Vol.3 No.3 May 2001

ChemoSense

GUEST EDITORIAL

An eye for a nose?

by Peter Disler, PhD FRACP FAFRM

Director and Professor, Victorian Rehabilitation Research Institute, and University of Melbourne
pdisler@healthsouth.com.au

What would you rather lose, your sight or your sense of smell? Very few people would give up sight to retain olfaction. Similarly they would not trade hearing for smell. Does this mean the sense of smell is of little worth?

Many people think so, and this is reinforced in current medico-legal legislation. Victorian law has now followed many international legal jurisdictions in basing compensation after traffic or industrial accidents on the 4th edition of the *American Medical Association's Guides to the Evaluation of Permanent Impairment*. Of the 339 page guidebook, the brief 16 linesdevoted to "Olfaction and Taste *(section 9.3c)*, explicitly minimise the problem by beginning with "Only rarely does complete loss of the closely related senses of olfaction and smell seriously affect an individual's performance of the usual activities of daily living". Significant impairment is only deemed present (and therefore financial compensation paid) when there is "complete bilateral loss" of taste or smell, and "detection by the patient of any odor

cont. pg 2

Taste and Smell Dysfunction: Clinical and Legal Issues

Heather J. Duncan

University of Cincinnati Taste and Smell Center
Cincinnati Ohio, USA
Heather.Duncan@uc.edu

At least two million Americans suffer from taste or smell problems (Report of the Panel on Communicative Disorders, 1979). These complaints tend to be misunderstood or dismissed by patients as well as by physicians. Thus, both the general population (from which juries are selected) as well as legal and medical professionals, are ill equipped to deal with these issues. Not only is the area of evaluation of these disorders relatively new (at least in comparison to auditory, visual or more obvious physical injuries) but the ramifications of loss or impairment of the chemical senses are not easily imagined.

The role of the chemical senses professional dealing with clinical assessment of olfactory or gustatory dysfunction is multi-faceted. It includes education, evaluation and counseling. In the role of educator, the professional helps the patient understand the terminology for describing symptoms (for example, "taste" loss vs. "flavor" loss, nasal sensation via trigeminal nerve endings vs. olfactory stimulation). The referring physician requires education in relating current symptoms to past events, possible etiologies, as well as the issues described above for the patient. For the legal professional, not only must these issues be explained, but a basic understanding of testing techniques, with their strengths and limitations must also be developed.

The three major areas in which dysfunction of taste or smell involves the legal system are malpractice suits, personal injury and disability/workers' compensation claims. While it would be impossible to detail every type of injury that ends up in one of these three legal areas, the major categories of damage for which monetary compensation might be sought, are: head or facial trauma; iatrogenic damage (caused by medical treatment or procedure) to taste or smell systems; and toxic exposure (chronic or acute) to chemicals via nasal exposure or oral intake.

cont. pg 2

INSIDE:

Centre for ChemoSensory Research
The University of New South Wales
ISSN 1442-9098

An eye for a nose? continued

or taste, even though he or she cannot name it, precludes a finding of permanent impairment."

No directions are provided as to how anosmia should be measured by the medical practitioner. Moreover even if the criterion is reached, the compensation payout to the accident victim is only based on 3% loss of total body function, equal to the loss of the last joint of the little finger.

Heather Duncan's valuable review, in this issue of *ChemoSense*, makes a strong converse case as to the importance of smell and taste, and shows how the trained clinician can make a contribution to accurate assessment of loss and to its treatment and management.

People *do* value their sense of smell (and taste). Ask the question again, but this time, ask, would you rather lose sight in *one* eye than your senses of smell and taste? Now you will find less certainty: at least half will give up an eye.

Smell and taste are becoming better understood in terms of psychology, physiology, chemistry, and genetics. One of the outcomes of chemosensory science will be better forms of chemosensory assessment. Credibility among the professionals will grow from valid and reliable measurements and humanity will serve better justice upon those who suffer the dangers and losses of amenities that their impaired chemical senses bring.

