

Index glycémique et repas composés

Comprendre les estimations,
leurs usages et leurs limites.

**Une estimation descriptive
n'est pas une prévision de glycémie.**

Index glycémique des aliments, charge glycémique des portions et contexte des repas mixtes : revue critique ciblée et propositions de conception pour Nutrikom.

Rapport scientifique v1.0 · 12 octobre 2026

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Synthèse en français · dossier scientifique en anglais

Propulsé par MedLab

L'essentiel

Ce que cette recherche permet de retenir

01 Des mesures à distinguer

L'index glycémique mesuré d'un aliment, celui d'une recette testée et l'estimation calculée à partir des ingrédients ne sont pas interchangeables. La charge glycémique tient aussi compte des glucides disponibles dans la portion. [1-5, 10-14]

02 Un descripteur, pas une réponse personnelle

Ces nombres ne prédisent ni votre courbe de glycémie, ni un pic, ni vos besoins en insuline. Les résultats concernant des habitudes alimentaires ne valident pas une prédiction pour un repas individuel. [10-14, 20, 22-29]

03 Des conditions avant tout affichage

Une estimation nécessite des sources traçables, un aliment et une préparation correctement appariés, des glucides disponibles compatibles et une couverture explicite. Si ces données manquent, un chiffre pour le repas complet doit être suspendu. [1-9 ; dossier 14-18]

04 Une proposition de recherche pour Nutrikom

Le rapport retient une dimension éducative indépendante à étudier. Les règles d'admission et l'interface proposées restent à qualifier ; l'intégration à un score global, la prédiction personnelle et les actions thérapeutiques sont différées. [Dossier 19-25, 28]

Portée et méthode

Revue critique ciblée, non exhaustive. Certaines sources ne sont accessibles que partiellement. Aucun essai clinique Nutrikom, calcul de repas réel ou test logiciel n'a été réalisé pour ce rapport. Cette synthèse ne constitue pas une recommandation personnelle.

Parcourir le rapport

Le dossier scientifique conserve sa pagination de référence : 01 à 32.
Les renvois internes désignent cette pagination, affichée en pied de page.

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Édition publique

Cette édition ajoute une synthèse française et une navigation au dossier v1.0. Le fond scientifique, les références et les réserves sont conservés. La recherche documentaire n'a pas été actualisée lors de cette mise en page.

Glycemic index, glycemic load and mixed-meal context

A descriptive estimate is not a glucose forecast

Question ID: GLY01

Date: 12 October 2026 (Pacific/Fiji) | **Version:** 1.0

Scope: generally healthy adults; adults with prediabetes, type 1 diabetes or type 2 diabetes. One entered mixed meal.

Disposition: ADOPT FOR DESIGN, with conditional numerical display. Retain glycemic context as an independent educational dimension. Food GI can be reported from an admissible, well-matched human measurement. Ingredient-weighted meal GI and meal GL can be displayed only as explicitly calculated descriptors, after source, carbohydrate, matching and coverage checks. They are not validated personal glucose or insulin predictions.

Decision	Contract
Retain descriptively	Food GI: source-specific human test result. Meal GI estimate: a carbohydrate-weighted index. Meal GL estimate: that index scaled to the entered available-carbohydrate amount.
Investigate / qualify	Consumer understanding of estimated mixed-meal values, matching quality, recipe coverage and supported input ranges. The proposed admission rules are conservative product rules, not established clinical cutoffs.
Abstain when necessary	No full meal number when positive-carbohydrate foods lack admissible GI values, available-carbohydrate amounts are unknown, or food/preparation matching is materially unresolved.
Defer	A GI/GL contribution to a global Nutrikom Score; personal glucose curves, insulin needs, medication advice, spike prevention and clinical meal suitability judgments.

Why the distinction matters: favorable trials of low-GI/GL dietary patterns do not validate a single-meal prediction. Mixed-meal validation studies disagree in magnitude and applicability, and newer type 1 diabetes evidence does not justify importing a pooled, mostly type 2 diabetes benefit. [10-14, 23-29]

This is a targeted critical evidence review and a proposed implementation contract. No Nutrikom clinical validation, live meal calculation, software test or clinical trial was performed.

Seven objects that must not be conflated

Object	Meaning and boundary
Food GI	Group-average relative incremental glucose response to a standardized amount of available carbohydrate in a tested food, versus a reference. Usually reported on glucose = 100. It is not a person's peak glucose.
Directly measured meal GI	The whole, specified recipe is tested using an appropriate equal-carbohydrate reference protocol. It applies to that tested food configuration; a different recipe is not the same measurement.
Ingredient-weighted estimated meal GI	An arithmetic weighted mean of ingredient GI values, weighted by their available carbohydrate. It does not measure the assembled meal or encode all interactions.
Food or meal GL	GI multiplied by the available carbohydrate in the consumed portion, divided by 100. Specify whether the underlying GI was measured for the food/whole meal or calculated from ingredients.
Dietary GI	A carbohydrate-weighted mean across a specified set of recorded foods, days or a dietary instrument. An unweighted mean of meal GIs is wrong. One recorded day is not usual dietary GI.
Dietary GL	Sum of portion GL values for the explicitly observed period. A multi-day average describes those sampled days; habitual exposure requires an appropriate sampling and assessment design.
Actual postprandial response	A time series or defined endpoint measured in a person under particular conditions: glucose concentration, incremental AUC, peak, time to peak, insulin, or CGM outcomes. None is numerically interchangeable with GI or GL.

The historical GI method, subsequent standardization, and calculated dietary descriptors answer different questions. [1-3, 5, 8, 10-12] A high-quality ingredient table cannot, by itself, validate a personal response model.

Boundaries carried forward

DAY01: one meal is not a day or usual diet. REC01: intake confirmation, composition coverage and sampling representativeness remain separate. REF01: reference comparisons are descriptive. MEAL01: composition is not physiology. IDX01 / NKS01: the global score remains experimental. The present review adds a GI-specific contract; it does not validate the ledger or the Nutrikom Index.

Reproducible search and appraisal approach

Search conducted: 11 October 2026 UTC / 12 October 2026 Pacific/Fiji. Targeted searches covered PubMed/PMC-indexed records, original journal pages, ISO, FAO, EUR-Lex and university sources. This was not a complete MEDLINE/Embase export, a preregistered systematic review or duplicate independent screening.

Route	Queries used or query families
Exact queries	“glycemic index calculated mixed meals measured glycemic load validation healthy adults”; “low glycemic index glycemic load diet prediabetes type 1 type 2 diabetes randomized trials meta analysis”.
Targeted follow-up	“Dodd 2011 Calculating meal glycemic index using measured and published food values compared with directly measured meal glycemic index”; exact title of Seckiner 2024 plus author/year.
Methods and datasets	“ISO 26642 2010 glycaemic index food determination current standard”; “International tables glycemic index glycemic load values 2021 systematic review Atkinson Brand Miller 4000”; “A glycaemic index compendium of non-Western foods”.
Meal and modifier searches	Exact titles/authors for Bao, Dodd, Ballance, Meng, Matthan, Vanhatalo, Sonia, Hermansen, Shukla and Wolpert; combinations of mixed meal / measured / calculated GI, cooling rice, ripeness banana, food order and type 1 dietary fat.
Population searches and update	PREVIEW glycemic index prediabetes; OmniCarb; low GI/GL diabetes BMJ 2021; EASD nutrition 2023; “low glycemic index diet type 1 diabetes adults systematic review randomized 2024 2025 2026”. Followed citations to the 2025 Zeng review.
Definition / disclosure checks	FAO available carbohydrate; Regulation 1169/2011 Annex I carbohydrate polyols; exact DOI/title with funding, conflict of interest or correction. DOI/PMID checked against primary records where accessible.

