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EDITORIAL

From overtreatment to precision: a new clinical standard for DCIS management

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Ductal carcinoma *in situ* (DCIS) remains one of the most conceptually challenging diagnoses in breast oncology. DCIS is technically non-invasive, contained within the basement membrane, and lacks metastatic potential in its pure form. Yet patients are told that they have "breast cancer," a term that triggers anxiety, shapes perception, and drives treatment decisions. The incidence of DCIS has increased dramatically after the introduction of screening mammography, particularly with the detection of microcalcifications. Despite this increased incidence, breast cancer-specific mortality remains remarkably low (3%–4% over 20 years).

This discrepancy between incidence and mortality reveals a diagnostic and therapeutic dilemma[1]. The historical response to uncertainty has been intervention (excision, radiotherapy, and endocrine therapy) applied broadly to reduce risk. While these strategies have effectively lowered local recurrence, the strategies have also contributed to overtreatment, exposing patients to toxicity and psychological burden without necessarily altering long-term survival. The central clinical question is no longer whether treatment works, but for whom it is truly necessary.

DCIS now stands at the intersection of the following two eras: the traditional assumption that all pre-invasive disease must be treated; and the emerging recognition that risk is not uniform. Precision tools create an opportunity to replace reflexive escalation with biologically informed decision-making. The future standard depends on our readiness to rethink established patterns safely.

DCIS today: what still holds true

Despite evolving perspectives, several evidence-based principles remain foundational. Radiotherapy continues to reduce ipsilateral breast tumor recurrence (IBTR) by 50%–60%, a finding confirmed across multiple randomized trials and meta-analyses. The benefit applies to both *in situ* and invasive recurrences and is largely independent of age, grade, comedo necrosis, and method of detection. What radiotherapy has not reliably demonstrated is a proportional reduction in breast cancer-specific mortality, which is a reminder that recurrence is not always a surrogate for lethality[2].

Endocrine therapy (most often tamoxifen) provides additional benefit in estrogen receptor-positive DCIS, reducing recurrence risk by approximately 30%–40%. The advantage of estrogen therapy is additive when combined with radiotherapy but negligible in ER-negative disease. Thus, biology, not uniformity, should shape its use.

Surgical standards have also evolved. Margin consensus now prioritizes "no ink on tumor" with ≥ 2 mm as an adequate threshold when radiotherapy is planned. Increasing margins beyond this has not been shown to improve outcome but may compromise cosmesis and drive avoidable re-excisions. Selective sentinel lymph node biopsy is indicated in cases of mastectomy, suspected microinvasion, or lesions with aggressive features rather than as a universal staging tool[3]. These principles deliver safety but do not deliver personalization. The era ahead demands both (**Table 1**).

Precision medicine arrives

Traditional pathology offers meaningful but incomplete risk prediction[4,5]. Grade, size, necrosis, and architectural pattern describe morphology but not necessarily behavior. The introduction of genomic assays, including the DCIS score, represents a critical step forward. These tools quantify recurrence risk on a continuous scale and have been validated in the E5194 and Ontario cohorts, demonstrating the predictive capacity independent of clinicopathologic variables.

This is not a replacement for surgical medical judgment but a refinement. High-risk genomic profiles justify escalation, supporting intervention with radiotherapy and possibly endocrine therapy[6]. Low-risk profiles, in contrast, challenge the assumption that all patients with DCIS require the same treatment schema. This shifts the clinical goal from eradicating every recurrence to preventing clinically meaningful harm.

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Artificial intelligence and radiomic analytics represent the next frontier. Early but growing evidence suggests that high-resolution imaging analysis may stratify DCIS based on hidden morphologic features correlated with recurrence biology. If validated, these tools may identify surveillance-eligible patients, even before surgical excision. Risk-adapted care becomes proactive rather than reactive in that scenario.

Precision medicine does not seek to treat less, rather precision medicine seeks to treat correctly.

Active surveillance: promise with necessary caution

Prospective trials (COMET, LORIS, LORD, and LORETTA) now examine whether surveillance is safe in carefully selected low-risk patients. Early results have shown similar short-term invasive cancer rates between standard treatment and surveillance, suggesting feasibility. This progress is meaningful. For the first time, conservative management is not a sign of withdrawal but a strategy under study.