Taste and Smell Dysfunction: Clinical and Legal Issues continued

Litigation issues that involve the production of malodors (i.e., mold odor in a shipment of clothing or off-taste in food) are also relevant to chemosensory professionals, but are beyond the scope of this article.

Olfactory loss or deficit is probably the most common chemosensory problem that ends up in the legal system. The patient usually reports complete smell loss, either at the time of, or following an incident. The deficit may change in the time between insult and evaluation by a chemosensory specialist. While dyosmia (an abnormal, usually bad, odor sensation in the nose) may be a part of the complaint, it is rarely the issue for the legal system.

Olfactory loss: Causes and co-morbid conditions

The most common cause of olfactory loss that ends up in a legal case is head trauma. The mechanisms, symptoms and prognoses for this condition are adequately described elsewhere (Callahan and Hinkebein, 1999; Costanzo 1985; 1991; Costanzo and Becker, 1986; Costanzo et al., 1991; 1995; Zasler et al., 1992). Malpractice cases will occasionally refer to olfactory loss after sinus surgery. Because of the location of the olfactory receptor cells, it is unlikely that they would suffer damage during surgery (Friedman et al., 1999). There are anecdotal reports of anesthesia affecting olfaction, and certainly events go on during hospitalization that are not direct results of surgery (and thus are not deemed to be malpractice) but may result in damage to the olfactory system. Toxic exposure to the olfactory system can be acute (industrial accidents) or chronic (exposure to formaldehyde, paint solvents; see Hastings and Miller, 1997). Temporal contiguity between olfactory (more accurately described as "flavor" and erroneously described as "taste") loss and an injury is a key indicator of causation, but is often disputed. Particularly in the case of head trauma, a patient may be coping with other serious injuries in the first days after trauma and may not truly appreciate the loss of olfaction/food flavor until some time after the event. Often treatment in the emergency room will involve assessment of cranial nerves II through XII, but not cranial nerve I (olfactory).

Co-morbid conditions must also be considered, not so much because they have caused the current level of deficit, but because pre-existing conditions may have resulted in hyposmia of some degree, at that time unrecognized by the patient. In the case of head/facial trauma, is there remaining obstructive damage to the sinuses? Smoking history (Frye et al, 1990), alcohol abuse (Ditraglia et al., 1991), chronic or allergic rhinitis (Apter et al., 1999; Cowart et al, 1993; Moll, et al., 1998; Simola and Malmberg, 1998;), as well as a variety of neurologic and metabolic conditions and simple aging (Murphy, 1993; Weiffenbach, 1991), can all be associated with a hyposmic level of olfactory functioning. An upper respiratory infection (URI) concurrent with the injury can be a contributing factor (Duncan, 1997). These possibilities can be considered in determining the level of olfactory function that is normal for a particular patient, from which he or she has suffered a further deficit.

Olfactory Assessment

The types of olfactory assessment available to the health care professional are expanding, but their use in the litigation system is often

cont. pg 8

The *Sense*-sational Miracle Fruit

Hae-Jin Song
Centre for ChemoSensory Research, UNSW
hj.song@unsw.edu.au

Try this for a new taste sensation!

Nibble on the flesh of a certain berry, then taste a slice of lemon. As if by miracle, the lemon will taste sweet! In fact, for about the next hour, anything sour will have a sweet taste, as if sugar has been added.

Richadella dulcifera (formerly *Synsephalum dulcificum*), commonly known as miracle fruit or miracle berry, is a small, evergreen shrub of tropical West Africa. The fruit is a small bright red, ellipsoid berry approximately 2 to 3 cm long and containing a single seed. It is practically tasteless but contains a taste-modifying protein which temporarily gives sour substances a sweet taste. Miracle fruit is not important as a food crop but is of interest as a commercial source of natural sweetener. Scientists are also interested in the light it may shed on how the taste system works.