Selection favored human comparative experiments, original methods, traceable GI datasets and systematic reviews of randomized dietary interventions. In vitro and formula-only GI predictions were not accepted as measured food GI. Low-carbohydrate trials were not relabeled as low-GI trials. Children and pregnancy were outside the adult scope; mixed-age evidence is marked indirect.

Bibliographic records for Bao, Ballance, Dodd, Chiavaroli, Seckiner and Zeng were retrieved before use. Search ranking and indexing are dynamic; the bibliography, queries and access codes document a targeted evidence path, not exhaustive recall.

What standardized GI measurement establishes

Jenkins and colleagues introduced the food GI concept in 1981 using fasting volunteers and standardized carbohydrate challenges. That foundational study is historical evidence, not a claim that every original value satisfies today's protocol. [2]

ISO 26642:2010 remains the referenced published standard in the ISO catalogue; its entry was confirmed in 2021 and showed review in progress in 2026 when checked. The full paid standard was not obtained. Protocol details here are triangulated from the original methodology review and an interlaboratory study implementing the ISO method. Full clause-level conformity requires the licensed text. [1, 3, 4]

Protocol element	Scientific meaning / admission consequence
Participants and conditions	Standardized fasting tests in healthy adults, with adequate replication and at least 10 evaluable participants for the conventional standardized group estimate. Record the actual population and exclusions; "tested in humans" is insufficient.
Carbohydrate challenge	Typically 50 g available carbohydrate; an accepted 25 g protocol may be used where appropriate. The reference and test food must use the same carbohydrate dose. Record assay, portion, cooking and reference food.
Reference replication	Repeated reference challenges characterize within-person variability. The ISO interlaboratory implementation used repeated glucose measurements; audit the actual repeat count and analytical criteria, not only a paper's GI label.
Blood sampling / endpoint	Standardized sampling over two hours, including baseline and early post-meal points; incremental area above baseline excludes area below baseline. Record capillary/venous method and the iAUC calculation.
Group calculation	For each participant: test-food iAUC divided by that participant's mean reference iAUC, multiplied by 100; then average participant ratios. Do not silently substitute ratio of group means.
What the number excludes	Peak height, speed, insulin response, late hyperglycemia, hypoglycemia risk and a person's response on another day. GI values may exceed 100; glucose = 100 is a reference, not a ceiling.

Implementation boundary: Nutrikom consumes curated measurements; it does not itself conduct an ISO test. Label an exact directly tested meal as "published measured GI for this recipe", with population and preparation, never "your measured GI".

Dataset selection and source-quality tiers

Source	Use and limitation
2021 international tables [5]	Preferred starting register: 2,091 higher-quality entries and 1,927 less robust entries are separated. Table membership is not an exact food match. Preserve the original study, preparation, uncertainty and glucose-scale conversion. Published table GL uses specified standardized portions; recalculate for the user's portion.
University of Sydney GI Search [6]	Useful maintained lookup with food, brand/country, portion and reference information. Save retrieval date and row identity; changes are versioned locally. A database search result does not establish equivalence to an unnamed local product.
Non-Western compendium [7]	940 items from 159 studies; includes single foods and mixed meals tested in healthy people or people with type 2 diabetes. Improves regional coverage. Audit each protocol and population; do not treat the compilation as uniformly ISO-equivalent.
Original qualified human studies	An exact, traceable local product/recipe study can be preferable to a generic table entry. Review comparator, sample, carbohydrate definition, repeatability and conflicts. Publication recency alone is not a quality tier.
Older tables / national mappings	Use as routes to original data, with duplicate-study detection. Food-composition tables such as CIQUAL supply nutrient data, not automatically measured GI. An assigned GI mapping used in epidemiology is not proof of a matched consumer food.

Proposed tiering: source quality and food match are separate axes

Tier A: traceable human GI measurement with adequately documented standardized methods, reference, population and uncertainty; current tables' high-quality entries are candidates, subject to audit. **Tier B:** traceable human data with important method limitations, a different clinical population or incomplete reporting. Research/qualified range use only after review; not the default full meal estimate. **Tier C:** in vitro, model-predicted, uncited, food-name-only, crowdsourced or AI-invented values. Exclude from numerical GI/GL. These are Nutrikom design tiers, not an ISO classification.

A Tier A study with the wrong cultivar or preparation can be unusable. A commercially funded study is not automatically invalid; neither peer review nor a GI logo removes the need to audit its methods and match. Confirm data-reuse rights before production ingestion.

Food matching is a scientific dependency

Match field	Required rule
Identity	Match food type, relevant species/cultivar, brand/product and recipe. Store country/market, product date and source record. Do not assign all bread, rice, noodles or bananas one GI.
State and preparation	Match edible raw/cooked state, milling/particle structure, cooking method and duration, hydration, cooling/reheating and ripeness when these distinguish the tested product. Unknown material preparation blocks an exact match.
Recipes and shared portions	Use either the complete tested recipe or a non-overlapping ingredient decomposition. Retain ingredient amounts, final yield and consumed share. Never add a whole-recipe GI contribution and its ingredients together.
Composition compatibility	Available-carbohydrate concentration must refer to the same edible state and basis as the portion. A raw rice nutrient record cannot be multiplied by cooked rice grams. Include carbohydrate-containing sauces, drinks and coatings.
Candidate alternatives	A food-name similarity score may suggest candidates for review; it cannot establish physiological equivalence. A curated equivalent must have a recorded rationale and uncertainty; materially different candidates support abstention, not arbitrary averaging.
No-carbohydrate items	A genuinely known zero available-carbohydrate item needs no GI. A missing field, rounded label zero or “not tested” is not proof of zero carbohydrate. Retain fats/protein for context without inventing a GI.
Cultural transfer	Use local names, recipes, processing and portions. Unmatched regional foods remain visible. Do not replace a traditional dish with an unrelated Western proxy merely to achieve numerical coverage.

The variability across grain products in international tables and the additional regional compendium make food-specific matching necessary. [5, 7] A database value obtained in one country does not establish a nationality-specific biological coefficient.

Match status contract

Store **exact_tested** / **curated_equivalent** / **candidate_range** / **unmatched**, the matching rationale and reviewer/version. Default full estimates require exact_tested or a documented Tier A equivalent. A candidate range must have bounded, plausible alternatives; it is not a license to combine different foods into one confident value. This admission policy is a design proposal requiring audit and usability testing.

Mixed meals: useful association, imperfect agreement

The correct question is not simply whether GI “works”. Association across group-average meals, agreement with a measured whole-meal GI, and prediction of an individual glucose curve are different validation targets. The following experiments do not resolve them equally.

Human study / protocol	Finding and transfer limit
Bao 2011 [10] Healthy young lean adults; 121 single foods at 1,000 kJ and 13 mixed meals at 2,000 kJ. Glucose and insulin responses measured.	GL explained between-meal variation in mean glucose response ($R^2 = 0.58$, $P = .003$) and insulin response ($R^2 = 0.46$, $P = .01$). This supports a relative group-level descriptor, not individual calibration or a glucose value in mmol/L. Small meal set; selected foods and participants.
Dodd 2011 [11] 30 healthy participants; seven foods combined into three 50 g available-carbohydrate meals with staple, vegetables, sauce and chicken.	Predicted versus measured GI: potato 63 (95% CI 56-70) versus 53 (46-62); rice 51 (45-56) versus 38 (33-45); spaghetti 54 (49-60) versus 38 (33-44). All predictions higher, $P < .001$. Limited recipes; disagreement is material even with measured component values.
Ballance 2018/2019 [12] 14 healthy completers; randomized crossover, realistic potato/pasta/rice dinners with salmon, carrots and sauce; sampling to 180 min.	A carbohydrate-dose and fat/protein-adjusted calculation agreed with 15 of 17 meal comparisons assembled from this and earlier studies. This is evidence for further model development, not a universal correction. Unequal practical carbohydrate doses and reference normalization differ from a strict equal-dose GI test; small, largely female cohort.
Meng 2017 [13] Four crossover experiments, 20-22 adults per experiment, age 50-80, BMI 25-30; white bread plus differing carbohydrate, protein, fat or oat fibre.	Additional carbohydrate increased glucose iAUC; a large protein addition reduced glucose while increasing insulin responses. Tested fat and fibre additions did not significantly alter the measured responses. “Protein/fat/fibre always buffers GI” is unsupported; doses, food forms and study duration matter.

