

# Therapeutic food

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**Therapeutic foods** are foods designed for specific, usually nutritional, therapeutic purposes as a form of dietary supplement. The primary examples of therapeutic foods are used for emergency feeding of malnourished children or to supplement the diets of persons with special nutrition requirements, such as the elderly.

Therapeutic foods are usually made of a mixture of protein, carbohydrate, lipid and vitamins and minerals. Therapeutic foods are usually produced by grinding all ingredients together and mixing them. “The mixing process allows for the protein and carbohydrate components of the food to be embedded in the lipid matrix.<sup>[1]</sup> The size of the particles in the mixture has to be less than 200  $\mu\text{m}$ <sup>[1]</sup> for the mixture to maintain its consistency. Using this method, the therapeutic food is produced and packaged without using water, which would eliminate the issue of spoilage. Some therapeutic foods require the addition of water before administering, while others can be consumed as-is. Therapeutic foods are designed and manufactured to ensure that they are ready to eat straight from the packaging. Those foods resist bacterial contamination and require no cooking.<sup>[1]</sup>

The World Health Organization's standards for the treatment of malnutrition in children specify the use of two formulas during initial treatment, F-75 and F-100. These formulas contain a mixture of powdered milk, sugar, and other ingredients designed to provide an easily absorbed mix of carbohydrates and essential micronutrients. They are generally provided as powdered mixes which are reconstituted with water. The WHO recommends the use of these formulas, with the gradual introduction of other foods, until the child approaches a normal weight.<sup>[2]</sup>

The standard treatment of childhood malnutrition is administered in two phases.<sup>[3]</sup> Phase one usually deals with children who are severely malnourished and very ill as a result. The therapy used in this phase is F-75, a milk-based liquid food containing modest amounts of energy and protein (75 kcal/100 mL and 0.9 g protein/100 mL) and the administration of parenteral antibiotics.<sup>[4]</sup> When an improvement in the child's appetite and clinical condition is observed, the child is entered into phase two of the treatment. This phase uses F-100. F-100 is a “specially formulated, high-energy, high-protein (100 kcal/100 mL, 2.9 g protein/100 mL) milk-based liquid food”.<sup>[4]</sup> The child is in phase two until he/she is no longer wasted [weight-for-height z score (WHZ) 2].<sup>[4]</sup> Phase two starts while the child is at the hospital but is usually completed after the child goes home. The parent is then responsible for feeding the child a flour supplement made of cereal and legumes as a replacement for the milk-based foods used in phases one and two.<sup>[4]</sup>

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## Ready-to-use therapeutic food

A subset of therapeutic foods, ready-to-use therapeutic foods (RUTFs), are energy-dense, micronutrient-enriched pastes that have a nutritional profile similar to the traditional F-100 milk-based diet used in inpatient therapeutic feeding programs and are often made of peanuts, oil, sugar and milk powder.<sup>[6]</sup>

RUTFs are a “homogeneous mixture of lipid-rich and water-soluble foods.”<sup>[1]</sup> The lipids used in formulating RUTFs are in a viscous liquid form. The other ingredients are in small particles and are mixed through the lipid. The other ingredients are protein, carbohydrate, vitamins and minerals. The mixture needs to be homogeneous for it to be effectively consumed. To do this, a specific mixing process is needed.<sup>[1]</sup> The fat/lipid component of the RUTF is heated and stirred first. The heat should be maintained for the lipid to remain in the optimum form for mixing in the other ingredients. The powdered protein, carbohydrate, and vitamins and minerals are then slowly and gradually added to the lipid, while the lipid is being vigorously stirred. After all the ingredients are added and vigorous stirring is maintained, the mixture is then stirred with more speed and for several minutes.<sup>[1]</sup> If the powdered ingredients have a particle size that is larger than 200 µm, the mixture starts to separate; the particle size needs to be maintained at less than 200 µm.<sup>[1]</sup>

The most common RUTFs are made of four ingredients: sugar, dried skimmed milk, oil, and vitamin and mineral supplement (CMV).<sup>[5]</sup> Other qualities that RUTFs should have included a texture that is soft or crushable and a taste is acceptable and suitable for young children. RUTFs should be ready to eat without needing to be cooked. A very important characteristic is that the RUTFs have a long shelf-life and that they are micro-organism contamination resistant, without the need for expensive packaging. Since the ingredients need to be suspended in liquid, the liquid used in producing RUTFs needs to be fat/lipid. 50% of the protein forming RUTFs should come from dairy products.<sup>[5]</sup>

### Effectiveness

There is insufficient evidence to establish the effectiveness of ready to use therapeutic food within the person's own home for the treatment of severe acute malnutrition in children under five years of age.<sup>[7]</sup>

### Examples

- K-Mix 2, a high energy food, developed by UNICEF in the 1960s
- Citadel spread, a paste of peanuts, oil, sugar and milk powder in use since 1971
- Plumpy'nut, a solid RUTF, made in France since 1996 for treatment of severe acute malnutrition
- Medika Mamba, an enriched peanut butter therapeutic food produced and distributed by Meds and Food for Kids in Haiti since 2003
- BP-100, a nutrient-fortified wheat-and-oat bar designed to provide a similar nutritional profile to F-100 by the World Health Organization

- Nutribun, a fortified bread product developed by United States Agency for International Development and distributed under the Food for Peace program

## References

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### An example of the composition of a RUTF<sup>[5]</sup>

Nutrition composition	
Moisture content	2.5% maximum
Energy	520-550 Kcal/100g
Proteins	10 to 12% total energy
Lipids	45 to 60% total energy
Sodium	290 mg/100g maximum
Potassium	1100 to 1400 mg/100g
Calcium	300 to 600 mg/100g
Phosphorus (excluding phytate)	300 to 600 mg/100g
Magnesium	80 to 140 mg/100g
Iron	10 to 14 mg/100g
Zinc	11 to 14 mg/100g
Copper	1.4 to 1.8 mg/100g
Selenium	20 to 40 µg
Iodine	70 to 140 µg/100g
Vitamin A	0.8 to 1.1 mg/100g
Vitamin D	15 to 20 µg/100g
Vitamin E	20 mg/100g minimum
Vitamin K	15 to 30 µg/100g
Vitamin B1	0.5 mg/100g minimum
Vitamin B2	1.6 mg/100g minimum
Vitamin C	50 mg/100g minimum
Vitamin B6	0.6 mg/100g minimum
Vitamin B12	1.6 µg/100g minimum
Folic acid	200 µg/100g minimum
Niacin	5 mg/100g minimum
Pantothenic acid	3 mg/100g minimum
Biotin	60 µg/100g minimum
n-6 fatty acids	3% to 10% of total energy
n-3 fatty acids	0.3 to 2.5% of total energy

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