Miraculin

The active principle of miracle fruit is a large glycopeptide called miraculin, which was first isolated by Theerasilp and Kurihara (1988).Twenty micrograms of miraculin is sufficient to produce a clear increase in the sweetness of lemon and a marked diminution of its sourness. Purified miraculin contains 6.3% carbohydrate and 14.4% nitrogen and has a molecular weight of about 45 000 Daltons. When denatured and reduced, it is cleaved into two fragments of approximately 28 000 and 17 000 Daltons (Giroux & Henkin, 1974). Masuda et al. (1995) isolated and sequenced a cDNA clone encoding miraculin. The encoded precursor to miraculin was composed of 220 amino acid residues, including a possible signal sequence of 29 amino acids. Northern blot analysis showed that the mRNA encoding miraculin is already expressed in miracle fruits at three weeks after pollination, and is present specifically in the fruit pulp.

Mechanism of action

It was originally thought that miraculin modifies the actual sweet receptors in such a way that they can be stimulated by acids (Bartoshuk et al., 1974). However, the mechanism of action for miraculin is now thought to be due to a sweet residue that is attached to the protein, which cannot bind with sweet receptors until H+ ions (acids) cause the miraculin to change its shape. Hence, miraculin is perceived to be sweet only in the presence of acids. Thus, technically, it is not miracle fruit which makes sour substances taste sweet, but rather the acidic environment that is generated by sour substances which induce the sweetness of miraculin. Figure 1 visualises the mechanism of action for miraculin.

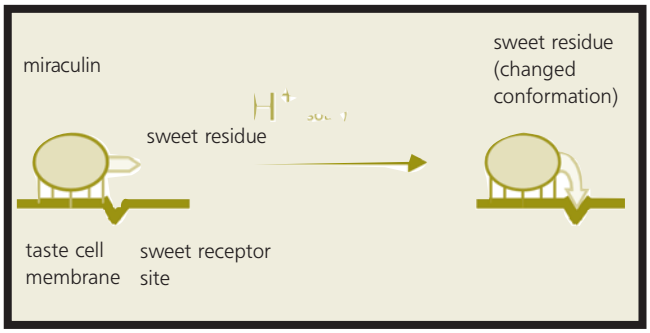


Figure 1. Mechanism of action for miraculin

In the presence of H+ ions, the sweet residue of miraculin can bind with the sweet receptor. (Artwork based on schematic diagram by Wayne Silver, Wake Forest University, NC, USA)

Sweet-tasting and sweetness-inducing proteins

There are several known sweet-tasting proteins. These include thaumatin, monellin, mabinlin, pentadin and brazzein. Miraculin and curculin, on the other hand, are not sweet-tasting proteins as such but rather sweetness-inducing proteins. Both sweet-tasting and sweet-*inducing* proteins have been isolated from plants that grow in tropical rainforests, although they share no sequence homology or structural similarities (Faus, 2000). Like most other sweet-tasting proteins, miraculin is heat-labile and changes conformation at low pH (van der Wel, 1973), hence its sweetness-inducing effect.

Sweet-tasting and sweet-inducing proteins shed light on the receptor mechanisms of sweetness perception. In a study by van der Wel and Arvidson (1978), the gustatory effects of the sweet tasting proteins thaumatin and monellin were observed in humans after application to small areas on the anterior third of the tongue or to single fungiform papillae. The sweet sensation produced by thaumatin and monellin developed more slowly but reached a higher intensity and had a longer

cont. pg 4

The *Sense*-sational Miracle Fruit continued

duration than that generated by sucrose. Also, the response evoked by these proteins was more pronounced at the lateral edges, whereas that evoked by sucrose was stronger at the tip of the tongue. In contrast, the taste modifier miraculin had no noticeable effect on the sweet taste elicited by thaumatin, monellin and sucrose. These observations suggest multiple and independent sweetness receptors. Another taste modifier, gymnemic acid from *Gymnema sylvestris*, an anti-sweet substance known to make sugar taste like sand (Kurihara & Nirasawa, 1994; Niederauer, 1978), abolished the sweet taste of all three compounds. Experiments with time intervals of less than a minute between stimuli showed strong cross-adaptation between thaumatin and monellin, between the two proteins and sucrose, and between the two proteins and miraculin-induced sweet taste of citric acid. While the differences in response to the sweet tasting proteins and sucrose may be taken as evidence for the existence of more than one kind of sweet receptor, the cross-adaptation noted between the various substances tested would seem to indicate that at some point they engage a common receptor mechanism.