Synthesis: weighted estimates are transparent compositional indices with some group-level predictive information. Evidence is insufficient to present them as equivalent to directly measured mixed-meal GI or as calibrated personal responses. Retain the computation only with its actual name and limitations. Do not implement a generic fat/protein subtraction derived from one model.

Repeatability, portion size and methodological disagreement

Evidence	What Nutrikom may conclude
Matthan 2016 [14] 63 healthy adults, repeated white-bread and glucose challenges, each with 50 g available carbohydrate.	Reported within-person and between-person CVs were about 20% and 25%. Repeating standardized tests did not eliminate variation. A food GI cannot specify one individual response; the study does not mean every published group mean is unusable.
Wolever et al. 2017 commentary [15]	Criticized interpreting individual response variation as invalidation of a group food property. This is methodological argument, not a new randomized experiment. Preserve the distinction instead of selecting only the supportive or only the skeptical paper.
Wolever et al. 2019 [4] Six foods tested in three laboratories, 13-15 healthy participants per laboratory using the ISO method.	Interlaboratory testing supports standardized group estimates. It does not show that a value predicts a particular consumer, all meals, or late glucose responses. Industry involvement and testing-service interests are disclosed in the access/funding register.
Venn et al. 2006 [30] 20 healthy adults; five foods at three portions; glucose dose-response curve from 0 to 75 g.	Calculated GL did not differ significantly from curve-derived GL for 12 of 15 combinations; it overestimated three larger bread/granola portions. Absence of a significant difference is not proof of equivalence. Same participants and measured carbohydrate limit transfer to app-matched foods.

Do not convert arithmetic scaling into physiological scaling

Holding food GI fixed, doubling the entered carbohydrate doubles calculated GL by definition. It does not establish twice the glucose peak, twice the incremental AUC or twice the insulin requirement. The standardized test dose and actual portion are distinct. [3, 30]

A reported SEM or confidence interval concerns uncertainty in a study mean. It is not a prediction interval for another person, another preparation or another day. A database mean displayed to one decimal place cannot erase source, matching and portion uncertainty.

Design inference: explain GI as a standardized comparative property and GL as a portion-dependent index. Never describe either as the number of grams of glucose entering blood. Even glucose-equivalent response experiments are not measurements of absorbed glucose mass.

Food structure, processing and meal sequence

Modifier / human evidence	Allowed inference and limit
Structure / processing: Vanhatalo 2022 [16] Two randomized trials, 30 healthy normal-weight adults each; semolina foods providing equal carbohydrate.	Pasta elicited lower glucose and insulin responses than bread or couscous made from the same grain basis. Structure can matter beyond macros. "Processed" is not a monotonic GI variable; do not infer a GI correction from a processing category or whole-grain label.
Cooking, cooling / reheating: Sonia 2015 [17] 15 healthy adults, randomized crossover; fresh rice versus rice cooled 24 h at 4°C and reheated.	Glucose response was lower for cooled/reheated rice: reported AUC 125 ± 50.1 versus 152 ± 48.3 mmol·min/L, $P = .047$. One rice/protocol, small study. No universal percentage reduction or safe-storage instruction follows from this result.
Ripeness: Hermansen 1992 [18] Adults with type 2 diabetes; underripe versus overripe banana challenge.	Ripeness altered the measured glycemic response. This is direct evidence in type 2 diabetes and indirect for healthy adults. Do not assign all bananas a ripeness multiplier or mix historical bread-reference GI numbers with glucose-scale values.
Sequence: Shukla 2015 [19] 11 adults with type 2 diabetes treated with metformin; carbohydrate first versus vegetables/protein first, separated by 15 min.	Changing the order lowered measured post-meal glucose and insulin in this small crossover experiment. Food order is absent from a simple food list; no universal GI discount or guaranteed prevention of a peak follows. Transfer to type 1 diabetes or unrestricted eating is unproven.
Fibre, fat and protein [3, 13, 20]	Fibre type, viscosity, food matrix and dose matter. Fat/protein can change gastric emptying, insulin secretion or later metabolism; effects are not a fixed subtraction from carbohydrate. Lower early glucose does not imply lower insulin or lower late exposure.
Portion size and cooking yield [8, 30]	Cooked water uptake changes carbohydrate per 100 g; it need not change the total carbohydrate of an unchanged dry quantity. Larger portions change calculated GL. Use edible amount and yield rather than assuming the nutrient concentration is invariant.

These experiments justify conditional explanations and careful matching. They do not supply a general-purpose recipe simulator. Do not stack independent-looking percentage effects for cooling, fibre, fat and sequence; the combined intervention was not necessarily studied.

Clinical and situational modifiers are not ingredient fields

Context	Interpretation boundary
Insulin and type 1 diabetes	Dose, timing, delivery system, active insulin, insulin sensitivity and carbohydrate absorption can change the response. A GI/GL estimate must never produce an insulin dose, bolus schedule or assurance against hypoglycemia.
Type 2 diabetes medication	Medication class, dose and timing matter. Treatments affecting insulin, glucose production, carbohydrate digestion or gastric emptying cannot be inferred from meal macros. The app must not invent a medication-adjusted GI.
Baseline glucose / HbA1c	Starting glucose affects the observed curve; HbA1c describes longer-term glycemia, not an immediate meal correction. No diagnosis or treatment adequacy conclusion follows from the entered meal.
Activity and recent intake	Activity before/after eating, prior meals, fasting duration, alcohol and sleep/circadian context may alter the observed response. Clock time or “Snack” alone does not identify these conditions.
Other clinical contexts	Gastroparesis, pregnancy, major gastrointestinal surgery, acute illness and other clinical conditions are outside this general adult calculation contract. Do not extrapolate its explanatory claims to them.
CGM	CGM describes interstitial glucose over time in an observed context. A single trace is not a food GI test or causal proof that one ingredient caused a change. Record device, timestamps, baseline, insulin/medications, activity and overlapping meals for any future validated analysis.

A direct type 1 diabetes counterexample

Wolpert et al. studied seven adults under two 18-hour closed-loop periods. Dinners contained identical carbohydrate and protein but 60 versus 10 g fat. The higher-fat dinner required more insulin (12.6 ± 1.9 versus 9.0 ± 1.3 units, reported mean $\pm$ SEM; $P = .01$) and still produced more hyperglycemia. Small sample and unequal energy limit generalization. These are study results, never a dosing rule. [20]

The PREDICT study measured standardized and home responses in 1,002 UK adults with a US validation cohort. Its use of extensive personal and contextual information illustrates why macronutrients alone are not a personal prediction model. Commercial involvement and limited population transfer require attention. [21]

Minimum-profile principle: no diagnosis, HbA1c, CGM or medication data are required to show a qualified descriptive food GI/GL. Collecting those data alone does not authorize clinical interpretation. A clinical mode requires its own defined purpose and validation.

