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The construct problem in recurrent localized back heat

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Abstract

Recurrent localized back heat or burning sounds like one observation, yet spontaneous sensation, skin-surface temperature, evoked thermoception, and conditional safety assessment are distinct evidence objects. This critical synthesis crosses indirect evidence on pain language, sensory testing, thermography, dorsal sensory syndromes, and two selected UK guidelines. No reviewed source establishes a default cause or diagnosis. A useful next study must preserve participants' wording, location, depth, boundary, and timing, then link each episode to concurrent measurements.

Keywords: localized heat sensation · burning sensation · construct validity · thermoception · thermography

A sensation becomes several variables

A recurrent sensation described as heat or burning in the back can sound like one observation. It is not. At minimum, the phrase can point to a spontaneous felt sensation or an itch- or pain-associated descriptor, a measured temperature at the skin surface, a response to an externally applied thermal stimulus, or a safety context defined by other findings. These are different evidence objects. Joining them under one label would make an apparent explanation possible before the underlying observation has been specified. ^[1, 2, 3, 4]

The first object is what a person feels without an investigator applying a stimulus: its exact quality, location, perceived depth, boundary, timing, and context. The second is a surface measurement, which still requires a region, baseline, comparison, environment, device, and time point. The third is

evoked thermoception: what happens when a controlled warm, cold, or painful stimulus is applied at a defined site and compared with a reference. The fourth is not another kind of heat measurement. It is the conditional safety setting in which population, tempo, anatomical distribution, associated neurological or functional findings, and other specified contexts determine whether a pathway applies. ^[1, 2, 3, 4]

No direct bridge follows between these objects. A normal surface measurement would not invalidate a felt sensation; an unusual surface measurement would not identify its cause. An evoked threshold cannot stand in for an unprovoked episode, and a thermal adjective alone cannot replace the constellation used by a safety guideline. The useful question is therefore not simply what ‘back heat’ means, but which observation was made, under what comparison, and what inference that observation can support. ^[1, 2, 3, 4]

What burning and warmth records do—and do not—show

Some indirect evidence comes from notalgia paraesthetica, an itch-defined upper-back condition rather than a cohort recruited for recurrent isolated back heat. In one 45-person series, burning was the recorded pain characteristic for 22 participants, but the article did not report whether the wording was volunteered or offered, whether multiple qualities could be chosen, or whether warmth was asked separately. In another 65-person cohort, pruritus quality was available for only 40 German participants and was missing for all 25 Brazilian participants; two of the 40 assessed German records included warmth and 19 included burning, with overlapping mixed-quality categories and unreported prompting and translation procedures. In that selected, incompletely assessed cohort, warmth was recorded in fewer assessed records than burning. This cohort-bound comparison does not establish descriptor frequency beyond those records. These observations show that both burning and a warmth label can be recorded inside an itch-defined dorsal phenotype. They do not estimate the frequency of localized back heat or establish that warmth and burning are the same sensation. ^[5, 6]

A comparative questionnaire study adds another boundary. Burning was recorded for 9 of 27 assessed notalgia participants, while all 29 participants had upper-back involvement and some had additional lower-back involvement. The instrument was named, but its exact prompt, response options, language handling, coding, and missing-data process were not reproduced. Bed warmth was also recorded as a trigger for 4 of 26 assessed participants. A warm external context is not equivalent to a spontaneous feeling of warmth at the symptomatic site. ^[7]

Nor does the word burning by itself settle mechanism. An English-language systematic review of sensory descriptors in low-back pain found conflicting results for hot, burning, or cold wording: four included studies reported discrimination between neuropathic and nociceptive classifications, two did not, and one was positive for hot but not cold pain. The review separated these pain-quality items from questions about pain evoked by thermal stimuli and concluded that the evidence was insufficient to support or refute sensory descriptors as identifiers of neuropathic low-back pain. Its populations and reference classifications are indirect for the present question, but the conflict is useful counterevidence against turning one adjective into a neuropathic label. ^[1]

