The importance of having 'Good Taste'

The power to change the lives of persons with deafblindness around the world

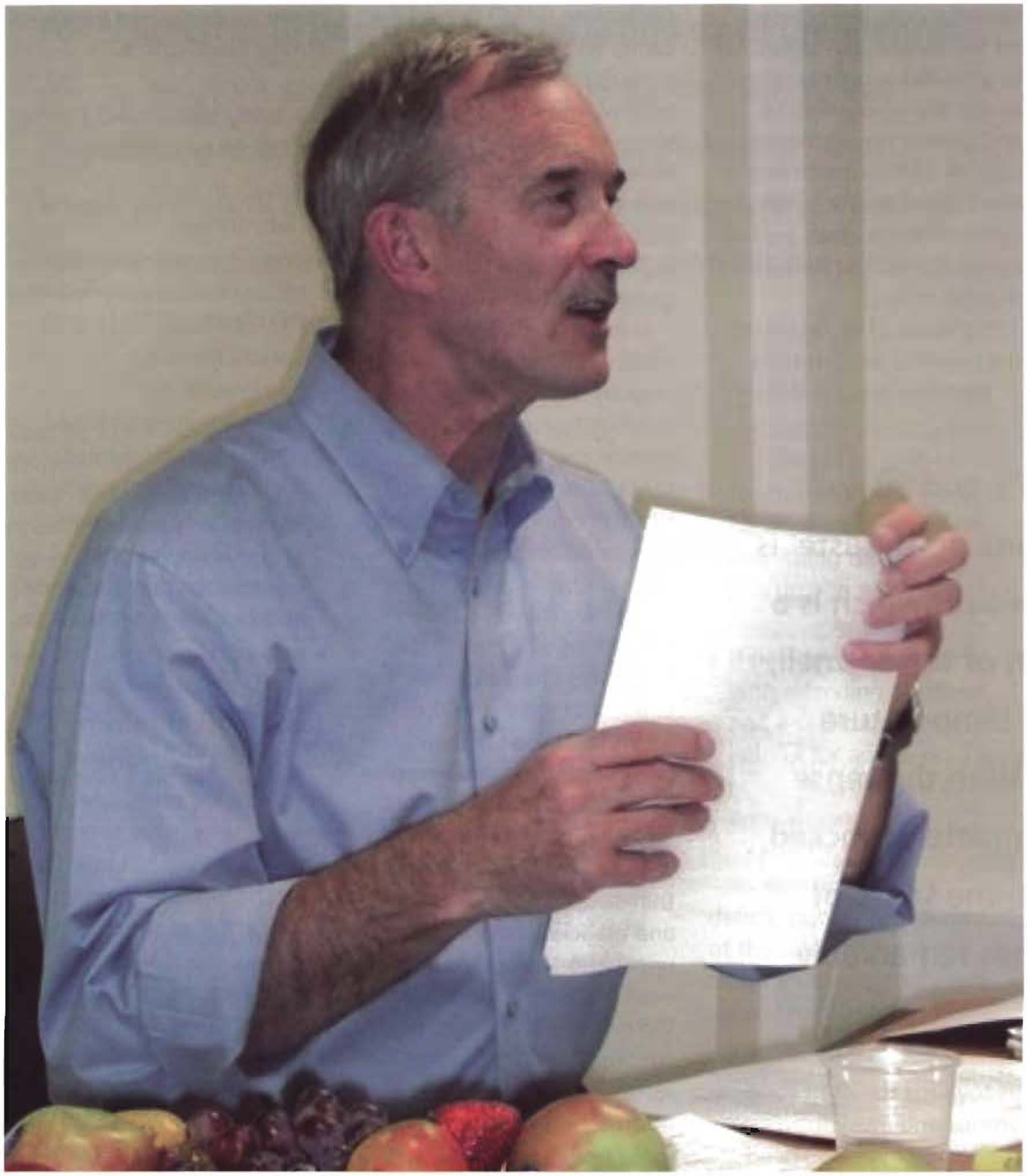
David Brown, from California Deafblind Services, continues his very successful series of articles about the senses and how they interact

Taste (the gustatory sense) is the sense that drives our appetite, and also protects us from poisons. The senses of taste and smell are very closely linked, although stimuli through each of these senses travel by very different neurological routes to reach the brain and provide information about environmental events and factors. Previous visual, auditory and tactile experiences can become powerfully attached to certain taste sensations and memories, and can stimulate strong taste anticipatory expectations.

