

Macronutrients and Micronutrients

Macronutrients & Micronutrients – Quick Reference Notes

1. Overview

Category	Primary Role	Typical Sources	Daily Requirement (Adult)
Macronutrients	Provide energy & building blocks for growth, repair, and metabolism	Carbohydrates, proteins, fats	Varies by age, sex, activity level (see sections below)
Micronutrients	Support enzymatic reactions, hormone synthesis, immune function, and cellular signaling	Vitamins & minerals	Measured in milligrams (mg) or micrograms (µg); specific RDA values per nutrient

2. Macronutrients

2.1 Carbohydrates

- **Function:** Main energy source; 1g = 4kcal.
- **Types**
 - *Simple:* monosaccharides (glucose, fructose) and disaccharides (sucrose, lactose).
 - *Complex:* oligo- and polysaccharides (starches, dietary fiber).
- **Recommended Intake**
 - 45–65% of total calories.
 - At least 25g of **dietary fiber** per day (women) / 38g (men).
- **Key Food Groups**
 - Whole grains, fruits, vegetables, legumes, dairy, nuts, seeds.

2.2 Proteins

- **Function:** Structural components (muscle, enzymes, hormones), transport, immune defense. 1g = 4kcal.
- **Amino Acid Classification**

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- *Essential* (9 for adults): histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, valine.
- *Non-essential*: can be synthesized by the body.
- **Recommended Intake**
 - 0.8g/kg¹ body weight/day for sedentary adults (56g for a 70kg person).
 - 1.2–2.0g/kg¹ for athletes, pregnant/lactating women, or during illness/recovery.
- **Key Food Groups**
 - Animal: meat, poultry, fish, eggs, dairy.
 - Plant: legumes, soy products, nuts, seeds, whole grains.

2.3 Fats (Lipids)

- **Function**: Dense energy source (9kcal/g¹), essential fatty acids, fat-soluble vitamin absorption, cell-membrane structure, hormone production.
- **Classification**
 - *Saturated fatty acids (SFAs)* – solid at room temperature; limited intake recommended.
 - *Monounsaturated fatty acids (MUFAs)* – olive oil, avocados.
 - *Polyunsaturated fatty acids (PUFAs)* – omega-3 (ALA, EPA, DHA) & omega-6 (LA).
Essential fatty acids: α-linolenic acid (omega-3) & linoleic acid (omega-6).
 - *Trans fats* – industrially hydrogenated; avoid.
- **Recommended Intake**
 - 20–35% of total calories.
 - 10% from saturated fats.
 - Omega-3: 1.1g (women) / 1.6g (men) EPA/DHA equivalents per day.
- **Key Food Groups**
 - Healthy oils (olive, canola, flaxseed), fatty fish,