Measured warmth is comparison-dependent

A skin-surface temperature value is not self-interpreting. It depends on the anatomical region, baseline and comparator, room conditions, preparation, device and analysis, and the time of measurement. One back-thermography pilot illustrates the problem under controlled laboratory conditions: participants acclimatized in a specified environment before a deliberate unilateral trunk-fatigue exercise, and thermograms were obtained before exercise, 10 minutes afterward, and about 24 hours later. This is an experimentally provoked surface measurement, not an observation of a spontaneous episode of warmth or burning. ^[2]

At the 10-minute measurement, all four reported back-region means were cooler than baseline. Yet the exercised side was relatively warmer than the non-exercised side: 0.54 degrees Celsius in the upper region and 0.32 degrees Celsius in the lower region when calculated from the reported group means. No side asymmetry was reported before exercise or at the approximately 24-hour follow-up. Thus, the same observation can be described as a bilateral absolute fall from baseline and a transient relative side difference. Reporting only that one side was ‘warmer’ would erase the reference against which warmth was defined. ^[2]

The study collected general fatigue and delayed soreness rather than localized warmth or burning, did not report participant-level or region-level symptom-temperature associations, and did not image the reported 48-hour soreness peak. Its measurements therefore cannot establish concordance or discordance between the target sensation and skin temperature. Infrared surface temperature also does not reveal perceived depth or deep-tissue temperature. A group side difference after exercise is neither a thermographic diagnosis nor an individual abnormality threshold. ^[2]

Evoked thermoception is another experiment

Quantitative sensory testing asks how a person responds when controlled stimuli are applied. Its result is therefore indexed to the tested site, modality, protocol, comparator, and reference sample. Abstract-level trunk reference work in 162 healthy participants reported site-dependent sensitivity relative to hand and foot, effects of age on most parameters, and different implications for absolute and relative reference strategies. A separate abstract-level map of 42 young healthy participants across 11 regions reported differences by region, modality, sex, and variability, with warmth-detection thresholds more variable than cold-detection thresholds. These records argue against importing a single limb or torso value into a focal back observation. They do not supply a diagnostic cutoff for spontaneous back heat. ^[8, 9]

The distinction remains visible in a 15-person pilot of dermatologist-diagnosed unilateral subscapular itch. Standardized QST was applied at the participant-rated itchiest area and the mirrored contralateral site, with a separate comparison against published age-, sex-, and trunk-site-matched reference data. The symptomatic and mirror sites did not differ on the reported sensory measures apart from higher mechanically evoked itch at the symptomatic site. Several deviations from the external reference data

were bilateral. This null site comparison does not prove equivalence or exclude unmeasured physiology, but it is counterevidence to assuming that a symptomatic back site must carry a localized thermal QST abnormality. ^[3]

Paradoxical heat is also not spontaneous heat. In the same pilot, paradoxical heat sensations were recorded on at least one trial at both symptomatic and contralateral sites, but one contralateral response was footnoted as technically not paradoxical heat and no corrected cell was supplied. The linked supplement containing the exact stimulus sequence, trial count, response rule, and scoring was not lawfully acquired in this workflow. Those procedural details and any recalculated count therefore remain unavailable, and the result cannot be used as a proxy for an unprovoked episode. ^[3]

Group-level associations give a further caution. An abstract-only systematic review reported overall pooled pain-threshold correlations of -0.15 with pain intensity and -0.16 with disability; no thermal-specific pooled estimate was verified. The abstract did not report evidence that those relationships varied across the named testing-site, spinal-region, pain-duration, or mechanical-versus-thermal categories. Sparse results for thermal temporal summation and pain tolerance were based on only a few studies. The unavailable full text prevents verification of thermal subgroup definitions, counts, estimates, heterogeneity, and study-level methods. Together with the pilot's null site comparison and a separate review's null thermal-discrimination findings, this evidence does not establish QST as an individual predictor of spontaneous back heat, pain, disability, mechanism, safety, or treatment response. ^[10, 1]