Generally healthy adults and prediabetes

Population / evidence	Finding, uncertainty and boundary
Generally healthy adults	Acute standardized food and mixed-meal studies establish comparative group responses, with variable agreement and reproducibility. They do not show that minimizing every meal's estimated GL improves health, or that a healthy adult needs to avoid any particular glucose peak. [4, 10-14, 16, 17, 30]
OmniCarb: Sacks 2014 [22] 163 overweight adults with elevated blood pressure but without diabetes; controlled crossover feeding, four five-week DASH-type diets varying GI and carbohydrate.	Lower GI did not improve the main insulin-sensitivity, lipid and blood-pressure outcomes in the overall pattern tested. This is useful counterevidence to universal benefit claims. Participants were at cardiovascular risk, not a representative sample of all healthy adults; short duration and a healthy background diet constrain transfer.
Prediabetes: PREVIEW, Raben 2021 [23] 2,326 adults with overweight/obesity and prediabetes; eight countries; initial weight-loss phase followed by a three-year 2 × 2 diet/activity trial.	High-protein/low-GI and moderate-protein/moderate-GI strategies did not differ in diabetes incidence. There were 62 cases, cumulative incidence 3.1%. Adherence to the intended contrasts was difficult, and attrition and low event incidence limit inference. Both protein and GI changed; this was not an isolated GI experiment.

What can be said to each group

Generally healthy: “GI compares tested carbohydrate foods under standardized conditions. The GL estimate also reflects the portion you entered.” This explains a construct; it is not a recommendation to optimize a personal glucose curve.

Prediabetes: “GI/GL can be one part of discussing carbohydrate choices, but this meal estimate cannot tell whether your blood glucose will stay in a particular range.” Do not promise diabetes prevention from a lower meal number.

Prediabetes combines heterogeneous glycemic states. A type 2 diabetes treatment meta-analysis does not automatically estimate prevention benefit in prediabetes. Observational dietary GI/GL associations may motivate research but cannot validate a single-meal counterfactual or an app action. [23, 24]

Type 2 diabetes: dietary-pattern evidence

Evidence	Outcome and limits
Chiavaroli 2021 systematic review [24] 29 randomized comparisons, 1,617 participants with diabetes, at least three weeks; predominantly middle-aged overweight adults with type 2 diabetes, often taking glucose-lowering drugs.	Low-GI/GL patterns reduced HbA1c by 0.31 percentage points (95% CI 0.19-0.42 lower); heterogeneity $I^2 = 75\%$. Authors rated HbA1c evidence high certainty and most secondary outcomes moderate. This pooled effect is not an adult type 1-specific result, a prediction for one person, or a meal-level validation.
Jenkins 2008 [25] 210 medication-treated adults with type 2 diabetes; six months; low-GI advice versus high-cereal-fibre advice.	HbA1c changed by -0.50 percentage points (95% CI -0.61 to -0.39) versus -0.18 (-0.29 to -0.07), $P < .001$ between treatments. It supports a dietary strategy in this treatment context. Advice, food choices and adherence changed together; the trial did not test an app's calculated mixed-meal number.
Canadian Trial of Carbohydrates in Diabetes, 2008 [31] 162 adults with type 2 diabetes managed by diet alone; one year; high-carbohydrate low/high-GI versus lower-carbohydrate high-monounsaturated-fat diets.	No HbA1c advantage was reported for the low-GI strategy, although CRP improved. This discordant trial cautions against universal claims; baseline control, comparison diet and intervention contrast affect the result. It does not negate the pooled average.
EASD DNSG 2023 recommendations [29]	Low-GI/GL diets may be recommended when compatible with the other dietary recommendations; certainty for this recommendation was moderate. GI is one consideration within a diet, not a standalone healthy/unhealthy food or meal designation.

Allowed: “Some dietary trials in type 2 diabetes found modest improvements in longer-term glucose control with lower-GI/GL eating patterns. That evidence does not predict the response to this meal.”

Prohibited: “This GL will reduce your HbA1c by 0.31%”; “low GL means safe with your medication”; “eat this to prevent a spike”; or “increase/decrease insulin because of this score”. Report HbA1c effects as percentage points, not as a relative percent reduction.

The 2021 review has a published correction concerning the abstract's systolic-blood-pressure dose-response statement. No blood-pressure benefit is used here; the HbA1c result above is the reported main finding. [24]

Type 1 diabetes: retain distinct evidence and uncertainty

Evidence	Finding and adult transfer limits
Giacco 2000 [26] 63 adults randomized to high-fibre, low-GI natural foods versus a lower-fibre diet for 24 weeks.	Reported improved glycemic control and fewer hypoglycemic episodes with the high-fibre strategy. The intervention changed fibre and GI together; it cannot isolate a pure GI effect or justify insulin calculations from meal GL.
Seckiner 2024 [27] 17 adults, crossover; 40% or 60% carbohydrate crossed with low/high GI; sensor-monitored four-day periods over four weeks.	No statistically significant differences in glucose AUC ($P = .78$), mean glucose ($P = .28$), variability ($P = .59$) or time in range ($P = .567$). Small, short study; null significance is not equivalence. It is not evidence that a low-GI strategy always improves CGM outcomes.
Zeng 2025 systematic review [28] 35 trials across dietary patterns; six low-GI trials (201 participants) across children, adolescents and adults; search through 11 November 2024.	No clear overall low-GI benefit; HbA1c evidence was very low certainty. A >12-week subgroup favored HbA1c (-0.45 percentage points, 95% CI -0.76 to -0.14); a pediatric subgroup also favored low GI. These mixed-age findings do not establish a universal adult effect. Other pattern results must not be relabeled as GI effects.
Acute high-fat meal evidence [20]	The delayed effect seen under controlled insulin delivery demonstrates a clinically relevant omission from GI/GL arithmetic. A lower early response cannot guarantee less total exposure or less insulin need. Neither that trial nor the dietary reviews validates the current app.

Reconcile the evidence rather than pooling the populations silently

The largely type 2 diabetes meta-analysis supports a modest average dietary-pattern benefit; the newer type 1-specific synthesis leaves low-GI effects uncertain. High-fibre, lower-carbohydrate and low-GI interventions overlap but are not synonymous. An effect of one cannot be assigned to another. [24, 26-29]

Allowed: “GI describes tested carbohydrate foods. In type 1 diabetes, insulin and the rest of the meal also affect glucose responses; this estimate does not guide dosing.”

Prohibited: applying the pooled HbA1c benefit to an individual with type 1 diabetes, promising a time-in-range improvement, calling a food hypoglycemia-safe, or interpreting a calculated GL as carbohydrate grams to enter in an insulin pump.

Minimum data contract: inputs and provenance

The contract below is a proposed engineering minimum for a descriptive calculation. It does not make entered intake true or a physiological prediction valid. Required means needed for that output; do not require unnecessary health-profile data.

Field	Requirement and state
Food identity and preparation	Required for any GI match. Stable food/recipe ID, source identity, edible state and all preparation attributes material to the selected GI record. Store unknown explicitly.
Consumed portion	Required for GL and ingredient weighting: edible amount and unit, conversion source, quantity status measured / estimated / bounded / unknown. A household unit needs a food-specific gram conversion. Not required merely to display a matched food GI.
Available carbohydrate	Required for each positive-carbohydrate contribution: g per consumed portion, original nutrient field, definition, analytical/calculation method, per-100-g or other basis, unit and uncertainty status. Preserve original values.
Recipe allocation	Conditional: ingredient amounts, edible yield, cooked yield, shared fraction/consumed share and losses where known. All carbohydrate contributors must be represented once. Unknown recipe composition can block meal GI/GL.
GI evidence record	Required for each admitted GI: value, reference scale, original reference food, study/table/row ID, DOI or institutional URL, population, tested portion/carbohydrate dose, preparation, sample size, uncertainty type, quality tier and data version.
Matching / normalization	Required: match status and rationale, original scale and conversion provenance, normalized glucose-scale GI, carbohydrate-definition compatibility, reviewer/version, admission or rejection reason.
Meal snapshot	Required for a meal result: immutable input revision, included item IDs, scope "entered meal", review/completeness state, computation version and timestamp. Later edits invalidate and recompute the result.
Other nutrient/context fields	Fat, protein, fibre, energy, time and label are optional for GI/GL arithmetic when carbohydrate is independently established; useful for conditional explanations. They never silently adjust GI. Population category is optional for descriptive display, required to select any population-specific evidence statement.

