and intense heterogeneous enhancement. Extensive calvarial destruction was accompanied by pachymeningeal involvement and direct infiltration of the adjacent right temporoparietal cerebral parenchyma, confirmed by the radiologists (Figure 4). A 55 × 35 mm intraparenchymal hematoma and marked perilesional edema were also present. A causal relationship between the biopsy and the hematoma was not established. The tumor extended toward the right mastoid region and temporomandibular joint, without skull base invasion. There was no midline shift, and the intracranial venous sinuses remained patent.

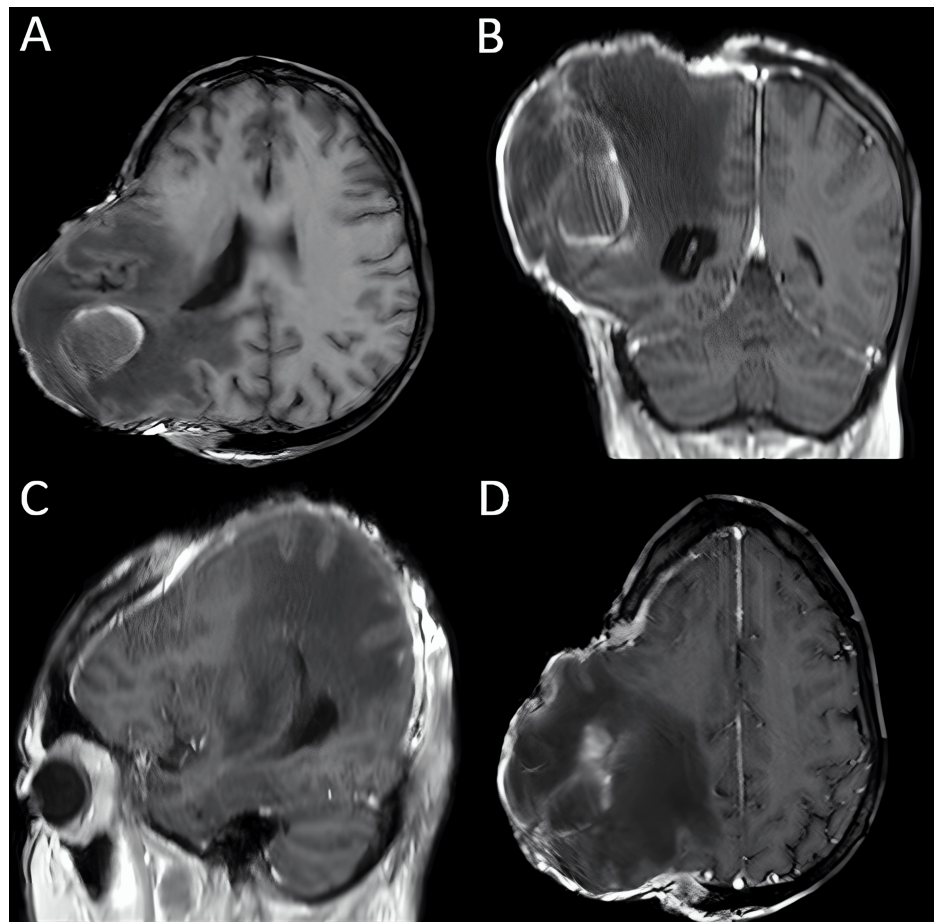


FIGURE 4: Contrast-enhanced T1-weighted brain magnetic resonance images. Axial (A), coronal (B), sagittal (C), and superior axial (D) reconstructions demonstrate a large, heterogeneous, partially necrotic transcalvarial scalp tumor invading the calvarium, dura, and adjacent cerebral parenchyma. The lesion is associated with marked vasogenic edema, mass effect with compression of the ipsilateral lateral ventricle, and herniation of cerebral tissue through the osseous defect.

Staging cervico-thoraco-abdominopelvic CT showed no regional lymph-node involvement or distant metastases. The disease was classified as cT4aN0M0 according to the eighth edition of the American Joint Committee on Cancer (AJCC) staging system for cutaneous squamous cell carcinoma of the head and neck [9].