Safety belongs to constellations, not adjectives

The two verified safety sources are selected, question-relevant UK boundaries, not an exhaustive safety assessment, diagnostic rule, Korean pathway, or patient-facing triage tool. NICE NG127 and NG234 are clinical pathways for different populations and decisions, not evidence that a thermal adjective is itself a red flag. NG127 addresses recognition and referral for suspected neurological conditions; NG234 addresses spinal metastases and metastatic spinal cord compression in cancer-related contexts. Their recommendations become relevant through combinations of population, tempo, distribution, pain pattern, neurological or functional findings, and context. Combining their words into one generic checklist would discard the conditions under which each recommendation was made. ^[4, 11]

Within NG127's adult pathway, immediate neurological assessment is attached to rapidly progressive symmetrical numbness over hours to days when weakness or imbalance is also present. A separate cauda-equina recommendation attaches immediate assessment to severe low-back pain radiating into a leg together with newly disturbed bladder, bowel, or sexual function, or new perineal numbness. Stable adult cervical or lumbar radiculopathy follows another pathway, qualified by duration, uncontrolled pain, disability, and specified neurological or functional exceptions; these rules do not label recurrent back heat as radiculopathy or make six weeks a universal waiting period. In NG127, "immediate" means specialist assessment within hours or sooner if needed, but that definition belongs to this guideline. Its adult sensory recommendations are committee consensus boundaries: NICE reports that the reviewed evidence yielded nothing capable of supporting those recommendations directly. ^[4]

NG234 keeps oncology context explicit. For a person with a past or current cancer diagnosis, a listed symptom or sign of cord compression triggers immediate contact with the MSCC coordinator and treatment as an oncological emergency. A listed pain characteristic suggesting spinal metastases without a cord-compression sign instead leads to MSCC-coordinator advice within 24 hours. For someone without a past or current cancer diagnosis, urgent oncology assessment is tied to both independent suspicion of cancer and a listed pain characteristic. The recognition frame names severe unremitting or progressive pain, mechanical or strain-aggravated pain, sleep-disturbing nocturnal pain, localised tenderness, exertional leg claudication, and specified neurological or functional findings; it does not authorize inferring cancer suspicion from warmth or burning alone. These are distinct UK service pathways, including an MSCC-coordinator role, not a Korean implementation rule. ^[11]

NG234's recognition rationale draws on comparative and undiagnosed-cancer symptom evidence together with committee experience, but the recommendation PDF supplies no diagnostic-accuracy estimate for back heat or for any single listed factor. Targeted searches of both guideline PDFs found no back-heat, localized-warmth, burning, skin-temperature, or temperature criterion. That source-specific silence shows only that these guidelines do not establish isolated recurrent localized back heat as their redirect criterion. It neither reassures, excludes neurological or malignant disease, nor establishes that a thermal complaint could never accompany another clinically relevant constellation. ^[4, 11]

The study that has not yet been done

Within the frozen searches, eligibility rules, access states, retrieval date, and verified Tier 1 set used for this synthesis, no source prospectively enrolled people because of recurrent localized back heat and observed a spontaneous episode with all of the following linked at participant level: mapped wording and perceived depth, visible or palpable skin findings, concurrent surface temperature, evoked thermoception, clinically relevant associated findings, and episode context. The same bounded record yielded no direct spontaneous subjective-objective comparison, participant-level characterization of warmth in the target phenotype, or diagnostic-accuracy study. This is a source- and method-bounded negative yield, not evidence that such episodes are rare, benign, objectively concordant, objectively discordant, or absent from research outside the frozen routes.

A future interpretable observation should begin with the participant's report rather than translating it into a presumed construct. Prospectively record a participant-drawn back map, boundary, level, laterality, area, and perceived depth, together with the exact Korean or English quality words used. Record onset, duration, recurrence, and the timing of the observation within an episode. Posture, movement, clothing, ambient conditions, exertion, sleep, touch, itch, pain, and perceived relief should remain separate fields, with uncertainty, non-observation, and missingness explicit. This is a proposed minimum description set, not a validated questionnaire.

