

Probiotic Yeasts and Yeast-derived β -glucan in Chronic Wound Care, and their Implications for Nursing Practice: Scoping Review

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ABSTRACT

Aims: To map the range and nature of the evidence on probiotic yeasts and yeast-derived preparations in chronic wound care, and to identify what follows for nursing practice and for future research.

Design: Scoping review, conducted using Joanna Briggs Institute methodology and reported against the PRISMA extension for scoping reviews (PRISMA-ScR).

Data Sources: PubMed/MEDLINE, Scopus, Web of Science and CINAHL was searched from inception to 16 July 2026, supplemented by a targeted cross-publisher academic search. The searches specified in the protocol had not been executed when this version was prepared; Section 2.9 sets out why that matters and what it means for the claims made here.

Review Methods: Sources were eligible under a Population–Concept–Context framework if they reported a probiotic yeast, an inactivated yeast preparation, or a yeast-derived cell-wall bioactive applied to a wound of any aetiology in humans, animals, or in vitro and ex vivo systems. Data were charted on a standardised form. Following JBI guidance, critical appraisal was descriptive rather than an inclusion filter.

Results: Thirty-five records were identified and five met the eligibility criteria as sources of evidence: one human randomised controlled trial of a yeast-derived β -1,3/1,6-glucan in diabetic foot ulcers, three in vitro or ex vivo studies, and one in vivo animal study of live *Saccharomyces cerevisiae*. Three further studies of yeast-containing kefir preparations, one of which included *Kluyveromyces marxianus*, were identified through a cited secondary synthesis and are reported separately with an explicit provenance caveat. No controlled human trial of a live probiotic yeast in chronic wound care was identified. Evidence from an adjacent literature documents fungaemia following live *Saccharomyces* administration, including in critically ill burn patients.

Conclusion: The evidence for live probiotic yeasts in wound care is small, preclinical and confined almost entirely to one species, and includes a null result. The only human trial identified used a purified, non-viable yeast cell-wall fraction, which carries no live-organism translocation risk. That contrast, rather than any single result, is what this review contributes.

Impact: This review separates two evidence bases that are usually discussed together: live probiotic yeasts, and non-viable preparations derived from them. The separation matters at the bedside, because product claims rarely make it, and because the safety profile differs. The review also connects the probiotic-fungaemia literature to the burn-wound population for the first time, and sets out what would have to be established before any live-yeast preparation could reasonably be considered for a wound.

Keywords: β -glucan, Chronic Wound, Diabetic Foot Ulcer, Gut–skin Axis, Nursing; Probiotic Yeast, *Saccharomyces Cerevisiae*, Wound Care

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INTRODUCTION

1.1 Fungi in the Chronic Wound: A Familiar Problem, Viewed from an Unfamiliar Angle

Chronic wounds are among the most stubborn and

expensive problems in health care, and their management falls disproportionately to nurses. A cross-sectional analysis of 34,113 patients with chronic wounds across 215 hospitals found that the nursing work environment, the proportion of degree-prepared nurses, and nursing skill

mix each predicted in-hospital mortality, escalation of care and length of stay [11]. Wound outcomes, on that evidence, are nursing-sensitive before they are product-sensitive. Global Burden of Disease modelling continues to place skin and subcutaneous conditions among the leading contributors to years lived with disability [12], although the chronic wounds at issue here are largely accounted for elsewhere in that hierarchy, under diabetes.

Research into the wound microbiome has been almost entirely bacterial. Kalan and colleagues profiled 100 non-healing diabetic foot ulcers by ITS1 amplicon sequencing and estimated fungi in up to 80% of wounds, while parallel culture captured only 5% of colonised wounds; the proportion of *Ascomycota* at first presentation predicted healing time, and yeasts formed interkingdom biofilms with co-isolated bacteria [13]. The gap between 80% and 5% reflects both the insensitivity of culture and the known biases of ITS-based estimation, since ITS copy number varies between fungal taxa and common primers under-detect *Basidiomycota*. Even allowing for that, the direction is unambiguous. Fungi are in these wounds, they matter, and routine practice does not see them.

From there a further question follows. If fungi are already present and clinically consequential in the wound bed, could a deliberately introduced, health-associated yeast, or something derived from one, be used therapeutically in the same environment? And what would a nurse need to know before considering it? That is the question this review maps.