Surgery was not considered feasible because of the extent of skin, calvarial, dural, and cerebral involvement, the expected tissue defect, and the low likelihood of achieving complete resection with adequate reconstruction. After multidisciplinary review, definitive concurrent chemoradiotherapy was proposed: 66 Gy in 33 fractions of 2 Gy with weekly cisplatin at 35 mg/m². This was an individualized decision made by the tumor board. Immunotherapy and other alternative systemic treatments were not available in our setting. The proposed treatment, its expected benefits, and its risks were explained to the patient, who declined it.

Two months later, she was readmitted with headache and vomiting suggesting intracranial hypertension, and an episode of facial palsy. A noncontrast brain CT showed that the tumor size was roughly unchanged, but perilesional edema and mass effect had increased. She received intravenous corticosteroid boluses, followed by three-dimensional conformal palliative radiotherapy to 30 Gy in 10 fractions. She completed all 10 fractions. Early tolerance was good, but her symptoms did not improve. She died about one month after the end of radiotherapy. The immediate cause of death was not documented.

Discussion

The long interval between the burn and the onset of ulceration is consistent with the usual presentation of

chronic Marjolin ulcer. In this patient, ulceration appeared approximately 33 years after the injury, followed by gradual enlargement and later accelerated growth. This latency is close to the mean of 28.8 years reported in a retrospective series of 140 patients [3].

Any new or changing lesion on an old scar needs further investigation. Persistent ulceration, induration, exophytic growth, bleeding, necrosis, or rapid enlargement should lead to representative biopsies of sufficient depth [1]. In our patient, the foul odor was probably due to necrosis and bacterial superinfection. The infection needed treatment, but it could not explain a mass that kept growing.

Scalp Marjolin ulcers can destroy the skull and extend into the dura or brain [4-7]. The same pattern has been described in advanced scalp squamous cell carcinoma not related to a burn scar [8]. In our case, the evidence came from two sources: dural invasion was proven on biopsy, while brain infiltration was confirmed on imaging. No brain tissue was obtained for histology because the tumor was not resected.

The absence of an initial neurological deficit is notable despite the extensive intracranial involvement. Slow progression may have allowed the brain to tolerate the lesion for some time, but a single case cannot explain the mechanism. Neuroplasticity has been described with slow-growing brain lesions, especially gliomas, but whether it applies to direct invasion by a skin cancer remains speculative [10].

When a Marjolin ulcer is resectable, surgery with clear histological margins is the preferred treatment. A margin of at least 2 cm of normal-looking tissue is often recommended, but the final plan depends on the anatomy and on histological margin assessment [1].

The type of reconstruction depends on the depth and size of the defect and on whether the pericranium is preserved. Large defects involving the scalp, skull, and dura may need vascularized tissue and joint planning by the neurosurgical and reconstructive teams [6].

When bone or dura is involved, en bloc resection followed by reconstruction may be an option. In our patient, the brain extension and the expected large tissue loss made complete oncological resection unlikely.

Definitive radiotherapy is an option for selected patients with unresectable cutaneous squamous cell carcinoma [11]. Adding weekly cisplatin was a case-by-case decision of the multidisciplinary team, based on the management of other locally advanced head and neck squamous cell carcinomas. Evidence for concurrent chemoradiotherapy in Marjolin ulcer with brain extension is limited, so this regimen should not be seen as a standard of care for this disease.

The 2026 European guidelines recommend anti-programmed cell death protein 1 (anti-PD-1) therapy as first-line systemic treatment for locally advanced cutaneous squamous cell carcinoma when curative surgery or radiotherapy is not possible [12]. Immunotherapy and other systemic treatments were not available in our setting, which limited the options we could offer.

At readmission, her neurological condition had worsened, with more edema and mass effect, although the tumor size was largely stable. Tumor size alone therefore did not reflect her clinical decline. Palliative radiotherapy did not improve her symptoms. Because follow-up was short, no post-treatment imaging was documented, and the immediate cause of death was not recorded, we cannot draw firm conclusions about tumor response or the cause of death.

This case shows why changes in a burn scar should be investigated early, before the tumor spreads deeply. Once intracranial structures are involved, treatment becomes much harder, and a multidisciplinary team must decide case by case whether surgery or definitive radiotherapy is feasible.

