



Flavor World of Infants - Glutamate and Mother's Milk

What is our first encounter with taste? Breastfeeding is fundamentally a biological process which allows a mother to continue to nourish her infant after birth. Of the 20 free amino acids in human breast milk, glutamate is the most abundant, accounting for more than 50% of the total free amino acid content. Its presence may influence taste acceptability to infants.

Neonatal human infants respond with a quiet and relaxed face when ingesting distilled or tap water. A sour taste always triggers nose-wrinkling, lip pursing and some gaping, whereas bitter-tasting solutions induced head-shaking, frowning, tight closure of the eyes, depressed mouth-corners, wide mouth opening and tongue protrusion, leading to wide gaping and sometimes spitting and drooling. In contrast, a sweet taste always induces eager sucking, smacking and licking movements.

Interestingly, an unseasoned vegetable broth causes facial displays similar to those induced by sour tasting liquids. However, a monosodium glutamate (MSG) seasoned vegetable broth triggers facial expressions very similar to those induced by the sweet taste. These results suggest that glutamate is a palatable taste stimulus for human infants. Because of its presence in breast milk, it might conceivably contribute to the taste acceptability of a soup that has the characteristic *umami* taste.

Nursing mothers are often told to consume certain foods and beverages and even herbs and spices. This is because there is a strong belief that a mother can optimize the quality and quantity of her milk to meet the needs of her child, through her own diet and psychological wellbeing. The following foods are just some examples that are recommended for nursing mothers: juices, fenugreek tea and milk, green leafy vegetables, *halava* (a sesame-based sweet) and yogurt in Egypt; special teas from so called 'hot' plants containing sesame seeds, absinthe and cotton seeds in North Mexico; soups made with pork and vegetables in Cambodia; soups containing marungay leaves and papaya in the Philippines and steamed glutinous rice in Japan.

The type of foods and herbs eaten by women during pregnancy, and hence the flavor principles of the culture, may be experienced by an infant before his or her first taste of solid food. Research has shown that the flavors of the foods eaten by a mother during pregnancy are transmitted to the amniotic fluid. Infants, in their mother's milk, will experience some of these flavors. The flavor of human milk directly reflects the foods, spices and beverages eaten by the mother. The infant not only detects these flavors but they also serve to modulate feeding. Studies on other animals reveal that young animals prefer flavors experienced *in utero* and in their mother's milk.

Amniotic fluid and breast milk share a commonality in their flavor profiles with the foods eaten by the mother. This suggests that breast milk may bridge the gap between the experiences with flavors *in utero* and those in solid foods. Moreover, breastfeeding, unlike formula feeding, provides the infant with the potential for a rich source of varying chemosensory experiences, as well as - literally - the warmth of being close to the mother's heart. The different flavors experienced through their mother's milk may be unique for each infant but can also help to identify the culture to which they belong. Even the philosopher Hippocrates knew, thousands of years ago, that breast milk was best for the child.

It seems that if the flavors experienced by breast-fed infants are rich in variety and that the flavors consumed by their mothers set the stage for child and adult preferences.

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