1.2 Probiotic, Postbiotic, β -Glucan: Why the Words Matter Here

Three terms recur in this literature, and the distinctions between them are clinical, not semantic. A probiotic is a live microorganism which, administered in adequate amounts, confers a health benefit on the host [14]. A postbiotic, per the ISAPP consensus, is a preparation of inanimate microorganisms and/or their components that confers a health benefit; effective postbiotics must contain inactivated microbial cells or cell components, and the panel explicitly placed purified microbial metabolites and vaccines outside the definition [15].

That exclusion clause is why this review does not call the β -1,3/1,6-glucan preparation in Table 1 a postbiotic. Soluble β -glucan (SBG) is extracted and purified from *S. cerevisiae* cell walls and separated from cellular biomass. It is a cell-wall component, which argues for inclusion, but it is also a substantially purified fraction, which argues against; the ISAPP definition has been contested on precisely this kind of boundary case [16], and the trial itself predates the 2021 definition by eight years and describes SBG as a macrophage-stimulating agent rather than a postbiotic [1]. Rather than resolve a live definitional dispute by assertion, we use the descriptive term yeast-derived β -glucan, or more generally *non-viable yeast-derived preparation*, throughout. Nothing in the argument below depends on which side of the postbiotic boundary SBG eventually falls. What matters clinically is that it is not alive.

The bidirectional gut–skin axis supplies the mechanistic frame. Resident cutaneous microbiota interacts with the gut microbiome through shared immune signalling, metabolite exchange and barrier regulation, and disruption of that balance has been implicated in delayed healing [17,18]. A review of probiotic mechanisms in tissue repair describes four routes: direct pathogen killing and competitive exclusion, reinforcement of the epithelial barrier, induction of fibroblast and epithelial migration, and immunomodulation via natural killer cells, macrophages and cytokines [19]. That same synthesis reports that a formulation containing **Saccharomyces boulardii** induced epidermal growth factor and its receptor, along with insulin-like growth factor activity [19] — one of the few mechanistic findings in this space attributable to a yeast rather than a bacterium, though it was observed in the gut rather than in a wound.

Non-viable preparations have attracted interest for the same reason they interest us here: they reach several of these mechanisms without the regulatory and safety complications of applying live organisms [20]. Cell-free lactobacilli lysates cleared intracellular *Staphylococcus aureus* from infected keratinocytes and ex vivo human skin while upregulating antimicrobial peptides and tight-junction proteins, work motivated explicitly by safety concerns about live organisms in vulnerable patients [21]. Probiotic organisms shape local and systemic immune responses more broadly [22]. Almost all of this, however, was generated with bacteria, principally lactobacilli. The yeast-specific picture is thinner, and as this review shows, it is shaped very differently depending on whether the agent is alive.

1.3 What This Review Adds

Four recent reviews cover adjacent ground. Two 2026 syntheses examined the wound microbiome as a whole: one the dual protective and pathogenic role of wound communities [18], the other gut–skin microbial interactions with an emphasis on mechanistic routes to future targets [17]. A 2025 review addressed postbiotics for skin wound healing across taxa, concluding that they accelerate closure, stimulate collagen synthesis and improve barrier integrity while avoiding the viability problems of live preparations [23]. A 2020 review catalogued topical probiotic studies in animals and humans, yeasts among them [24].

None of the four isolates yeasts as an intervention class, and none organises itself around the live-versus-non-viable distinction that this review finds to be the decisive one. Nor do they address the implementation questions that determine whether a nurse can act on any of this. That is the space we occupy: narrower than the microbiome reviews, and pointed at the bedside rather than at the bench.

1.4 Objective and Research Question

Under a Population–Concept–Context framework, this review asks: what is the nature and extent of the available evidence on probiotic yeasts and yeast-derived preparations (Concept), applied to wounds in humans, animals or laboratory models (Population), across clinical,

translational or laboratory settings (Context), and what follows for nursing practice? The review maps evidence rather than testing effect. It distinguishes live-organism from non-viable-derivative evidence throughout, and identifies the gaps that would need closing before either could inform practice.

