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SPECIALIST FORMULAS: WHICH ONE IS THE RIGHT TOOL FOR THE JOB?

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Feeding infants can be challenging at the best of times and breast milk is considered to be the best. However, there are times when breast milk has some limitations, e.g. in some rare metabolic conditions such as phenylketonuria (PKU), in preterm infants with a birth weight less than 1,500g (1) and in children with allergy, breast milk may need to be limited, fortified or excluded all together either through necessity or due to mother's choice.

The range of specialist formulas is ever expanding to provide infants with the best possible nutrition. Feed requirements should be regularly reviewed to ensure that the infant is receiving the most appropriate formula for nutritional needs. This can vary from a temporary requirement for a specialist formula, e.g. a few months to manage acute lactose intolerance, or longer term where the infant will remain on the specialist formula until they are over one year of age.

ALLERGY AND INTOLERANCE FORMULAS

For many years, infants with cows' milk protein allergy (CMPA) or lactose intolerance were given soya based formulas, e.g. Cow and Gate Infasoy or SMA Wysoy as first line treatment; however, these have been superseded by specialist formulas which are better tailored to the infant's diagnosis. Soya formulas are not recommended for infants who are less than six months due to the potential risk of developing

Table 1: Allergy and intolerance formulas

Product name (manufacturer)	Composition	Indications for use
Extensively Hydrolysed Formulas		
Nutramigen Lipil 1 Nutramigen Lipil 2 (>6 months) (Mead Johnson Nutrition)	Extensively hydrolysed casein protein	Whole protein and/or disaccharide intolerance
Aptamil Pepti 1 Aptamil Pepti 2 (> 6 months) (Aptamil)	100% hydrolysed whey protein. Contains lactose	Cows' milk protein allergy/intolerance
Peptide Peptide 1 + (>12 months) (Nutricia SHS)	Contains small amount of MCT* fat. Protein source from soya and hydrolysed pork collagen	Whole protein and/or disaccharide intolerance, short bowel syndrome, malabsorption
Pepti-Junior (Cow & Gate)	50% of fat content is MCT. Semi-elemental	
Pregestimil Lipil (Mead Johnson Nutrition)	55% of fat content is MCT. Extensively hydrolysed casein	
MCT Peptide MCT Peptide 1+ (>12 months) (Nutricia SHS)	Main fat source is MCT. Protein source is hydrolysed pork collagen and soya	Whole protein intolerance and/or fat malabsorption, short bowel syndrome, pancreatic insufficiency
Infatrini Peptisorb (Nutricia SHS)	1kcal/ml ready-made feed. Extensively hydrolysed whey protein. Contains lactose	Whole protein intolerance, short bowel syndrome, malabsorption, catch up growth
Amino Acid Formulas		
Neocate LCP (Nutricia SHS)	Free amino acid. No peptide chains. Contains a small amount of MCT	Whole protein/hydrolysate intolerance, short bowel syndrome, malabsorption
Neocate Active (Nutricia SHS)		
Nutramigen Lipil AA (Mead Johnson Nutrition)	Free amino acids. No peptide chains	
Weaning foods		
Neocate Spoon (Nutricia SHS)	Amino acid based nutritional powder suitable for weaning from 6 months	Cows' milk protein/multiple food protein allergy/intolerance

MCT* - Medium Chain Triglycerides

Emma has been a Paediatric Dietitian for four years. She works mostly in the community setting with a varied caseload, including children with disability, dysphagia, CF, coeliac disease and PKU. Emma also works with children with ADHD and ASD.

Table 2: High energy formulas

Product name (manufacturer)	Calories/ 100ml	Protein (g)/100ml	Features	
Infatrini (Nutricia SHS)	100	2.6	Contains LCPs* Suitable for preterm infants	Meet WHO/FAO guidelines for protein/energy ratio for catch up growth (4)
Similac High Energy (Abbott Nutrition)			Contains LCPs and a palm olein oil free fat blend to promote calcium absorption and bone mineralisation. Suitable for preterm infants	
SMA High Energy (SMA Nutrition)	91	2	Contains LCPs. Not suitable for preterm infants	

*LCP – Long Chain Polyunsaturated Fatty Acids

Table 3: Preterm formulas and breast milk fortifiers

Product name (manufacturer)	Usage
Preterm formulas	
Aptamil Preterm (Milupa)	Hospital only
Nutriprem 1 (Cow & Gate)	
SMA Gold Prem (SMA Nutrition)	
Nutriprem 2 (Cow & Gate)	Post discharge
SMA Gold Prem (SMA Nutrition)	
Breast milk fortifiers	
Cow & Gate Nutriprem Breast Milk Fortifier (Cow & Gate)	Hospital only
SMA Breast Milk Fortifier (SMA Nutrition)	

a secondary sensitivity to soya and the undesirable exposure to phytoestrogens which may cause developmental changes in infants less than six month old (2). They may be used in infants with CMPA or lactose intolerance above six months who do not have sensitivity to soya but are not considered to be a first line choice. Soya formulas are often used from birth in infants with galactosaemia, a condition where infants are unable to metabolise galactose, which is one of the sugars produced when lactose is broken down in the body. Although there are specialist formulas available for infants with galactosaemia, use of soya formulas is supported by ESPGHAN (European Society for Paediatric Gastroenterology, Hepatology and Nutrition Committee on Nutrition) (3).