If surface temperature is studied, the measurement should be concurrent with the mapped report and document the method, anatomical match, ambient conditions, acclimation, timing, and prespecified comparisons. Absolute temperature, change from a within-person baseline, contralateral difference,

and difference from a defined reference region answer different questions and should not be substituted for one another. Repeated within-person observations would help separate a stable regional difference from an episode-linked change. Touch assessment and instrument measurement should also remain distinct. A normal surface measurement cannot invalidate a felt sensation, and an abnormal one cannot identify a mechanism or measure deep temperature.

Spontaneous sensation, evoked quantitative sensory testing, objective surface temperature, and whole-body thermoregulation should therefore be stored as separate variables even when collected together. Visible skin findings, musculoskeletal or positional context, systemic or referred symptoms, sleep and functional effects, and sensory, motor, autonomic, cancer-context, or other safety variables should be recorded only to the extent appropriate to the research setting and observation. The resulting field set is a prospective design proposal derived from current gaps. It is not a completed protocol, diagnostic work-up, clinical instruction, referral rule, or instrument with established reliability, validity, thresholds, or Korean implementation properties.

What remains unresolved

The four observation lanes developed here are not a ranked differential and do not exhaust the serious rival framings. The frozen Tier 1 set did not directly adjudicate dermatological or inflammatory change; musculoskeletal, positional, or referred sensation; or broader systemic, autonomic, vascular, trauma, cardiopulmonary, and thermoregulatory contexts. Their absence from a standalone synthesis is an evidence gap, not evidence against them. The indirect dysesthesia literature also leaves competing peripheral, spinal, mixed, and non-neurological interpretations unresolved. No framing has been selected as the default cause.

Within the represented indirect dysesthesia lane, weak anatomical concordance and null or inconsistent local paired nerve-fibre findings also resist a single preferred explanation. They do not establish a lesion, exclude an unmeasured process, or resolve peripheral, spinal, mixed, or non-neurological interpretations.

Several source boundaries narrow what can be said even within the represented lanes. The supplement to PMID 38835743 was not lawfully acquired, so its exact paradoxical-heat procedure and scoring remain unsupported. PMIDs 32086681, 24525274, and 23711482 remain abstract-only; PMID 33077130 remains a journal abstract with a probable precursor that has no established formal version relationship. In the full text for PMID 28902951, MRI, biopsy, and diabetes denominators or counts conflict or remain incompletely paired and must not be silently reconciled. These are reporting and access limits, not missing values that prose can repair.

The language boundary is equally consequential. The bounded contemporary Korean searches found no direct study of the target phenotype and did not establish a validated Korean symptom vocabulary; repository polysemy and script normalization also showed why 배열 cannot be treated as 背熱. The historical search retained one edition-identified measurement or touch-proxy lead, but its base image, variants, transcription, translation, and contextual meaning remain unverified. Korean expressions

such as 열감 or 화끈거리다, English warmth or burning, and Literary Sinitic 背熱 therefore cannot be collapsed into a cross-language or cross-era construct. Public language and historical discovery remain discovery material, not prevalence, diagnosis, or modern clinical validation.

This paper should be redesigned rather than merely expanded if direct prospective participant-level observations link spontaneous episodes with mapped language, skin and surface-temperature findings, evoked testing, and context; if evidence supports prevalence, diagnostic accuracy, prognosis, or an intervention effect; or if lawful full text materially changes a claim or method. A verified Korean construct map, a passage-verified historical argument, a qualified Korean safety pathway, or direct evidence from an omitted rival lane would require a linked or split object and renewed review. If completion seems to require a generic red-flag list, ranked differential, causal conclusion, reassurance, or patient-specific instruction, that is itself a signal that this concept-and-method form has exceeded its evidence.

Declarations

Author contributions (CRediT)

Yeonseung Choe: Conceptualization, Methodology, Clinical framing, Research-system design · Baekrokdam Research Commons (BRC): Investigation, Data curation, Writing – original draft, Evidence verification

Data availability

Only public literature was used. The evidence ledger linking citations to passages, permitted claims, and prohibited inferences is downloadable with this article.

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Ethics

This public-literature work contains no individual patient data. Any human-participant implementation of the protocol requires separate ethics review and consent.

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