Table 1 Margin width and radiotherapy decision grid in DCIS

Margin status	Radiotherapy use	Clinical interpretation
≥ 2 mm	Yes	Optimal balance between local control and cosmetic outcome
> 2 mm	Yes	No evidence that wider margins further reduce recurrence risk
< 2 mm	Yes	Re-excision may be considered based on extent of disease, imaging findings, and surgical feasibility
Any margin	No	Higher risk of ipsilateral breast events; careful patient selection required

However, surveillance is not ready for unrestricted practice. Upgrade rates at excision remain clinically significant. Approximately 20% of patients meeting LORIS criteria have been shown to harbor invasive carcinoma at the time of surgery. A subset exhibits aggressive biology, including HER2 positivity or nodal involvement. These findings underscore the risk of misclassification and the ethical imperative to ensure patient safety.

Surveillance should be available only within structured programs, with clear eligibility, expert radiologic interpretation, and rapid intervention protocols if disease progresses. To offer surveillance without infrastructure is not innovation, rather surveillance without infrastructure is negligence. The goal is not abandonment of treatment but refinement of treatment responsibility (**Table 2**).

Surgical reality: precision without excess

Surgery remains central to DCIS management, not as a universal solution but as a targeted tool[7]. The modern surgical standard emphasizes precision, as follows: clear margins that balance oncologic control with anatomic preservation; re-excision decisions based on feasibility and biology rather than dogma; and sentinel node sampling only when staging value exists.

Radiotherapy and endocrine therapy should be contextual instruments, not reflexive instruments. The benefit must be weighed against toxicity, quality of life, and individualized recurrence risk. The surgeon is no longer simply the executor of a technical step but the architect of a calibrated pathway, integrating genomics, imaging, and patient preference into a unified plan[4].

This is not less surgery but smarter surgery (**Table 3**).

Table 2 Key clinical trials evaluating active surveillance and biological risk stratification in DCIS

Study/Trial	Population	Management strategy	Key findings
COMET	Low-risk, hormone receptor-positive DCIS	Active surveillance *vs.* guideline-concordant standard therapy	Non-inferior short-term invasive cancer rates; quality-of-life advantages under evaluation
LORIS	Screen-detected low- or intermediate-grade DCIS	Surgery *vs.* active surveillance	Approximately 20% upgrade to invasive carcinoma at surgical excision
LORD	Low-grade (grade I–II) DCIS	Active surveillance	Feasibility demonstrated; long-term oncologic safety pending
ECOG-ACRIN E5194/Ontario cohort	Selected DCIS treated with excision alone	Genomic risk stratification	DCIS score™ predicts both invasive and *in situ* recurrence

Table 3 Clinical risk stratification framework for DCIS

Risk category	Defining features	Recommended management approach
Low risk	Low- to intermediate-grade DCIS, small lesion size, favorable biology, low DCIS score™	Breast-conserving surgery ± endocrine therapy; consideration of treatment de-escalation within clinical trials
Intermediate risk	Discordant clinicopathologic features, intermediate DCIS score™, close but negative margins	Breast-conserving surgery with radiotherapy and/or endocrine therapy; individualized decision-making
High risk	High-grade disease, comedo necrosis, extensive disease, high DCIS score™, or suspicion of invasion	Surgery with radiotherapy ± endocrine therapy; sentinel lymph node biopsy when mastectomy is planned or when invasion can not be excluded

Conclusions

DCIS is not one disease. DCIS is a category that consists of indolent lesions and precursors with aggressive potential. The challenge and responsibility is to know which is which. Precision medicine now offers the framework to answer that question. The pathway forward is neither routine escalation nor blanket de-escalation, but selection.

The future standard is clear:

- escalate treatment when biology demands it;
- de-escalate when risk is low and safety is preserved;
- use surveillance only within expertise and structure;
- treat DCIS as a spectrum, not a monolith.

From overtreatment-to-precision is the evolution of responsible care.

Conflict of interest statement

No potential conflicts of interest are disclosed.

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