2. METHODS

2.1 Protocol, Registration and Deviation

The Concept was registered as *probiotic yeast*, meaning live organisms. During screening we identified a randomised controlled trial of a purified yeast cell-wall β -glucan, and widened the Concept to include inactivated and yeast-derived preparations. The amendment was made after the relevant record had been seen, not before, and the title was changed accordingly. We judged the widening defensible because the clinically decisive variable turned out to be viability rather than organism, and because excluding the only human trial in the field would have produced a misleading map. Readers should nonetheless weigh the finding knowing the criteria moved to meet it.

2.2 Methodological Framework

We followed Joanna Briggs Institute scoping review methodology rather than Cochrane systematic review methodology, and reported against PRISMA-ScR [25]. A recent scoping review of wound-care mobile applications for nurses offers a close methodological precedent, using JBI methodology, searching MEDLINE, Embase, CINAHL, Web of Science and grey literature, and reporting via PRISMA-ScR [26]; its multi-database search is the standard Section 2.9 measures this review against.

2.3 Eligibility Criteria

Population. Human patients with wounds of any aetiology; animal models of cutaneous or soft-tissue wounding; in vitro or ex vivo wound, skin or biofilm models.

Concept. A probiotic yeast (live), an inactivated or lysed yeast preparation, or a yeast-derived cell-wall bioactive such as β -glucan, applied to the wound, the wound model, or its associated pathogen community. Bacterial probiotics were retained only where a study compared them directly against a yeast, or where a mechanistic finding was specific to a yeast; such sources are flagged as cross-taxa evidence and are not counted as yeast-specific.

Context. Any clinical, translational or laboratory setting, without geographic restriction. English-language sources only, which we report as a limitation.

Exclusion. Pathogenic rather than health-associated fungi. One record was excluded on this ground during screening.

2.4 Information Sources

Four databases were specified a priori: PubMed/MEDLINE, Scopus, Web of Science and CINAHL, the last of these mandatory given the nursing orientation of the review. A supplementary cross-publisher academic search was also run to identify mechanistic, definitional and safety literature; it is reported separately in Figure 1. Section 2.9 states the consequences plainly.

2.5 Search Strategy

The PubMed/MEDLINE search combined MeSH and free-text terms across three blocks: probiotic and yeast terms; wound and skin terms; and supporting mechanistic terms. Discrete logged queries included “probiotic yeast wound healing”, “yeast exopolysaccharide antimicrobial biofilm wound”, and a species-specific query for *Kluyveromyces marxianus* with wound terms. The supplementary search used three natural-language queries covering mechanisms of yeast action in wound repair, *Saccharomyces*-specific evidence in diabetic foot ulcer and burn models, and nurse-led implementation of microbiome-based wound interventions. The full, re-executable syntax with run dates is provided in Appendix A.

2.6 Selection of Sources of Evidence

Both authors screened all records independently at title and abstract, and again at full text, against the criteria in Section 2.3. Disagreements were resolved by discussion. The selection process is reported in **Figure 1**.

2.7 Data Charting and Data Items

A standardised form captured, for each retrieved source: study model; organism or agent, and whether viable; intervention and delivery format; comparators; outcomes; sample size; and stated limitations. **Table 1** presents the five sources charted from their full texts. **Table 1b** presents three further studies known to this review only through the evidence table of a cited secondary synthesis and not independently retrieved; they are reported separately, and marked as such, rather than being folded into Table 1 as though they had been charted from source.

2.8 Critical Appraisal

Consistent with JBI guidance for scoping reviews, formal critical appraisal was not used as an inclusion filter; methodological limitations are described alongside each source instead. We note that the journal's review guidance suggests the Cochrane risk-of-bias tool and GRADE. Both are built to grade certainty across a body of evidence answering a focused effectiveness question, and neither transfers cleanly to an evidence-mapping design whose finding is the shape of the literature rather than the size of an effect. We have therefore followed the JBI convention and state so explicitly rather than invoking a framework we did not apply.

2.9 Synthesis, and the Limits of This Search

Given the heterogeneity of designs, from materials characterisation to a randomised trial, synthesis is narrative. Meta-analysis would not be meaningful and was not attempted.