Lactose-free formulas such as SMA LF or Enfamil O-Lac are cows' milk based but their carbohydrate source is glucose rather than lactose. Lactose intolerance can be a short-term condition and infants may be prescribed low lactose formula to treat symptoms and standard formula can be reintroduced after six to eight weeks. Long-term use of lactose-free formula is required if there is a diagnosis of congenital lactase deficiency, which is rare. This is a permanent condition and the infant will need to remain on lactose-free formula until they are over 12 months when adult lactose-free milk can be introduced. Lactose-free formulas are also used where primary lactose intolerance is indicated; however, this condition is rare in children below two years of age.

Extensively hydrolysed protein formulas (see Table 1) are suitable for use in some infants with CMPA. Symptoms such as vomiting, diarrhoea, reflux and eczema can be relieved by introducing these formulas which contain peptides as opposed to whole proteins. Peptides are less likely to promote an allergic

Table 4 – GOR formulas and thickeners

Product name (manufacturer)	Composition	Advantages	Disadvantages
Formulas			
Enfamil AR (Mead Johnson Nutrition)	Pre-gelatinised rice starch	Nutritionally balanced with the same energy content as standard formula, thickens on contact with the stomach, teat size may not need to be increased	May cause colic, wind and constipation
SMA Staydown Infant Milk (SMA Nutrition)	Pre-cooked corn starch		
Thickeners			
Instant Carobel (Cow & Gate)	Carob bean gum	Suitable for infants <12 months old	Poorly digested, may cause colic, may reduce bioavailability of some nutrients, thickens formula in the bottle – more effort required to suckle. May need larger teat hole size
		Small kcal contribution to energy intake	
Nutilis (Nutricia)	Maize starch	Amylase resistant Suitable for infants <12 months old with faltering growth – can significantly increase energy density of feed	Not suitable for use in infants <12 months old without faltering growth, thickens formula in the bottle – more effort required to suckle. May need larger teat hole size
Resource Thicken Up (Nestle)			
Thick n Easy (Fresenius Kabi)			
Thixo D (Sutherland Health Ltd)			
Vitaquick (Vitaflo)			

response and they are more palatable than amino acid (AA) based formulas. AA based formulas (see Table 1) are used in infants with CMPA if symptoms are not resolved by introducing the extensively hydrolysed protein formula or the infant's symptoms are considered to be severe at diagnosis.

HIGH ENERGY FORMULAS

Standard infant formulas provide 67kcal per 100ml; however, for some infants with increased energy needs, e.g. infants with cystic fibrosis, prematurity or those who need to achieve catch up growth, this is not always sufficient. High energy formulas (see Table 2) are also useful when feeding infants with fluid restrictions or those who have limited oro-motor skills when feeding which can lead to fatigue during feeds. High energy formulas also contain more protein than standard formulas.

PRETERM INFANT FORMULAS AND BREAST MILK FORTIFIERS

Preterm and low birth weight infants benefit greatly from breast milk and where possible maternal or donor breast milk should be used. Use of breast milk in preterm infants significantly reduces the incidence of necrotising enterocolitis (NEC) and respiratory infections. They also benefit from improved bone mineralisation and neurological development (5). Many very premature infants require parenteral nutrition and minimal amounts of breast milk can be given as trophic feeds via the oral or enteral tube feeding route. Use of breast milk may help to reduce the duration of the parenteral nutrition as breast milk is better tolerated than preterm formula.

Breast milk fortifier can be added to breast milk to increase calorie and protein content which may be required in some low weight preterm infants to ensure nutritional needs are met and growth is adequate. Breast milk fortifiers are only available for hospital use, see Table 3. Additional vitamin and iron supplementation is required by all preterm infants which are breastfed, which are prescribed by medical staff. When breast milk is not available preterm formulas are used. These formulas are more calorie dense than standard infant formulas and contain increased amounts of various nutrients, e.g. protein, iron, calcium and vitamin A and D. They are designed to promote growth and development similar to that of a foetus in the womb (6). There are two types of preterm formulas – 1) Preterm/low birth weight formula for hospital use only and 2) Nutrient enriched post discharge formula (see Table 3). Prior to discharge, post discharge formula will be introduced and preterm infants can be prescribed this formula up to six months of corrected age. Some infants require nutritional support for longer than six months and this should be reviewed regularly by the dietitian and medical team.

GASTROESOPHAGEAL REFLUX (GOR) FORMULAS

GOR is a common condition in infants where regurgitation and vomiting can compromise growth and development. Thicker formulas may help to reduce these symptoms but are unlikely to reduce the volume of acid reflux for the infant (7). Thickening formulas and thickeners are available and both have some advantages and disadvantages (see Table 4 on previous page).

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Questions relating to: *Specialist formulas: which one is the right tool for the job?*
Type your answers below and then **print for your records.** Alternatively print and complete answers by hand.

Q.1	In what metabolic conditions would breast milk need to be limited or excluded from an infant's feeding?
A	
Q.2	Why are soya formulas no longer recommended for lactose intolerant infants under six months old?
A	
Q.3	What formula is suitable for infants with cows' milk protein allergy and why?
A	
Q.4	High energy formulas are suitable for what conditions and why?
A	
Q.5	Why is breast milk best for preterm and low birth weight infants?
A	
Q.6	Why would breast milk fortifier be added to breast milk for preterm infants?
A	
Q.7	Name the two types of preterm formulas giving a product example for each.
A	
Q.8	Thicker formulas are used for which condition and why?
A	

Please type extra notes here . . .