Store source provenance for **both** the nutrient value and the GI value. They may come from different datasets; each must match the same consumed food. A verified GI source cannot repair an incompatible nutrient record.

Available carbohydrate: admission before arithmetic

GI testing concerns available carbohydrate, not total energy, carbohydrate energy percentage or total sugars alone. FAO distinguishes directly measured available carbohydrate, carbohydrate by difference, and expressions by weight versus monosaccharide equivalents. Definitions must be retained rather than guessed from a field called “carbs”. [8]

Incoming value	Required treatment
Direct available-carbohydrate field	Admit only with a documented definition, compatible analytical basis and matching edible state. Retain whether expressed as native component weights or monosaccharide equivalents; normalize with documented component-specific factors if needed.
Total carbohydrate by difference, including fibre	Subtract fibre only if that source's definition requires it, its fibre value is known on the same basis, and other non-available components have been resolved. A missing fibre value is not zero. Do not infer available carbohydrate from sugars alone.
European label carbohydrate	EU carbohydrate includes metabolised carbohydrate and polyols; fibre is separately defined. Therefore do not subtract fibre again. Label carbohydrate is not automatically a GI-compatible available-carbohydrate dose when polyols or unusual ingredients are material. [9]
Polyols / resistant starch / novel ingredients	Require the ingredient identity and a validated mapping consistent with the GI test carbohydrate definition. Do not subtract every polyol gram, assign every polyol glucose equivalence, or apply generic “net carbs”. Unresolved compatibility means no full GL.
Sugars, starch, fibre separately reported	Reconstruct only using a documented complete definition and compatible assays, avoiding overlaps. Total/added/free sugars are not interchangeable with available carbohydrate. Missing starch cannot be inferred as zero.
Raw and cooked records	Use consumed state or a documented recipe/yield calculation. Account for edible share and water gain/loss. Do not use dry-food carbohydrate per 100 g with cooked weight without conversion.
Energy-derived carbohydrate	Do not back-calculate GI input from calories minus fat/protein calories. Rounding, fibre, alcohol, polyols and definition differences make this an unsuitable default replacement.

Operational policy: maintain an approved nutrient-definition mapping table, versioned independently of GI data. Reject negative reconstructed carbohydrate or inconsistent units; request correction rather than clamping values to zero. Special products require curator review, not an AI guess.

Formulae, scales and what the units mean

Let m_i be consumed edible grams, a_i compatible available-carbohydrate grams per 100 edible grams, $c_i = m_i \times a_i / 100$, and g_i the admitted food GI normalized to glucose = 100. All positive-carbohydrate items must be included for a full meal estimate.

Quantity	Calculation / interpretation
Total available carbohydrate	$C = \sum c_i$. This is a composition estimate in grams for the entered meal.
Ingredient-weighted meal GI	$GI_{est} = \sum (c_i \times g_i) / C$, for $C > 0$. This is a calculated carbohydrate-weighted index, not a measured response.
Food GL for the entered portion	$GL_i = c_i \times g_i / 100$. Retain the underlying GI source and the entered portion.
Meal GL from ingredients	$GL_{est} = \sum GL_i = GI_{est} \times C / 100$, when the same complete ingredients and definitions are used.
Meal GL from a directly measured meal GI	$GL_{est} = GI_{measured_recipe} \times C / 100$, only for a matching recipe. GL is still calculated for the entered portion; label this basis explicitly.
Dietary period descriptors	Dietary GI = $\sum (c_i \times g_i) / \sum c_i$; dietary GL = $\sum GL_i$ over the stated period. Apply the same completeness rules. Mean sampled-day GL must state which days were averaged.
Zero available carbohydrate	GI_{est} is undefined / not applicable if $C = 0$. GL has an arithmetic value of zero only when zero is established. Prefer “No available carbohydrate recorded” over a low-risk badge. This does not predict no glucose or insulin response.

Scale normalization is explicit and performed once

Use glucose = 100 throughout the consumer contract. The 2021 tables converted white-bread-reference values by multiplying by 0.71. Preserve this as the table convention, not a universal biological constant. If an original study supplies its own valid reference conversion, retain and document that choice; do not reconvert an already normalized table value. Unknown or nonconvertible reference scales are inadmissible. [5]

GI and GL are conventionally shown as index values, not mg/dL, mmol/L, insulin units or percentages of a personal target. GI is not bounded by 100. A GL value is not a measured mass of absorbed glucose. Use sensible display rounding, retaining unrounded internal values.

Coverage and missing-data policy

Coverage answers “how much of the entered available carbohydrate has an admissible GI match?” It does not answer whether the meal was fully reported, whether the food data are correct, or whether the meal represents the person's diet.

Carbohydrate-weighted GI coverage: $K_C = \sum c_i$ for admitted GI-matched items / $\sum c_i$ for all entered items. Report as a percentage only when every c_i is known and $C > 0$. Keep a separate matched-carbohydrate subtotal in grams. An item-count percentage is not an acceptable substitute.

State	Output consequence
All quantities and compatible carbohydrate known; all positive-carbohydrate GI matches admitted	$K_C = 100\%$. Full ingredient estimate eligible, subject to other gates. This means complete matching of entered carbohydrate, not certainty or physiological validation.
Carbohydrate known; one GI missing	K_C can be computed. Show which food lacks GI. Do not normalize the matched subset and call it the meal GI. A known-contribution GL subtotal may be shown as partial.
Quantity or carbohydrate unknown	Total C is unknown: K_C is undefined. Do not claim “80% coverage” using the known subtotal as denominator. Full GI/GL withheld; retain known food values and say which input is missing.
True non-consumption	Explicitly excluded item, with zero consumed amount. Keep history if relevant; it contributes nothing. It is different from a food whose amount is not yet entered.
Known zero carbohydrate	No GI needed for coverage. Pure zero-carbohydrate contributions do not reduce K_C . Rounded label zero needs handling of the source's rounding/quantification limit when material.
Composition missing versus GI missing	Both are explicit, distinct states. Missing composition prevents knowing c_i ; missing GI may still allow a known carbohydrate amount and coverage. Neither becomes zero.
Meal not user-reviewed or incomplete	Show source food GI if matched. Withhold a prominent “meal” total; if useful, expose “estimate for recorded items only”, clearly partial and without adequacy or completeness claims.

Proposed full-number gate: 100% of known positive available carbohydrate must have admitted GI values. This conservative completeness rule is a product choice, not a scientifically validated reliability percentage. There is no universal 80%, 90% or other evidence-based “good enough” cutoff.

Ranges, uncertainty and abstention

Uncertainty source	Treatment
Published GI SEM / confidence interval	Preserve uncertainty type, n and protocol. It describes a study estimate. Do not label it the expected glucose range for a user or silently treat SEM as SD.
Several defensible matches	Use a curated set of genuinely plausible equivalent foods/preparations. Report a scenario range only if the candidate set and provenance are defensible. Do not use the entire database minimum/maximum for an unmatched dish.
Bounded portion uncertainty	Compute defined input scenarios using supported quantity bounds. Recalculate both numerator and denominator for each scenario; GI weights change if only one ingredient changes.
Independent statistical errors	Do not propagate errors as independent by default. Shared study, recipe yield, food matching and portion errors are often correlated. A formal confidence interval requires a justified model, not a convenient square-root formula.
Unknown GI without a bound	No full meal GI/GL range. GI = 0 is not an imputation, and 100 is not a universal upper bound. The known GL subtotal may be shown with the missing contribution named.
Unknown quantity without a bound	No finite meal estimate or meaningful carbohydrate coverage. Ask for a portion or retain descriptive food information only.
Values near a classification boundary	Do not turn a small estimated difference into a categorical health judgment. If conventional food-GI bands are ever shown, retain scale, source and uncertainty; avoid meal traffic lights.
Numerical precision	Round consumer estimates to avoid unsupported precision, without altering internal computation or making a rounded number appear measured. "About" does not compensate for a missing denominator.