3. Results

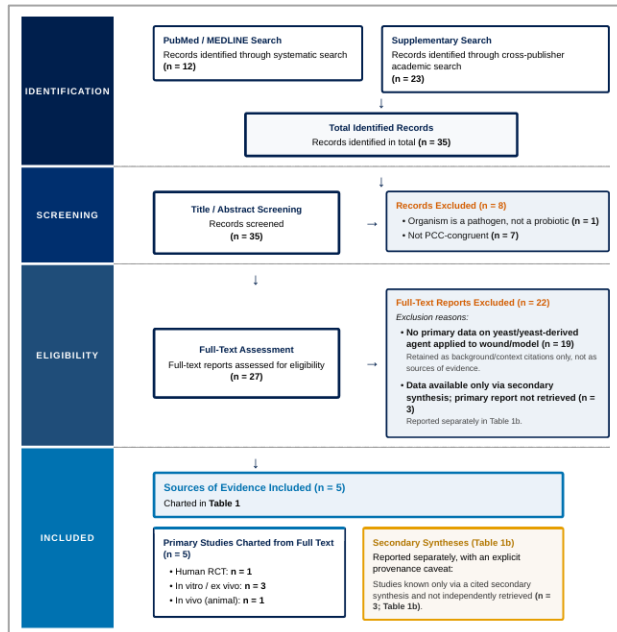
3.1 Selection of Sources of Evidence

The searches identified 35 records: 12 from PubMed/MEDLINE and 23 from the supplementary cross-publisher search. Eight were excluded at screening, one because the organism under study was a pathogen rather than a health-associated yeast, seven as not congruent with

the Population–Concept–Context criteria. Of the 27 full-text reports assessed, 22 were excluded as sources of evidence: 19 report no primary data on a yeast or yeast-derived agent applied to a wound, and are retained as background citations only; three report relevant data but only through a secondary synthesis, and appear in Table 1b. Five sources met the criteria and are charted in Table 1.

A species-specific search for *Kluyveromyces marxianus* with wound terms returned no PubMed-indexed results. Section 3.3 qualifies what that does and does not establish. Figure 1 shows the full cascade.

Figure 1
PRISMA flow diagram



3.2 Characteristics of the Included Sources

The five charted sources are summarised in Table 1. The strongest of them by design is a randomised, double-blind, placebo-controlled phase II trial in which topical soluble β -1,3/1,6-glucan, purified from *S. cerevisiae* cell walls,

was applied to diabetic foot and leg ulcers alongside conventional care [1]. Weekly percentage reduction in ulcer size favoured SBG at weeks 1–2, 3–4 and 5–6 ($p < 0.05$), and healing incidence at week 8 was 44% versus 17% ($p = 0.03$). The trial's own primary comparison, median time to complete healing, did not reach significance (36 versus 63 days, $p = 0.130$), and the proportion healed by week 12 favoured SBG without reaching significance (59% versus 37%, $p = 0.09$). It is a positive but modest trial, and it should be described as one. Mechanistic support for glucan-driven repair, including macrophage activation and accelerated re-epithelialisation, comes from work on *S. cerevisiae* cell-wall glucans rather than from wound-specific studies [6].

Figure 2 reproduces the trial's reported outcomes, significant and non-significant together, since the distinction between them carries most of the interpretive weight here.