Conclusions

A scalp Marjolin ulcer can grow through the skull into the dura and brain while neurological function is still preserved. In our patient, subsequent deterioration was accompanied by worsening cerebral edema and mass effect. A normal neurological examination should not delay the work-up of a growing scalp lesion.

Any persistent or progressive change in an old burn scar should be biopsied without delay. CT and MRI give complementary information on bone and intracranial involvement. Early multidisciplinary assessment helps find feasible treatment options before further spread limits them.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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Disclosures

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References

1. Saaq M, Ashraf B: Marjolin's ulcers in the post-burned lesions and scars . *World J Clin Cases*. 2014, 2:507-14. [10.12998/wjcc.v2.i10.507](https://doi.org/10.12998/wjcc.v2.i10.507)
2. Kowal-Vern A, Criswell BK: Burn scar neoplasms: a literature review and statistical analysis . *Burns*. 2005, 31:403-13. [10.1016/j.burns.2005.02.015](https://doi.org/10.1016/j.burns.2005.02.015)
3. Xiang F, Song HP, Huang YS: Clinical features and treatment of 140 cases of Marjolin's ulcer at a major burn center in southwest China. *Exp Ther Med*. 2019, 17:3403-10. [10.3892/etm.2019.7364](https://doi.org/10.3892/etm.2019.7364)
4. Gupta SK, Sandhir RK, Jaiswal AK, Kumar S: Marjolin's ulcer of the scalp invading calvarial bone, dura and brain. *J Clin Neurosci*. 2005, 12:693-5. [10.1016/j.jocn.2004.08.030](https://doi.org/10.1016/j.jocn.2004.08.030)
5. Sengul G, Hadi-Kadioglu H: Penetrating Marjolin's ulcer of scalp involving bone, dura mater and brain caused by blunt trauma to the burned area. *Neurocirugia (Astur)*. 2009, 20:474-7. [10.1016/S1130-1473\(09\)70147-2](https://doi.org/10.1016/S1130-1473(09)70147-2)
6. Mishra SS, Behera SK, Panigrahi S, Senapati SB: Penetrating Marjolin's ulcer of scalp with intracranial extension: a multidisciplinary experience. *Asian J Neurosurg*. 2014, 9:240. [10.4103/1793-5482.146646](https://doi.org/10.4103/1793-5482.146646)
7. Jung JA: Invasive Marjolin's ulcer penetrating the scalp to involve bone and dura mater: a case report . *J Wound Manag Res*. 2025, 21:46-9. [10.22467/jwmr.2025.03230](https://doi.org/10.22467/jwmr.2025.03230)
8. Chirukandath R, Krishnan SK, Sulaiman SV, Kollannur LK, Nishthar Cmt M: Squamous cell carcinoma scalp with intracranial extension: challenging case of multidisciplinary care. *Cureus*. 2023, 15:e34975. [10.7759/cureus.34975](https://doi.org/10.7759/cureus.34975)
9. Amin MB, Edge SB, Greene FL, et al.: *AJCC Cancer Staging Manual*. 8th Edition . Springer, Cham, Switzerland; 2017.
10. Desmurget M, Bonnetblanc F, Duffau H: Contrasting acute and slow-growing lesions: a new door to brain plasticity. *Brain*. 2007, 130:898-914. [10.1093/brain/awl300](https://doi.org/10.1093/brain/awl300)
11. Likhacheva A, Awan M, Barker CA, et al.: Definitive and postoperative radiation therapy for basal and squamous cell cancers of the skin: executive summary of an American Society for Radiation Oncology clinical practice guideline. *Pract Radiat Oncol*. 2020, 10:8-20. [10.1016/j.prro.2019.10.014](https://doi.org/10.1016/j.prro.2019.10.014)
12. Stratigos AJ, Dessinioti C, Garbe C, et al.: European consensus-based interdisciplinary guideline for invasive cutaneous squamous cell carcinoma: part 2. Treatment - update 2026. *Eur J Cancer*. 2026, 243:116764. [10.1016/j.ejca.2026.116764](https://doi.org/10.1016/j.ejca.2026.116764)