A supported scenario range is not a personal prediction interval

For fixed known c_i and admissible g_i bounds $[L_i, U_i]$, the arithmetic GL bounds are $\Sigma(c_i \times L_i)/100$ and $\Sigma(c_i \times U_i)/100$. GI bounds use the same numerator divided by C. These are input-scenario bounds only. If amounts also vary, evaluate coherent joint recipe/portion scenarios; do not mix incompatible low and high ingredients.

A partial GL subtotal is a mathematical contribution from included items, not a lower bound on a person's glucose response. Never infer missing biological effects from the fact that each admitted arithmetic term is nonnegative.

Nutrikom decision matrix: admission and dependencies

Decision	Admission criteria	Display basis
DISPLAY FOOD GI	Admitted human GI source; exact or justified equivalent food/preparation; known normalized scale. Portion need not be known.	Published food GI, study mean and available uncertainty. Identify measured population and source. A clinically tested value is not silently treated as an ISO healthy-adult reference.
DISPLAY ESTIMATED MEAL GI	User-reviewed entered meal; non-overlapping ingredients; all c_i known and compatible; $C > 0$; all positive-carbohydrate matches admitted ($K_C = 100\%$); no unresolved material matching issue.	Ingredient-weighted estimate, explicitly labeled. Whole-meal interactions and personal context remain unmodeled. Do not label it "measured meal GI".
DISPLAY MEAL GL	Same completeness and carbohydrate gates; known consumed portion. GI basis can be an admitted ingredient estimate or an exactly matched directly measured recipe.	"Estimated GL for the entered portion". State which GI basis was used. Do not copy the source table's serving GL if the user's portion differs.
DISPLAY RANGE/PARTIAL	A range requires defensible bounded scenarios; a partial subtotal requires known admitted contributions and an explicit excluded list. These are two different subtypes.	"Input-scenario range" or "GL subtotal for matched foods". Show K_C only if its denominator is known. Withhold full meal GI for an unmatched remainder.
ABSTAIN	Unknown/unusable scale; incompatible carbohydrate definition; unbounded quantity; materially wrong food/preparation match; source Tier C; or no defensible numeric completion.	Give reason and useful known information. Abstention applies to the affected output, not necessarily to calories, foods, carbohydrate amounts or an independently matched food GI.

Priority: validate inputs and sources; identify the scope; calculate coverage; then select the most informative admitted output. Full numbers never take priority over an unresolved dependency. These output codes may coexist: a meal can show food GI for one matched food while abstaining from meal GI/GL.

Evidence versus design: the distinction between measured and weighted GI and the limits of mixed-meal prediction follow [1-4, 10-14, 20, 30]. Exact UI gating, including user review and the full-coverage rule, is a proposed conservative contract requiring testing.

Decision matrix: allowed claims and prohibited inferences

Output	Allowed English	Prohibited inference
DISPLAY FOOD GI	"Published GI: 52 (glucose = 100), for the tested preparation." Show source and uncertainty if available.	"Your glucose will rise by 52"; "52% healthy"; "suitable for all people with diabetes".
DISPLAY ESTIMATED MEAL GI	"Ingredient-weighted GI estimate: about 52. Calculated from the matched foods; the mixed meal itself was not tested."	"Measured meal GI"; "moderate blood sugar response for you"; "validated by ISO" merely because ingredient values were standardized.
DISPLAY MEAL GL	"Estimated GL: 26 for the entered portion. This combines available carbohydrate with the GI values of the matched foods."	"26 grams of glucose will enter your blood"; "dose insulin for 26 g"; "your peak will be low".
DISPLAY RANGE/PARTIAL	"Estimated GL range: 25-27 across the listed food matches." Or: "Known GL contribution: 18. One carbohydrate-containing food has no matched GI."	Calling a subtotal the whole meal; calling scenario bounds a 95% personal glucose interval; presenting an imputed zero as a measured value.
ABSTAIN	"Meal GI/GL unavailable: the carbohydrate amount for the sauce is unknown." Offer a route to correct the input.	"No glycemic impact"; hiding all known nutrients; inventing a missing GI from food name, processing label or an AI response.

Directly measured meal GI is a separate data type

If the exact complete recipe has a qualified whole-meal measurement, identify it as **published measured GI for this recipe**. Preserve the tested dose, composition, method and population. It is not the DISPLAY ESTIMATED MEAL GI calculation; the UI should retain a distinct measured-versus-calculated badge. A changed recipe loses that exact-measurement status.

Changing portion alone changes calculated GL but does not turn the person's response into a measurement. A paper that reports post-meal iAUC at practical unequal carbohydrate doses has measured a response; it has not necessarily produced ISO-comparable meal GI. This distinction must be checked before importing a "meal GI" field. [1, 3, 12]

Short English presentation and optional explanations

The following hierarchy is a **UX proposal**, not the demonstrated best interface. Keep the foods, entered portion and available-carbohydrate estimate visible before an optional GI/GL panel. A missing GI must not hide usable composition information.

Situation	Proposed wording
Complete estimate	Title: "Glycemic context" "Ingredient-weighted GI estimate: about 52. Estimated GL: 26 for the entered portion." "Calculated from matched food data; this does not predict your blood glucose or insulin response."
Coverage details	"GI matched for all 50 g of entered available carbohydrate." Details: food matches, source dates, carbohydrate definitions, preparation and uncertainty. Avoid the shorthand "100% accurate".
Partial known carbohydrate	"Meal estimate incomplete. GI data cover 30 of 50 g of entered available carbohydrate; the remaining food has no suitable GI match." Optional detail: "Known GL contribution: 18."
Unknown quantity	"A portion is missing for the sauce. We can show matched food GI values, but cannot calculate meal GI/GL or carbohydrate coverage."
Known zero carbohydrate	"No available carbohydrate recorded. Meal GI is not applicable." In clinical context: "This does not describe all possible glucose effects."
Mixed-meal explanation	"The calculation uses carbohydrate amounts and published food GI values. Protein, fat, food structure and your circumstances can change the measured response."
Optional food idea	"If you want to explore another carbohydrate food, compare a matched alternative and your intended portion. Its estimated GI/GL may differ; your personal response cannot be promised."

Conventional glucose-scale food GI bands are low ≤ 55 , medium 56-69 and high ≥ 70 . [5, 7] They classify the index, not overall health, clinical safety or personal suitability. Do not add invented meal GL targets, green/red health bands, "remaining GL allowance", a deficit message or a meal timing penalty.

A small numerical GL obtained by shrinking a portion is not necessarily a better or sufficient meal. Optional alternatives should respect preferences, cost and cultural foods; do not prescribe a fixed gram substitution or claim that adding fat prevents a spike.

Independent dimension, global score and AI boundary

Design choice	Disposition and reason
Independent educational glycemic context	ADOPT FOR DESIGN. It preserves the distinction between standardized carbohydrate quality and portion amount. Qualification and abstention must remain visible; meal estimates are optional, not a compulsory meal grade.
Enter a global Nutrikom Score	DEFER. No retrieved study validates combining this estimate with nutrient density, processing heuristics or timing. GI, GL, carbohydrate amount and fibre overlap; double-counting and portion incentives would require explicit construct work. No weights are proposed.
Restrict all GI education to diabetes mode	NOT NECESSARY. A qualified food GI or calculated GL is a descriptive construct that can be explained to adults without collecting health data. Consumer comprehension still needs evaluation.
Diabetes-oriented prediction / action mode	DEFER pending a separately defined endpoint, population, data flow and clinical validation. A separate screen or a diagnosis checkbox does not itself validate a predictor, dosing feature or treatment recommendation.