In another taste experiment, Hellekant (1976) observed the effects of miraculin (1mg/mL) on the neural taste response to sucrose, citric acid, sodium chloride and quinine in dog, pig and rabbit. In the dog, miraculin caused a slight short-lasting increase in the response to acid. No effects were observed in the pig. In the rabbit, miraculin enhanced the response to citric acid in one out of three animals for a few minutes. Thus, sweetness perception of miraculin seems species-specific within mammals.

Applications

Miracle fruit is widely used in Ghana in native dishes and beverages as the pulp is pleasantly sweet, neutralises sour or bitter flavours, can be active for up to four hours on the palate and gives excellent flavour with citrus fruits (Pieniazek, 1976). Miraculin itself can be extracted from miracle fruit by using ion exchange chromatography and gel filtration chromatography of the purified fraction (Armah et al., 1999). The purified miraculin may be used to sweeten foods and beverages and as with many sweet-tasting and sweet-inducing proteins, there are many potential industrial applications.

There are attractive possibilities of preparing tablets from miraculin and of widespread use in the food industry for low calorie products, including jams, confectionery and fruit products. Miraculin is particularly suitable for yoghurt in which 0.5-2.5 mg pure miraculin/L produces a permanent effect - small amounts reduce the acid taste and greater amounts produce a pleasant sweet taste (Netherlands Patent, 1970). One further advantage of miraculin is the absence of aftertaste (Pieniazek, 1976). However, unlike thaumatin and monellin which are useful for sweetening soft drinks, the long lasting sweetness-inducing effect of miraculin will probably restrict its application in soft drinks (van der Wel et al., 1974).

It has also been suggested that chewing gum incorporating miraculin be used to enhance and preserve its flavour (Johnson, 1972). Furthermore, miraculin may be added to toothpastes and acid-containing pharmaceutical preparations. Other novel applications include miraculin being used as a diet aid. It was, for a time, commercially available in the United States as a diet aid (Kalat, 1992). Dieters could coat their tongue with a miraculin pill and then eat and drink unsweetened, slightly acidic substances and such substances would taste sweet without providing many calories (Bartoshuk et al., 1974).

Currently, miraculin is being developed by BioResources International (USA), by traditional plant breeding as well as expression in recombinant hosts (Dansby, 1997). Given the increase in demand for "low-calorie" sweeteners and "natural" food products combined with the fact that sweet-tasting and sweetness-inducing proteins are several orders of magnitude sweeter than sucrose (which effectively means negligible addition to calories, no contribution to tooth decay and no triggering of demand for insulin), there is ongoing industrial interest for expanding their range of applications.

REFERENCES

Armah, G.E., Achel, D.G., Acquaah, R.A. and Belew, M. (1999) Purification of miraculin glycoprotein using tandem hydrophobic interaction chromatography. *United-States-Patent*.

Bartoshuk, L.M., Gentile, R.L., Moskowitz, H.R. and Meiselman, H.L. (1974) Sweet taste induced by miracle fruit (Synsephalum dulcificum). *Physiology and Behavior* **12** (6): 449-456.

Dansby, R. (1997) Sweet science: overexpression of monellin in yeast. *Nature Biotechnology* **15**: 419-120.

Faus, I (2000) Recent developments in the characterization and biotechnological production of sweet-tasting proteins. *Applied Microbiology and Biotechnology* **53** (2): 145-151.

Giroux, E.L. and Henkin, R.I. (1974) Purification and some properties of miraculin, a glycoprotein from Synsepalum dulcificum which provokes sweetness and blocks sourness. *Journal of Agricultural and Food Chemistry* **22** (4): 595-601.

Hellekant, G. (1976) On the gustatory effects of gymnemic acid and miraculin in dog, pig and rabbit. *Chemical Senses and Flavor* **2** (1): 85-95.