Figure 2
Reported Outcomes of the Zykova et al, (2013)
Phase II Trial

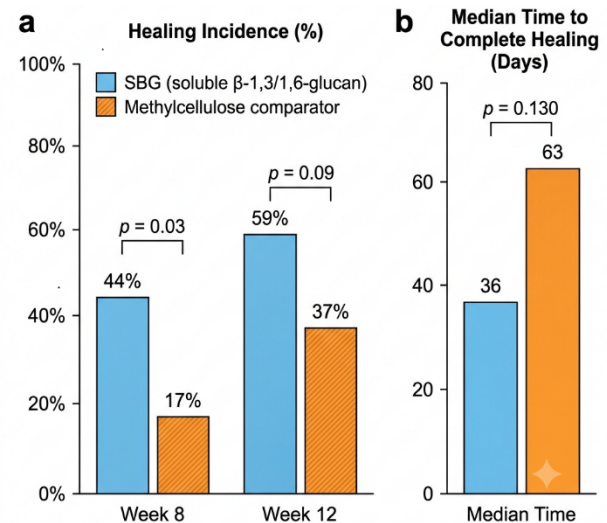


Table 1
Sources of evidence charted from the full text

Study	Model	Agent	Intervention	Key outcome(s)	Key limitation
Zykova et al., 2013 [1]	Human RCT; double-blind, placebo-controlled, phase II; n = 60; Wagner grade 1–2 diabetic foot and leg ulcers	Soluble β -1,3/1,6-glucan (SBG) extracted from <i>S. cerevisiae</i> — a purified, non-viable cell-wall fraction	Topical SBG versus methylcellulose comparator, three times weekly for up to 12 weeks, alongside conventional management	Greater weekly percentage reduction in ulcer size at weeks 1–2, 3–4 and 5–6 ($p < 0.05$); healing incidence 44% vs 17% at week 8 ($p = 0.03$); 59% vs 37% healed by week 12 ($p = 0.09$); median time to healing 36 vs 63 days ($p = 0.130$); well tolerated	Modest sample; the primary time-to-healing endpoint did not reach significance; SBG is a purified fraction rather than a live organism, so it speaks to the derivative pathway and not to live-yeast therapy
Tao et al., 2024 [2]	In vitro plus ex vivo human skin wound model	<i>Lactobacillus plantarum</i> — bacterial, included as a	ProGel, an injectable gelatin hydrogel entrapping the live organism	Retained >80% probiotic viability after entrapment and >70% after a week of storage; 7 log reduction in <i>P. aeruginosa</i> , 3–7 log in <i>S.</i>	Human tissue evidence is ex vivo only; the organism is bacterial, so the findings bear on

		cross-taxa comparator		<i>aureus</i> , 40–70% in <i>C. albicans</i> ; cytocompatible with human dermal fibroblasts	delivery format rather than on yeast
Cho et al., 2024 [3]	In vitro materials characterisation; no living wound model	<i>Saccharomyces cerevisiae</i> (SC), live	SC loaded onto electrospun polyvinylpyrrolidone/SiO ₂ composite nanofibre	Bead-free nanofibres of mean diameter 624.7 $\pm$ 99.6 nm; optimal SC:PVP:SiO ₂ :water:ethanol ratio 3:4:0.1:4.8:1.2; SC encapsulation confirmed by SEM	No biological or wound-healing testing was performed, so the study demonstrates delivery feasibility and nothing about therapeutic effect
Besser et al., 2019 [4]	In vitro human plasma biofilm model (hpBIOM); n = 4 donors	<i>S. cerevisiae</i> , with <i>L. plantarum</i> and <i>B. lactis</i> as comparators, against five wound pathogens	Topical application onto an established biofilm	<i>S. cerevisiae</i> produced a modest reduction against two bacterial pathogens but <i>*no measurable antifungal effect against C. albicans*</i> ; <i>L. plantarum*</i> was the most effective organism tested	Donor-to-donor variability was marked; an in vitro model rather than living tissue
Oryan et al., 2018 [5]	In vivo rat burn model; n = 30	<i>S. cerevisiae</i> , live, 10 ⁷ CFU/mL, with a collagen hydrogel scaffold	Compared against silver sulfadiazine and against untreated wounds, dosed every five days over 22 days	The SC-plus-collagen-scaffold arm performed best: higher collagen content, improved mechanical strength, less scarring, comparable to the positive control	The only live-yeast in vivo study identified; animal rather than human, with small subgroups, and yeast and scaffold cannot be disentangled

3.3 Synthesis

3.3.1 In vitro and materials evidence. Live *S. cerevisiae* can be carried in candidate wound dressings. It survives electrospinning into a PVP/SiO₂ nanofibre at a defined formulation ratio, though that study tested no biological endpoint at all and demonstrates feasibility rather than benefit [3]. Cross-taxa work on an injectable hydrogel shows the same for a bacterial organism, with antimicrobial and cytocompatibility data attached [2]. Where *S. cerevisiae* itself was tested against wound pathogens, the picture is mixed and instructive: a modest reduction against two bacteria, and no measurable effect against *C. albicans*, in the one study that tested this directly [4]. Given that *Candida* is a recognised wound and biofilm pathogen, and given the interkingdom biofilms Kalan and colleagues described [13], that null result is not a footnote.

3.3.2 In vivo evidence. One study. Oryan and colleagues applied live *S. cerevisiae* with a collagen hydrogel scaffold to rat burn wounds and reported collagen content, mechanical strength and scarring comparable to silver sulfadiazine [5]. It is the strongest evidence for a biological rather than merely material effect of a live yeast, and it has not been independently replicated. The design also cannot separate the yeast from the scaffold.