Fact-linked optional AI: explanation only

Server-controlled facts must include: output type; GI basis (food measurement / whole-recipe measurement / ingredient estimate); values and units; scope; portion; coverage; source IDs; match status; missing fields; scenario labels; and approved limitations. The server chooses which facts are eligible and renders every figure and attribution.

AI output schema: **title** (brief), **explanation** (one or two sentences), optional **food_idea**, **fact_ids**, and explicit **conditionality**. Reject novel GI values, unsupported calculations, clinical predictions, dose advice, health grades and missing-data completions. Optional ideas require real matched foods; their nutritional contributions must be supplied by the server.

Example: title “An estimate for the entered portion”; explanation “This combines the carbohydrate amounts with matched food GI values. The meal itself was not tested, and your glucose response may differ.” Fact IDs: computation_basis, matched_carb_scope, physiology_limit. Conditionality: descriptive_estimate_only.

The deterministic local explanation should convey the same meaning without AI. Any AI benefit is a UX hypothesis to be tested against that adequate local baseline, not against an empty or misleading screen.

Proportionate validation plan before consumer release

Stage	Design and necessary evidence
1. Source and content audit	Independent dietetics/GI-methodology review of approved carbohydrate definitions, source tiers, matching rules and wording. Audit culturally diverse staples, mixed dishes, brands and special ingredients. Review licensing and published corrections.
2. Software correctness	Deterministic fixtures for units, yields, scale conversion, weighted means, coverage denominators, duplicates and later edits. Independent hand calculations are comparators for arithmetic only; passing them does not validate GI or clinical meaning.
3. Robustness and missingness	Perturb plausible portions, cooking states, recipe yields and candidate matches. Report how estimates and abstentions change. Predefine material error criteria from intended use; do not invent universal thresholds or optimize them on the evaluation set.
4. Mixed-meal construct validation	If asserting correspondence to measured meal GI, compare held-out exact recipes with qualified whole-meal measurements. Include diverse structure, preparations and carbohydrate/fat/protein amounts. Evaluate bias and agreement with intervals, not only correlation. A training-table lookup is not an independent comparator.
5. Comprehension	Compare amounts-only baseline, adequate local GI/GL explanation, and optional AI explanation. Test objective tasks: distinguish GI from GL, identify portion effects and missing coverage, reject a personal glucose/insulin inference. Include low numeracy, mobile and assistive-technology users; recruit each intended clinical group separately.
6. Clinical endpoint, only if later pursued	Define glucose endpoint, time horizon, assay/device, population and intended action before modelling. Measure baseline/context, treatment and repeat meals across days; separate development and external validation by person and setting. Assess calibration, error, safety-relevant failures and clinical utility, not just average fit.

Sample size follows the chosen endpoint, variance, design and required precision. Acceptance criteria follow intended use and clinical consequences; neither is specified numerically without supporting pilot/design work. No study or verification case below has been executed.

Clinical testing must distinguish type 1 diabetes, type 2 diabetes, prediabetes and non-diabetic adults. An algorithm trained in one group is not admitted to another merely by adding a population label. Evidence of engagement or user satisfaction is insufficient for either objective comprehension or clinical validity.

Proposed verification cases: arithmetic and data states

All numbers here are **synthetic fixtures**, not assigned GI values for real foods and not executed tests. They specify intended behavior for engineering and review.

Case	Expected behavior / rationale
A: complete two-food fixture	Food A: 30 g available carbohydrate, GI 60. Food B: 20 g, GI 40. C = 50 g; weighted GI = $(1,800 + 800)/50 = 52$; GL = 26; K_C = 100%. Show both as estimates, never as a personal glucose response.
B: double the whole portion	A and B both doubled: C = 100 g; GI remains 52; GL becomes 52. Do not claim that glucose doubles. If only A doubles, recalculate weights: C = 80 g, GI = 55, GL = 44.
C: add a known zero-carbohydrate oil	The ingredient-weighted GI/GL arithmetic is unchanged. The meal's energy/fat changes. Do not infer identical physiology or label oil GI = 0 as a tested value.
D: B has no GI, but carbohydrate is known	K_C = $30/50 = 60\%$. Known GL contribution = 18. Withhold full meal GI/GL; do not report subset GI 60 as the meal GI and do not set B GI to zero.
E: B has curated GI scenarios 35-45	With fixed amounts: weighted GI 50-54; GL 25-27. Label as an input-scenario range, not a confidence interval or predicted glucose range. Require both candidates to be defensible matches.
F: B quantity unknown	Total carbohydrate and K_C undefined. Do not reuse the 60% coverage from case D. Matched food GI remains displayable; full meal values abstain.
G: scale conversion	A source explicitly on white bread = 100 with value 80 maps to 56.8 using the documented 2021 convention. An already glucose-normalized value 56.8 stays 56.8. Unknown reference food blocks conversion.
H: valid source GI above 100	A qualified glucose-scale GI 110 is not clamped to 100. With 20 g available carbohydrate, calculated GL = 22. Verify source quality; do not presume the value is impossible.

Meaningful additional checks: negative amounts, inconsistent units and impossible reconstructed carbohydrate fail admission; rounding does not change the internal calculation; recipe and ingredient overlap is detected before summation.

Proposed verification cases: interpretation and edits

Case	Expected behavior / claim boundary
Raw/cooked mismatch	150 g cooked rice paired with a dry rice composition record is inadmissible without a documented yield conversion. A GI match to an unrelated variety cannot repair it.
European label and fibre	A source already excludes fibre from carbohydrate: do not subtract it again. A material unresolved polyol content blocks GI-compatible available-carbohydrate calculation even if the label has a numeric carbohydrate total.
Cooled food, unknown preparation	Do not apply a universal “cooling discount”. Use a directly matched record, a defensible preparation scenario set, or abstain. Keep the known food and portion visible.
Recipe changed after measurement	A tested complete dish has a published meal GI. Replacing a carbohydrate ingredient removes exact-recipe status. Re-evaluate ingredient estimates; do not continue displaying the old value as measured.
Later portion edit / duplicate	Recompute GL, GI weights and coverage using a new immutable revision. Never display cached full coverage from the previous meal. A duplicate whole-dish/ingredient entry must not be summed twice.
Clinical-context challenge	Same foods and portions in healthy, prediabetes, type 1 and type 2 profiles retain the same descriptive arithmetic. Do not generate medication, insulin or HbA1c adjustments. Population-specific explanatory evidence is separately qualified.
CGM trace after a meal	Label the observed episode and measurement method. Do not retrospectively call the trace the food's GI, fit a universal GI from one meal, or attribute a late rise uniquely to one ingredient.
True fasting / missing meal	An explicitly uneaten meal has no consumed portion; GI is not applicable. An empty or interrupted record is not fasting, zero GL or evidence of no glucose exposure.
Owner-discussion example	581 kcal, 92.2 g carbohydrate, about 63% carbohydrate energy, “Snack at 15:00”: no GI matches or compatible available-carbohydrate definition supplied. No meal GI/GL number; no “massive glycemic load”, “immediate insulin spike” or “unsuitable snack”.
Lower number / AI challenge	A low calculated GL must not trigger a healthy badge, advice to add fat or a dosing instruction. If AI invents an alternative's GI or nutrient amount, discard it and show the local fact-linked explanation.

These are proposed acceptance scenarios for a future implementation. They are not evidence that current Nutrikom behavior satisfies this contract.