Johnson, T.R.Jr. (1972) Chewing gum. *United States Patent*.

Kalat, J.W. (1992) *Biological Psychology*. Wadsworth Publishing Co. Belmont, CA. p219.

Kurihara, Y and Nirasawa, S. (1994) Sweet, antisweet and sweetness-inducing substances. *Trends in Food Science and Technology* **5** (2): 37-42.

Masuda, Y., Nirasawa, S., Nakaya, K. and Kurihara, Y. (1995) Cloning and sequencing of a cDNA encoding a taste-modifying protein, miraculin. Gene 161 (2): 175-177.

Netherlands Patent (1970) Method for manufacturing food products and a special sweetener.

Niederauer, T. (1978) [Manipulation of flavouring substances.] Manipulation mit Geschmackstoffen. Wenn Zucker wie Sand schmeckt. *Gordian* **78** (3): 77-78.

Pieniazek, S.A. (1976) [Natural sweeteners and effects on taste.] Natuerliche Suessungsmittel und Geschmacksbeeinflussung. *Industrielle-Obst-und-Gemueseverwertung* **61** (9): 229-231.

Theerasilp, S. and Kurihara, Y. (1988) Complete purification and characterization of the taste-modifying protein, miraculin, from miracle fruit. *Journal of Biological Chemistry* **263**: 11536-11539.

van der Wel, H. and Arvidson, K. (1978) Qualitative psychophysical studies on the gustatory effects of the sweet tasting proteins thaumatin and monellin. *Chemical Senses and Flavour* **3** (3): 291-297.

van der Wel, H. (1973) Katemfe, Serendipity berry and miracle fruit. *Abstracts of Papers, American Chemical Society*, p165.

van der Wel, H., Brouwer, J.N. and de Iongh, H. (1974) *Sweet-tasting and sweetness-inducing protein from fruits of African plants*. pp. 154-161.

Consumer Habits and Taste Preferences of Importance to Prospective Food Exporters to Korea

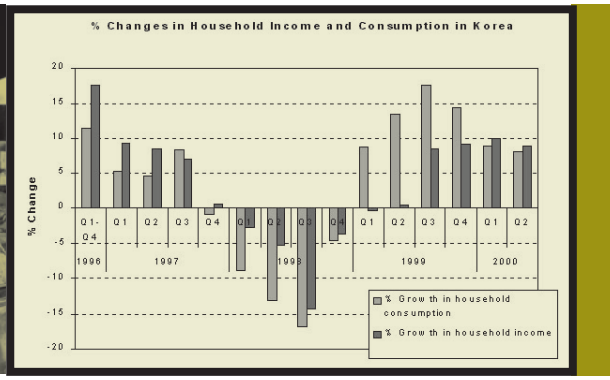
Joanne Wong,
Centre for ChemoSensory Research, UNSW
jowong@ihug.com.au

Global food marketing success requires exporters to have a well-developed understanding of the cultural uniqueness of their target foreign market and adapt their products accordingly to cater for the needs and wants of those consumers. Analysis of the demand potential of a foreign market based on the status of its economy is only the initial step when deciding whether to export to that country or not.

This field study was conducted with an aim to compile fundamental knowledge and understanding of consumer's taste preferences and habits in Korea. Focus was also placed on a number of mounting consumer trends in Korea. Hopefully, this insight will instigate further research by prospective food exporters on issues that is more specific to their product categories.

Before deciding to approach any potential consumer market, a business must have a thorough understanding and appreciation of that marketing environment. This is particularly important if the potential market is overseas. The way a foreign consumer thinks about and uses certain products may be completely different from what the domestic consumers think.

However, to have a strong presence in the global marketplace is not without challenges. In addition to mitigating currency volatility, avoiding political risk, and overcoming local competition, companies must also meet consumer expectation in a variety of cultural settings in order to be successful. Although international agreements have been responsible for developing global standards for a variety of health and fair-trade practices of food sold globally, standards for measuring consumer acceptance of products sold internationally have received little attention (Karahadian, 1995). Ironically, a sound appreciation of these issues may be the key to export success. The growing demand for identifying taste attributes and preferences in foreign markets has expanded the frontiers of sensory professionals.