The taste receptors, located in small areas called taste buds, are distributed throughout the mouth, right down to the oesophagus. The tongue has the most of these receptors, about 65% of them, but the rest are distributed over the epiglottis, the soft palate, and the laryngeal and oral pharynx. The taste receptors are sensitive to chemical stimulation provided by food substances dissolved in saliva in the mouth. Many nerves are responsible for transmitting taste information to the brain, and because of these multiple neural pathways a total loss of taste is very rare. Alongside distinctive and identifying taste information (for example, tastes that we might refer to precisely as 'banana' or 'coffee' or 'Parmesan cheese'), there are less specific and more generalised aspects of taste sensations (those responding to stimuli from the skin surface such as stinging, burning, and chilling) which can be induced by many foods through the trigeminal nerve (the fifth cranial nerve) in the tongue and the oral cavity. Facial palsy results from trigeminal nerve damage so is likely to involve some compromise to the full and effective sense of taste. We know that in the population of children with CHARGE Syndrome, for example, about 43% have damage to this fifth cranial nerve, which must present an additional, taste, difficulty to their other challenges with eating and drinking.

Infants experience taste sensations before birth as the first taste buds appear at about 8 weeks gestational age, and a foetus sucks and swallows up to 1 litre of amniotic fluid every day, so at the time of birth a functional sense of taste is already well-developed. Newborn infants have a high level of discriminatory taste because they have a great number of taste buds (about 7,000), and the number actually continues to increase for a period after birth. But the effectiveness and the number of the taste buds decreases with advancing age, so that a 60 year old person probably

"Many nerves are responsible for transmitting taste information to the brain, and because of these multiple neural pathways a total loss of taste is very rare"



has only about 2,000 of them remaining. You may have experienced older people complaining about the increasing blandness of foods and needing more salt or spice or sugar in their meals to stimulate their taste buds. Certain medications can be responsible for taste loss and should be reviewed in any child suspected of having disturbance of the sense of taste. Excessive dryness of the oral cavity, for example due to dehydration, can suppress the effectiveness of the sense of taste. This dryness can also be a common side effect of a number of medications (for example antidepressants, or antihistamines) and also of a number of diseases (such as diabetes).

There are specific types of taste cells that are stimulated by each of the five taste groups – sweet, sour, salt, bitter, and umami. This last taste has been known to the Japanese for a long time but has only recently been recognised in Europe and the US, where we used to think there were only four taste groups; it's the taste of protein (think of bacon for example). Many books and articles have diagrams that show maps of the human tongue with distinct areas that respond to each of these five taste groups, but now it is thought that these maps are very over-simplified. Taste

sensation can be localised on the tongue but sensitivity to all tastes is distributed across the whole tongue, and indeed across the other regions of the mouth where there are taste buds, but certainly some areas are more responsive to certain tastes than to others.

The sense of taste drives the appetite and protects us from poisons, so it steers us towards the right food groups and away from the wrong ones. We need carbohydrates, which is why we like the taste of sugar so much, and we are attracted to salty tasting foods because we must have salt in our diet. We also have an need for protein, and amino acids are the building blocks for proteins, so the taste quality umami, which is the meaty, savoury taste, drives our appetite for amino acids. Bacon is a classic food that stimulates the umami receptors because it is a rich source of amino acids. Monosodium Glutamate (MSG) does the same, which is why so many manufacturers use it as an additive in processed foods – it makes us want to eat them. Bitter and sour tastes cause aversive, avoidance reactions because most poisons are bitter, and food that has gone bad turns sour.