Access, funding and conflicts: methods and acute studies

Access codes: F = full article/PDF directly retrieved; I = primary text available through indexed sections, without a complete independently inspected PDF; A = abstract/record only; S = institutional page/standard catalogue. “NR” means not retrieved/verified here, not “none”. Disclosures are summarized, not exhaustive author-by-author declarations.

Reference / access	Funding, interests and appraisal limit
[1] ISO / S; [2] Jenkins / A; [3] Brouns / I	ISO full text paid and not obtained; catalogue checked. Historical Jenkins funding/COI NR. Brouns methodological review: disclosures NR. Do not claim clause-level compliance from this report.
[4] Wolever 2019 / I	Mondelez funded and participated in design/writing/publication decisions; authors include company and GI-testing-service interests. Standardization evidence remains informative, but independently audited replication matters.
[5] Atkinson 2021 / I	University of Sydney internal revenue support. Authors disclose GI-book royalties, GI testing/foundation roles and advisory interests. The review screened methodological quality but did not perform a full study risk-of-bias assessment. Dataset reuse terms require attention.
[6] Sydney / S; [7] Henry / I	Sydney operates a GI testing service; save source/retrieval version. Henry: Biomedical Science Institute Industry Alignment Fund support; authors declared no conflicts. Source studies still need individual appraisal.
[8] FAO / S; [9] EU / S	Original institutional definitions, not human clinical outcome experiments. They establish data semantics; no personal predictive validity follows.
[10] Bao / A-I; [11] Dodd / A-I	Bao funding/COI NR. Dodd: University of Otago support identified; COI NR. Abstract and indexed primary results, including reported intervals, were available; full methods/supplements not independently audited.
[12] Ballance / F	Full article PDF retrieved through an agricultural research-hosted copy. Norwegian public/agricultural funding with potato-industry participation; authors declared no conflicts. Model adjustments need external validation.
[13] Meng / I; [14] Matthan / I	NIH/NIDDK and USDA support identified; Matthan also clinical/translational NIH support. Complete conflict declarations NR. Selected primary methods/results and original USDA records available.
[15] Wolever commentary / I	Methodological opinion by authors affiliated with GI testing/advocacy and research organizations; full individual disclosures NR. A letter is not an independent new trial.
[16] Vanhatalo / I	Barilla funded the work. Disclosed author connection to Canadian Sugar Institute-supported training and previous GI-testing employment; other authors reported no conflicts. Institutional abstract/disclosure record checked.

Access, funding and conflicts: clinical evidence

Reference / access	Funding, interests and appraisal limit
[17] Sonia / A; [18] Hermansen / A	Primary abstracts/institutional records; complete funding/COI NR. Small food-specific studies; no generic cooling or ripeness coefficient can be licensed from their findings.
[19] Shukla / I	Robert C. and Veronica Atkins Foundation curriculum support identified; full conflict declaration NR. Small metformin-treated type 2 sample limits clinical transfer.
[20] Wolpert / I	NIH-related support identified; complete funding/COI not independently audited. Primary methods/results accessed; seven adults and unequal energy constrain application.
[21] Berry / I	Zoe Global plus public/charitable support; CGM support from Abbott. Several authors were Zoe consultants or employees. A rich-data research model does not validate a Nutrikom GI/GL display.
[22] Sacks / I	NIH/NHLBI and related public clinical/translational support. Full author disclosure detail NR. Controlled feeding strengthens internal validity; population/background-diet limits remain.
[23] Raben / F	EU and national/public funding plus GI Foundation royalties, food/weight-management and in-kind software support. Authors disclose industry/advisory/GI-service interests. Funders reported no role in design, analysis or writing.
[24] Chiavaroli / I	EASD/DNSG-commissioned review; Canadian research support identified. Several authors disclose food-industry, consulting, GI-testing or related interests. Full trial-by-trial funding audit not performed; high heterogeneity remains relevant.
[25] Jenkins / A-I; [26] Giacco / A	Original trial results retrieved; complete funding/COI NR. Nutrition interventions change several dietary features. Findings cannot identify the causal effect of an app-computed meal GL.
[27] Seckiner / A-I	Ege University Scientific Research Project Unit grant 21039. Complete conflict declaration NR. Primary abstract and indexed methods/funding available; small short crossover.
[28] Zeng / I	Swedish Research Council, Swedish Diabetes Foundation and Karolinska diabetes programme. One author disclosed an Abbott Scandinavia consulting agreement for a separate digital nutrition programme. Six GI trials involved only 201 participants across ages; GI-outcome certainty was very low.
[29] EASD / F	Original guideline PDF retrieved from a public hosted copy; extensive public, food-industry and pharmaceutical relationships disclosed. Guidance synthesizes evidence; it is not an app certification.
[30] Venn / A-I; [31] CCD / A-I	Venn funded by New Zealand Institute for Crop and Food Research and University of Otago; full COI NR. CCD complete funding/COI NR. Original outcome records checked; no independent reanalysis.

These access gaps constrain this review. Before admitting production GI records, retrieve the original source and relevant supplementary methods for that record; do not promote a paper to Tier A solely because it is cited here.

Remaining limitations and final disposition

Evidence-supported conclusions

GI is a standardized comparative food measure; calculated mixed-meal GI is an arithmetic estimate with incomplete agreement with measured meals. GL adds portion-dependent available carbohydrate. Neither gives an individual glucose concentration, insulin response or clinical action. The experimental and review evidence supports keeping those meanings separate. [1-4, 10-14, 20, 24, 28, 30]

Low-GI/GL dietary-pattern evidence is most supportive for modest average glycemic improvement in type 2 diabetes. Prevention evidence in prediabetes does not establish an isolated GI benefit, and adult type 1-specific inference remains limited. GI reduction cannot replace attention to the overall diet or treatment context. [22-29, 31]

Proposals that still require validation

The source tiers, 100% carbohydrate-match gate, optional numerical panel, precise wording, scenario presentation and local/AI explanation contract are design proposals. They are not experimentally established optimal UX choices. They must be assessed for both utility and the risk of users interpreting the number as personal medical advice.

Important limits of this review

The search was targeted, not exhaustive; no duplicate screening or meta-analysis reanalysis was performed. Some full texts, the paid ISO standard and several disclosure sections were unavailable. Several acute experiments were small and selected, dietary trials differed in comparators and co-interventions, and regional food coverage remains incomplete. No specific food GI database was comprehensively licensed, imported or audited for this report.

A real product must also keep data and code versions auditable. Source updates, reformulations and nutrient-definition changes can invalidate a previous food match. No repository/runtime snapshot is asserted here: this is a future data and interpretation contract for the linked Nutrikom project, not an implementation review.

Disposition	Decision
ADOPT FOR DESIGN	Independent educational glycemic context; explicit measured/estimated distinctions; compatible available carbohydrate; provenance and coverage; partial/abstention states; neutral, fact-linked local wording.
INVESTIGATE FURTHER	Record-level source admission, cultural matching, input robustness, mixed-meal agreement for intended uses and objective consumer comprehension; any incremental benefit of AI.
DEFER	Global score integration, personal glucose/insulin predictions, medication or dosing actions, meal health/safety grades and claims of spike prevention.

Bibliography: methods, datasets and definitions

Primary DOI/PMID or institutional links follow. Access levels, funding and conflicts are on pages 26-27. Search/access date: 11 October 2026 UTC. Bibliographic years identify publication, not retrieval. No subscription or paid standard access is implied.

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S. Catalogue/status inspected; full 18-page paid standard not obtained. Confirmed 2021; review shown in progress in 2026.

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Project dependency: DAY01, REC01, REF01, MEAL01, IDX01, UX01 and the NKS01 design direction supply the stated interpretation boundaries; they are not independent clinical evidence. Repository context:

<https://github.com/drYves/nutrikom-com>. No code or product state was changed by this review.