3.3.3 Human evidence. No controlled human trial of a live probiotic yeast in chronic wound care was identified. The

only human-tissue data point uses an ex vivo model and a bacterial organism [2], and the only human trial uses a non-viable derivative [1]. Subject to the caveat in Section 2.9, this absence is the review's principal finding.

3.4 Evidence Identified Through a Secondary Synthesis

A 2020 review of topical probiotics tabulates several further animal studies involving yeast-containing kefir preparations [24]. Three bear directly on this review and are presented in Table 1b, with the caveat that they are known to us only through that review's evidence table and have not been retrieved. Two carry real weight. One kefir preparation used in a rodent wound model contained **K. marxianus alongside five other organisms, which refines what this review can claim about that species: not that it is absent from the wound-healing literature, but that no PubMed-indexed study uses it as a named, standalone study organism, its only documented appearance being as one component of a multi-species consortium, reported at second hand. A consortium containing a species is not evidence about the species. Separately, a single-dose live S. boulardii* study reported no improvement in healing or in the wound microbiome a null result that tempers any enthusiasm for live-yeast monotherapy.*

Table 1b

Yeast-containing wound studies identified through a cited secondary synthesis, not independently retrieved

Study (as tabulated)	Model	Yeast-containing agent	Finding, as reported	Provenance
Rodrigues et al., 2005	Animal; punch wound	Kefir containing <i>Leuconostoc</i> spp., <i>Lactobacillus lactis</i> , <i>Acetobacter</i> spp., <i>*S. cerevisiae</i> , <i>Kluyveromyces marxianus</i> and <i>K. lactis</i>	Improved wound healing by size and histology, with better granulation and neovascularisation	Known to this review only through the evidence table of Knackstedt et al. 2020; not independently retrieved or verified against the primary report

Huseini et al., 2012	Animal; burn	Kefir-grain extract at several fermentation timepoints; yeast-containing	Healing improved with longer fermentation, and all extract arms outperformed silver sulfadiazine	As above; not independently retrieved
Partlow et al., 2016	Animal; wound	<i>S. boulardii</i> , live, single 5 billion CFU dose	No improvement in healing or in the wound microbiome — a null result for a live yeast probiotic used alone	As above; not independently retrieved

Wider literature situates these findings. *S. cerevisiae* has been studied in animal models of acute, thermal and diabetic wounds with mixed results, while topical *L. plantarum* reduced bacterial load in burn patients comparably to silver sulfadiazine [27], the same comparator used in the one live-yeast in vivo study [5]. Clinical trials of topical probiotics remain rare outside

atopic dermatitis, and those that exist use bacteria rather than yeasts [28,29]. Bacterial probiotics show clearer inflammatory-modulation benefits in diabetic wound models [30], and microbiota contribute to tissue repair across organ systems [31]. The yeast-specific gap, in other words, is not an artefact of how we searched. It is a real asymmetry in what has been studied.

3.5 Evidence and Gap Map

Table 2

Evidence and gap map, by domain and study type

Domain	In vitro / material	In vivo (animal)	Human clinical
Antibacterial activity, live yeast	Modest effect on two pathogens [4]	Not separable from the scaffold co-intervention [5]	None identified
Antifungal / anti- <i>Candida</i> activity, live yeast	Evidence of no effect [4]	None identified	None identified
Delivery-platform feasibility	Demonstrated; materials only [3]	Not tested	None identified
Tissue-level healing and biomechanics, live yeast	None identified	One study [5]	None identified
Yeast-derived β-glucan (non-viable cell-wall fraction)	No yeast- β -glucan-specific in vitro study identified in this search; mechanistic support is indirect, from work on <i>S. cerevisiae</i> cell-wall glucans [6]	None identified	Phase II RCT, diabetic foot ulcer, n = 60 [1]
Systemic safety / translocation risk, live yeast	Not assessed in the wound literature	Not assessed in the wound literature	Documented in enteral and critical-care populations [7,8,9], and reported specifically in critically ill burn patients [10]
<i>Kluyveromyces marxianus</i> , species-specific	No PubMed-indexed study identified	Appears only as one of six organisms in a multi-species kefir preparation, reported via a secondary synthesis (Table 1b)	None identified

