

NUTRITIONAL DICTIONARY OF FORMULA COMPONENTS

Proteins, amino acids, minerals, vitamins, lipids, carbohydrates and fiber

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RESEARCH AND PREFORMULATION DOCUMENT. This is not a medical prescription or an authorized formula for human use.

Purpose

To explain in clear, organized and technically cautious language each nutrient group described in the enteral nutrition support study, emphasizing normal function, potential contribution within a formula and the cautions that prevent interpreting a nutrient as a drug.

How to use this work

Entries support research, preliminary formulation and technical communication. They do not establish individual doses. Any formula intended for patients, children or pregnant women requires regulatory classification, professional evaluation and validation of the finished product.

Nutritional dictionary of components

This dictionary describes general physiological functions. A nutrient contributes to normal processes, but does not act alone or guarantee prevention, cure or reversal of disease. In clinical nutrition, benefit depends on indication, dose, the complete formula, absorption, coexisting disease and professional monitoring.

Proteins and peptides

Element	What it is	General contribution	Main caution
Whey protein	A complete dairy protein rich in indispensable amino acids.	Provides nitrogen and amino acids for tissue maintenance and repair and for enzymes, hormones and immune proteins.	Milk allergen; intake must fit age, renal function and nutrition goals.
Hydrolyzed whey protein WPH	Whey treated with enzymes to split part of the protein into smaller peptides.	May aid digestion and dispersion and supplies rapidly available protein.	Not automatically hypoallergenic or clinically superior; greater hydrolysis may increase bitterness and osmolality.
Peptides	Short amino acid chains produced by hydrolysis.	Absorbed through intestinal transport systems and contribute to total protein supply.	Profile depends on processing; molecular weight, taste, stability and ingredient evidence require control.

Amino acids

Element	What it is	General contribution	Main caution
L lysine	Indispensable amino acid.	Supports protein synthesis and tissue formation and can complement lysine limited proteins.	Whey is usually lysine rich; fortify only after amino acid profiling.
L cysteine	Sulfur amino acid that can become conditionally indispensable.	Part of proteins and glutathione synthesis.	Evaluate together with methionine and oxidation stability.
L methionine	Indispensable sulfur amino acid and methyl donor.	Supports protein synthesis and pathways producing	Excess can disturb amino acid balance; control total

Element	What it is	General contribution	Main caution
		cysteine and other compounds.	sulfur amino acids.
L arginine	Conditionally indispensable amino acid.	Participates in the urea cycle, protein synthesis and nitric oxide production.	Do not double dose; targeted use requires clinical review.
Glycine	Nonindispensable amino acid and protein component.	Participates in collagen, glutathione, creatine and metabolic conjugation.	Can change taste and osmotic load and does not replace complete protein.
L tryptophan	Indispensable amino acid.	Needed for protein synthesis and is a precursor of niacin, serotonin and melatonin.	Sensitive to degradation; do not make mood or sleep claims without evidence.
Amino acid profile	Quantitative measurement of amino acids in a protein or formula.	Shows whether the product meets the reference pattern for the target population.	Must be interpreted with digestibility, not total protein alone.

Macrominerals

Element	What it is	General contribution	Main caution
Potassium K	Main intracellular cation.	Supports fluid balance, nerve transmission and muscle contraction.	Low or high levels can affect cardiac rhythm; adjust in refeeding and renal disease.
Phosphorus P	Structural and metabolic mineral present as phosphate.	Builds bone and teeth and is part of ATP, membranes and acid base regulation.	Can fall dangerously during refeeding; control renal function and calcium relationship.
Calcium Ca	Macromineral stored mainly in bone.	Supports bone, muscle contraction, nerve signaling and coagulation.	Control vitamin D context, calcium phosphorus relationship, solubility and interactions.
Magnesium Mg	Intracellular cation and enzyme cofactor.	Supports energy production, protein synthesis and neuromuscular function.	Deficiency and excess are clinically important; adjust in refeeding and renal dysfunction.
Sodium Na and chloride Cl	Major extracellular electrolytes.	Maintain volume, osmotic and acid base balance; chloride contributes to gastric acid.	Excess can promote fluid retention in susceptible patients.

