Milk in Treatment of Moderate and Severe Undernutrition

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Cow’s milk products have a central role in treatment of undernutrition in both industrialized and developing countries. In industrialized countries, almost all products used for enteral feeding of malnourished patients in a hospital setting are based mainly on cow’s milk as the protein source. This is also the case in developing countries, where the introduction of new products with a high milk content has resulted in marked improvements in weight gain and reduction in mortality. It is not surprising that milk has such positive effects on recovery after undernutrition, as it has evolved as a food to support the offspring during a period of immaturity, vulnerability and high growth velocity.

The components of cow’s milk that are especially important for growth are protein, minerals and lactose, while cow’s milk fat is usually not used in the products for treating undernutrition. Milk protein is effective in supporting growth. FAO/WHO has recommended the protein digestibility-corrected amino acid score (PDCAAS), as the method to evaluate protein quality. This score is calculated from the first limiting essential amino acid needed in children recovering from undernutrition, and milk is the food with the highest PDCAAS scores, about 120% [1]. Furthermore, the protein fraction contains many peptides and other bioactive factors, which might have a special effect on growth and recovery from undernutrition. Milk is also an important source of minerals supporting growth (type II nutrients), such as potassium, magnesium, phosphorus and zinc, which are especially important during catch-up growth [2]. The high lactose content is also likely to have a positive effect on growth. The fear of symptoms due to lactose intolerance is likely to be overestimated as malnourished children seem to tolerate products with a high lactose content well [3]. The positive effects could be due to a prebiotic effect of lactose entering the large intestine, improved absorption of minerals and beneficial luminal effects [4, 5]. Furthermore, regular consumption of milk will
upregulate the lactase content in the intestine and thereby facilitate digestion of lactose and adapt the colon bacteria, as pointed out by Savaiano in his paper for this meeting.

In addition to the well-documented effects on weight gain, which has been a main outcome in most studies of treatment of children with undernutrition, there is strong evidence that milk also has a specific effect on linear growth. This is discussed in detail in the paper by Mølgaard for this meeting, which also discusses the potential effect of milk on muscle mass. A specific (positive) effect of milk on muscle mass would be valuable in children with undernutrition, but the evidence for such an effect is not strong, especially because very few studies have examined body composition during treatment of children with undernutrition.

Since the mid 1990s, F-100 has been the preferred product used for treatment of severe undernutrition. It contains skimmed milk powder and whey, vegetable oil, sugar, maltodextrin, and a mineral/vitamin mix. Thus, 100% of the protein comes from milk. Another successful type of products for treatment of children with severe and moderate undernutrition is ready to use foods, especially the milk- and peanut butter-based product manufactured under the trade name PlumpyNut, in which about 50–60% of the protein content comes from skimmed milk powder and whey. A subgroup of these products is called Lipid Based Nutrient Supplements [6]. Within both categories of foods, new products are developed, and one aim has been to reduce the amount of milk protein included, in order to reduce the price [7]. Corn Soy Blend (CSB) has been used for treatment of moderate undernutrition, but there is now consensus that this is not an effective treatment, as the content of anti-nutrients and fiber is too high and as there is no animal protein [8]. An improved product, CSB++, which has an 8% content of skimmed-milk protein, has been developed by WFP for children from 6 to 24 months [7]. The price is approximately triple that of CSB. Results from intervention studies are needed to finally justify the revised composition of CSB++.

It is evident that children with severe undernutrition should be treated with products with high milk content, as such products are very effective in stimulating growth and reducing mortality. Regarding treatment of the 36 million children with moderate wasting, it is important to consider the cost of the products. At the WHO/UNICEF/WFP/UNHCR 2008 meeting on management of moderate undernutrition, it was concluded that animal source foods and especially milk promote recovery, but also that there was a need to perform more studies to determine the minimal amount of milk protein needed to make a clinically relevant difference [8]. Such studies should not only focus
on weight gain but also on linear growth, body composition, physical activity and cognitive development.

References