Figure 3

Gut-skin axis mechanism model in the context of probiotic yeast

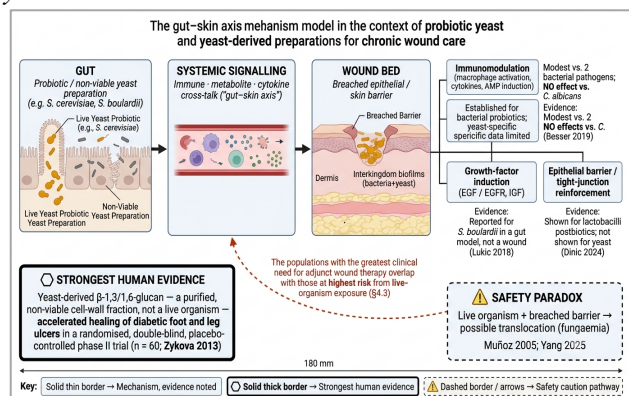


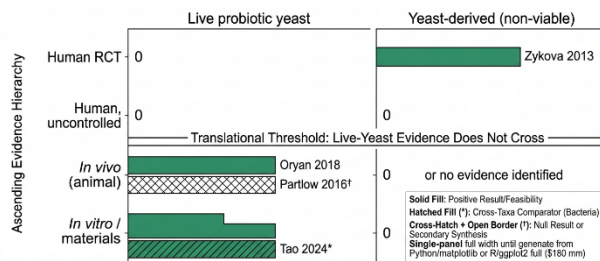
Figure 3 Proposed gut-skin axis mechanism underlying the potential role of probiotic yeasts and yeast-derived preparations in chronic wound healing. Oral administration of live probiotic yeasts or non-viable yeast-derived products (e.g., *Saccharomyces cerevisiae* and *Saccharomyces boulardii*) may influence wound repair through systemic immune-metabolic signaling, including modulation of cytokine networks, immune cell activity, and microbial metabolites. These systemic effects may contribute to immunomodulation, growth factor induction, and improved epithelial barrier function at the wound site, although direct evidence for yeast-specific effects remains limited. Current evidence suggests modest activity against selected bacterial pathogens but no demonstrated efficacy against *Candida albicans*. Among yeast-derived interventions, purified β -1,3/1,6-glucan has the strongest

clinical evidence, having accelerated healing of diabetic foot and leg ulcers in a randomized, double-blind, placebo-controlled phase II trial. The figure also highlights a key safety consideration: in patients with disrupted epithelial barriers, administration of live yeasts may increase the risk of microbial translocation and fungemia, emphasizing the potential advantages of non-viable yeast-derived products for wound management while underscoring the need for further clinical studies to establish efficacy and safety.

The asymmetry that Table 2 records is easier to see than to read. Figure 4 plots the same evidence against the conventional hierarchy of study designs, separating live organisms from yeast-derived preparations. The live-yeast column stops at the animal tier and contains one null result; the derived column is empty at every tier except the highest.

Figure 4

Evidence distribution by study design and agent viability



* Tao 2024 tested a bacterial organism; included as a cross-taxa comparator.
 † Partlow 2016: null result and secondary synthesis (Table 1b).
 Counts reflect the interim, one-database search described in Section 2.9 and will change once the full four-database search is executed.

4. DISCUSSION

4.1 Principal Findings

The evidence divides along one axis, and it is not the axis this literature usually uses. Live probiotic yeasts have three in vitro studies, one unreplicated animal study, a null animal result reported at second hand, and no human trial. A purified, non-viable yeast cell-wall β -glucan has a positive, if modest, randomised controlled trial in diabetic foot ulcers. Where a live yeast was tested head-to-head against bacterial probiotics it did not outperform them, and it showed no antifungal activity against *Candida*. Only one yeast species has been studied at all.

4.2 Relation to Existing Reviews

This review is narrower than the 2026 microbiome syntheses [18,17] and differently organised from the 2025 postbiotics review [23] and the 2020 topical-probiotics review [24], which address non-viable preparations and yeasts respectively without making viability the organising question. Our contribution is that separation, and the safety argument that follows from it.