Trace minerals

Element	What it is	General contribution	Main caution
Zinc Zn	Cofactor for many enzymes.	Supports DNA and protein synthesis, immunity, growth	High doses interfere with copper; elemental amount

Element	What it is	General contribution	Main caution
		and normal wound healing.	matters.
Copper Cu	Trace element incorporated into enzymes.	Supports iron metabolism, connective tissue, nervous function and antioxidant defense.	Excess can be toxic; control zinc copper balance and hepatobiliary disease.
Selenium Se	Component of selenoproteins.	Supports antioxidant defense, thyroid metabolism and immune function.	Relatively narrow margin between need and excess.
Chromium Cr	Trace element whose essentiality and supplement response remain debated.	May participate in macronutrient metabolism, but added benefits are not established.	Do not promise glucose control; exclude toxic hexavalent chromium.
Iron Fe	Part of hemoglobin, myoglobin and enzymes.	Enables oxygen transport and energy metabolism.	Do not add indiscriminately; assess inflammation, infection and prenatal duplication.
Manganese Mn	Enzyme cofactor.	Supports metabolism, bone formation and antioxidant systems.	Can accumulate with liver disease or excessive exposure.
Iodine I	Component of thyroid hormones.	Supports thyroid function, growth and neurologic development.	Both deficiency and excess affect thyroid function.
Molybdenum Mo	Cofactor for several enzymes.	Participates in sulfur compound and purine metabolism.	Needed only in very small amounts; avoid overformulation.

Vitamins

Element	What it is	General contribution	Main caution
Vitamin B1 thiamin	Water soluble coenzyme vitamin.	Essential for carbohydrate metabolism and nerve function.	Critical before and during refeeding in at risk patients; sensitive to processing.
Vitamin B2 riboflavin	Precursor of FAD and FMN coenzymes.	Supports energy production and metabolism of fats, drugs and other vitamins.	Light sensitive; use protective packaging.
Vitamin B3 niacin	Includes nicotinic acid and nicotinamide.	Forms NAD and NADP for energy reactions and cellular repair.	Pharmacologic doses cause adverse effects; use authorized nutrition levels.
Vitamin B5 pantothenic acid	Part of coenzyme A.	Supports fatty acid synthesis and breakdown and many metabolic pathways.	Deficiency is rare; account for processing loss.
Vitamin B7 biotin	Cofactor vitamin for carboxylases.	Supports fat, glucose and amino acid metabolism.	High doses can interfere with laboratory tests.

Element	What it is	General contribution	Main caution
Inositol called B8 in some markets	Vitamin like compound not universally recognized as an essential vitamin.	Part of phospholipids and cell signaling.	Do not confuse with biotin; permitted use and claims vary by jurisdiction.
Vitamin B9 folate	Family of food folates and folic acid used in fortification.	Needed for DNA synthesis, cell division and blood formation; especially important around pregnancy.	Coordinate with prenatal programs; high folic acid can mask B12 deficiency.
Vitamin B12 cobalamin	Water soluble cobalt containing vitamin.	Supports red blood cells, neurologic function and DNA synthesis.	Absorption can be reduced by disease or medication; verify stability and potency.
Vitamin C ascorbic acid	Water soluble antioxidant vitamin.	Supports collagen synthesis, nonheme iron absorption and antioxidant protection.	Degraded by oxygen, heat, light and metals; requires justified overage and packaging.