“Between 75% and 90% of what we think of as ‘taste’ is actually ‘flavour’, which is a combination of taste, smell, texture and temperature sensations. With the sense of smell completely blocked, for example, the sense of taste becomes remarkably ineffective”

Between 75% and 90% of what we think of as ‘taste’ is actually ‘flavour’, which is a combination of taste, smell, texture and temperature sensations. With the sense of smell completely blocked, for example, the sense of taste becomes remarkably ineffective (have you ever tried to enjoy eating a meal when you are completely congested with influenza?). As infants increase their experience of life they also come to associate visual and hearing information with taste memories, so that strong expectations and associations are already unconsciously operating for even quite young children. We can check this out for ourselves. With our noses held to block smell information, something that looks like cheese but tastes like a doughnut would be an unpleasant taste surprise, and produce an aversive response like gagging and spitting, even if we actually liked the taste of doughnuts. Equally, if we held our noses and closed our eyes and heard the sound of a cork popping from a bottle and then the sound of liquid being poured, all familiar indicators that a glass of wine was on its way to us, but then we drank and tasted strong black coffee, we would have an aversive taste response even if we loved strong black coffee.

So why does the sense of taste go wrong?

- Advancing age.
- Dehydration.
- Certain medications that cause excessive dryness in the mouth.
- Certain illnesses.
- Impairment or malfunctioning of other senses, including smell, touch, vision and hearing.
- Associations made with previous unpleasant experiences that can result in extensive taste aversions.
- Lack of use.

Taste and children with deafblindness

So, there are obviously reasons why other sensory impairments might interfere with the effective working of the sense of taste. Nerve damage, especially to the fifth cranial nerve is also likely to cause under-functioning of the sense of taste. Every individual’s response to taste is very unique, and seems to result from a combination of experiential factors and genetic makeup. In the population of children with deaf-blindness there is almost the same wide variability of taste preferences that are encountered in the rest of the population. The exception is the significant number of children with deafblindness who are reported to need very strong tasting flavors, things like sugar, ketchup, chili sauce, and salt, added to their meals before they will eat them. This may reflect the impact of limited sensation

"For children with deafblindness taste and smell preferences might be more strongly linked to the motivation to eat than they are for other children, so it is important that these preferences are ascertained and respected for each child if significant problems with eating and with nutrition are not to result"

coming in through the other senses of touch, temperature, smell, and vision rather than specific damage to the taste sense itself. For children with deafblindness taste and smell preferences might be more strongly linked to the motivation to eat than they are for other children, so it is important that these preferences are ascertained and respected for each child if significant problems with eating and with nutrition are not to result. A severely restricted diet, for example of liquid formula, can result in a very inexperienced and under-used sense of taste, so that tolerance and preferences can become very narrow indeed. In extreme form, aversive responses to taste, texture, and temperature inputs in the mouth can stimulate choking, gagging, and vomiting, so, again, it is important to observe closely and interpret carefully in order to build up a clear picture of the child's preferences and capabilities.

What can we do to help?

- Respect the child's taste preferences as much as possible, while also encouraging exposure to a wider range of taste, texture, and temperature experiences.

- Think about the tastes of the child's current diet and find ways to focus the child's attention on these, maybe by enhancing food and drink flavors in acceptable ways, and by keeping different foods separate rather than blended together.

- For children who are entirely tube fed on formula, seek advice from a feeding therapist for safe ideas to give taste experiences which might one day help to move the child on to oral feeding.

- Work that improves the functioning of other sensory systems (such as smell and touch and vision) can help to ameliorate the impact of under-functioning taste sense, because, in sensory terms, everything is designed to join up and work together.

- If possible, consultation with a feeding therapist and a dietician can be helpful for advice on a wide range of aspects of eating and drinking.

As with any sensory deficit, poor functioning of the sense of taste can be difficult to identify and assess, particularly when it is only a part of a wider pattern of sensory and other impairments.

David Brown
Education Specialist
California Deaf-Blind Services
1600 Holloway Avenue/
Pacific Plaza
San Francisco, CA
94132-4201

Tel : 415-405 7559
FAX : 415-405 7562
Email : davidb@sfsu.edu