4.3 A Translational Paradox

Live *Saccharomyces* probiotics carry a documented, if uncommon, risk of fungaemia. Genetic fingerprinting has matched probiotic *S. boulardii* strains to blood-culture isolates in patients who went on to develop fungaemia, typically those with central venous catheters, enteral or parenteral nutrition, or intensive-care admission [7,8]; fungaemia has also followed enteral administration in a patient without overt immunocompromise [9]. This is not

confined to the gastrointestinal literature from which it was first described. A 2025 review of skin microbiota in burn wound healing documents probiotic sepsis from *Saccharomyces* fungaemia in critically ill burn patients [10] the same clinical setting as the only live-yeast in vivo study in this review [5].

Any live-organism preparation applied to a wound is, by definition, applied where the epithelial barrier has already failed. The populations with the greatest need for adjunct wound therapy, being older, diabetic, or critically ill, are substantially the populations the safety literature identifies as most at risk from live-organism exposure. We state this as a reasoned concern rather than a demonstrated wound-specific risk: none of the five charted sources tested for translocation, and the fungaemia literature arose in a different exposure route. It is hypothesis-generating. It is also the first question any infection specialist will ask.

Two independent lines converge on the same place. The safety literature points away from live organisms in exactly this population; and the evidence base itself, assembled without reference to that literature, has its only human trial in a non-viable preparation. Work developing bacterial-derived non-viable preparations for skin wounds cites the instability and safety limitations of live strains as its motivation [32], so this is a live concern across probiotic dermatology and not a peculiarity of yeasts. Reassurance about live yeasts taken orally does not transfer to a wound bed. The route of exposure is different, and it is the route that matters.

4.4 Implications for Nursing Practice

Nothing here supports the routine use of live probiotic-yeast wound products. The β -glucan trial offers cautious, trial-supported grounds for interest in one specific non-viable preparation in diabetic foot ulcers, and nothing more. The practical skill this review asks of nurses is a single question: is the product alive? Marketing language rarely makes the distinction, the two evidence bases are not interchangeable, and the safety profiles differ. Beyond that, structured, protocol-driven, nurse-delivered care remains where the evidence actually is: thermography-guided preventive foot-care protocols [33], co-designed self-care and empowerment programmes for diabetic foot ulcers [34], and the broader body of non-pharmacological nursing interventions synthesised in network meta-analysis [35]. These should stay the priority. Should controlled trials of a yeast-derived preparation emerge, nurses are the people positioned to run pragmatic evaluation and adverse-event monitoring, given their continuity of contact with the wound. There is also a wider frame worth noting: a proposed microbiome–skin–brain axis suggests such interventions may carry mental-health relevance for patients with chronic wounds [36], which is again something nurses are placed to observe.

4.5 Limitations

Design heterogeneity precluded quantitative synthesis. Three studies in Table 1b were not retrieved from source and are reported as such. The search was restricted to English. The burn-specific fungaemia citation in Section 4.3, though directly on point, came from the

supplementary rather than the systematic search. The prevalence estimate anchoring Section 1.1 is ITS-amplicon-derived and carries that method's known biases. And the eligibility criteria were widened after the Zykova record was seen, as Section 2.1 discloses.

4.6 Research Agenda

Five priorities, in order. First, complete the four-database search; no count or absence claim in this review is final until that is done, and the Table 1b studies should be retrieved and verified at the same time. Second, test yeast species other than *S. cerevisiae*, *K. marxianus* among them, since the current evidence base is effectively a single-species literature. Third, replicate and extend the β -glucan finding, in other wound types and against active comparators, since it is both the best-evidenced and the lowest-risk route available. Fourth, any live-organism protocol should assess translocation risk in vulnerable populations before human exposure, informed by the burn-specific signal in Section 4.3. Fifth, plan the nurse-led implementation and pragmatic evaluation work for the

non-viable pathway now, because that is the pathway the evidence currently favours.

5. CONCLUSION

Live probiotic yeasts in chronic wound care remain a preclinical proposition: one species, one unreplicated animal study, one null result, no human trial, and no demonstrated advantage over bacterial probiotics. A purified non-viable yeast β -glucan, by contrast, has a modest positive randomised trial in diabetic foot ulcers and carries no translocation risk, in a population where translocation risk is precisely the concern. This review maps that asymmetry so that practice is not outpaced by product claims, and so that translational work starts from the pathway the evidence already favours. For the clinician, the practical residue is short. When a probiotic-yeast product is proposed for a wound, ask first whether it is alive. On current evidence, that single question separates what has been tested from what has not.

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