Lipids

Element	What it is	General contribution	Main caution
Total lipids	Energy nutrients including triglycerides and fatty acids.	Provide concentrated energy, essential fatty acids and absorption of fat soluble vitamins.	Amount, quality, tolerance and oxidation all matter.
Medium chain triglycerides MCT	Fats containing medium length fatty acids.	Relatively easy to digest and absorb and provide concentrated energy.	Do not supply all essential fatty acids; excess can cause gastrointestinal intolerance.
High oleic and canola oils	Predominantly unsaturated oil sources.	Provide energy and help reduce the saturated share of the fat profile.	Control origin, refining, stability, allergens and omega balance.
Linoleic acid omega 6	Essential fatty acid.	Supports membranes, growth and lipid mediator production.	Maintain proportional balance with other fats.
Alpha linolenic acid omega 3	Essential plant fatty acid.	Supports membranes and is a limited precursor of EPA and DHA.	Conversion is low and the oil oxidizes readily.
EPA and DHA long chain omega 3	Marine or algal polyunsaturated fatty acids.	Components of membranes; DHA is important in retina and brain.	Require oxidation and contaminant specifications; claims and doses need specific review.

Carbohydrates and fiber

Element	What it is	General contribution	Main caution
Carbohydrates	A principal energy substrate group.	Supply glucose and energy and spare protein from use as fuel.	Source and delivery rate affect glycemia, tolerance and osmolality.
Maltodextrin	Glucose polymers made from starch.	Provides energy with less sweetness and often less osmotic contribution than free glucose.	Raises blood glucose and is not fiber; specify source and dextrose equivalent.
Glucose syrup solids	Starch derived carbohydrates of different chain lengths.	Supply energy and processing functionality.	Control dextrose equivalent, sugars, osmolality and glycemic effect.
Simple sugars	Rapidly available mono and disaccharides.	Provide energy and palatability.	Excess increases sweetness, osmotic load and glycemic exposure.
Resistant dextrin	Low viscosity fermentable soluble fiber.	May support bowel regularity and microbial metabolite production.	Introduce gradually; may cause gas and is not suitable for every condition.
Partially hydrolyzed guar gum PHGG	Reduced viscosity soluble fiber.	May help normalize stool consistency and frequency in some people.	Response varies; validate tube flow, tolerance and stability.

How to interpret the dictionary

- Deficiency, adequacy and excess are different states; more does not mean greater benefit.
- Chemical form is only one determinant. Elemental dose, matrix, stability, interactions and tolerance also matter.
- In undernourished patients, refeeding alters phosphorus, potassium, magnesium, glucose and thiamin and requires clinical monitoring.
- Final values must be stated per 100 mL, per serving and per intended daily intake and verified at end of shelf life.
- Children and pregnant women have their own standards, limits and reference patterns; adult amounts must not be extrapolated.

Conclusion

Nutritional value arises from balance. Protein supplies a complete amino acid matrix; carbohydrates and lipids supply energy; vitamins and minerals enable many normal reactions; and fiber may support intestinal function. Sound design does not maximize each substance, but combines safe, bioavailable, stable amounts appropriate for the population.

Working questions

- Which elements are required for a complete formula and which are optional?
- Which amounts occur naturally in WPH and which would require fortification?
- How does the profile change among adult, child recovery and maternal supplement products?
- Which interactions can reduce stability, solubility or absorption?
- Which parameters must be measured at the end of shelf life?

Essential references

1. NIH Office of Dietary Supplements. Vitamin and Mineral Fact Sheets. <https://ods.od.nih.gov/factsheets/list-VitaminsMinerals/>
2. FAO. Dietary protein quality evaluation in human nutrition. <https://openknowledge.fao.org/handle/20.500.14283/i3124e>
3. WHO. Healthy diet. <https://www.who.int/news-room/fact-sheets/detail/healthy-diet>
4. WHO and FAO. Vitamin and mineral requirements in human nutrition. <https://www.who.int/publications/i/item/9241546123>
5. US National Academies. Dietary Reference Intakes. <https://www.nationalacademies.org/hmd/health-and-medicine/division/food-and-nutrition-board/dietary-reference-intakes>