(Source National Statistics Office, Korea.)

Over the ten financial years to 1998-99, Korea, with a population of 46 million, became increasingly important as a trading partner for Australia. However, while Australia has maintained a trade surplus with Korea for that entire period, the surplus fell dramatically during 1997-98 due to the Asian economic crisis of that year (*NSO*, 1999).

Despite the serious crisis-induced trade dislocation and recession, Korea's economy has undergone significant economic reforms, which have enabled Korea to recover more rapidly than all the other Asian economies affected (DFAT, EAAU, 1999). This recovery can be illustrated by the coinciding recuperation of household consumption levels shown in Figure 1. The data show that even though household income did not recoup to pre-crisis level until the third quarter of 1999, household consumption returned to previous levels by the end of the fourth quarter of 1998.

In the past, Australian exports to Korea were predominantly minimally processed foods such as grains (30% of total exports) and meat (25% of total exports) (STA *Annual Database*, September, 2000). However, Koreans are becoming increasingly intrigued by western style eating and many studies on Korean consumers have recognised their desire to try novel food products (Anon, *Business Asia*, 1999).

The study reported here was conducted in Seoul, Korea, in June 2000. The first part of the study aimed to find out general consumer habits of Koreans, by means of a questionnaire to 110 adults recruited from offices and colleges. The questionnaire addressed aspects of Korean consumer's taste preferences, with regards to both traditional and non-traditional style foods. Lastly, it aimed to investigate the relative importance of common drivers of food

cont. pg 6

Consumer Habits and Taste Preferences of Importance to Prospective Food Exporters

purchase.

In the second part of the study, advice and opinions were gathered on what a prospective food exporter should know. This task was carried out by conducting a series of interviews with experts from various disciplines related to the food industry, such as people from sales and marketing, consumer research, food research and product development backgrounds.

The final part of this study aimed to identify, by means of field observation, any insight into Korean consumer behaviour that may be difficult to obtain by quantitative data collection methods.

Results of Korean Consumer Habits Questionnaire

Decision Makers of Food Purchase In Sample Population

The results indicated that the majority of the decision makers of food purchases are married females (59%). Married men had significantly less involvement in deciding what food to purchase in the household (8%). Overall, the results indicate that potential exporters should pay attention to Korean women in their market research and promotion efforts.

Acceptance Level of Common Western-Style Convenience Foods

Korean consumers had a definite affinity towards western style processed meat products, such as sausages and meat balls, in comparison to other types of foods, such as canned fish, canned soup and pasta.

Meal Style Preferences Among the Korean Sample

Overall preference for Korean style meals was found. However, it was revealed through analysis by age group that Korean consumers between the age group of 26-40 have a notable liking of western style meals.

What Korean Consumers Want to See in Food Package Labels

A substantial proportion (35%) of subjects wanted to see information on the nutritional value or content of the product on the food package labels. In addition, 24% indicated that they wanted to see information on the health benefit of the product, and 26% cooking instructions. Therefore, food exporters should try to make nutrition information, health benefits and cooking instructions available to their customers in the most convenient form, by way of labelling, pamphlets or any other means.

Shopping Habits of Korean Consumers

Responses indicated that the supermarket is unanimously the most common shopping choice for groceries, and that their visits are very frequent (3.08 times per/week, average).

Popular Traditional and Non-Traditional Dishes

The most popular Korean style dish is Korean hot pot, with a 23.1% preference of total responses, reinforcing Korean's preference for intense flavours. The most popular non-traditional dish was Japanese Sashimi (21% of total responses). In addition, many other non-traditional dishes nominated were Japanese style.

Western Style Breakfast and Traditional Korean Style Breakfast

68% of the subjects indicated a preference for traditional Korean style breakfast over western style breakfast. In addition, many respondents have also indicated that they prefer to have soup and rice as part of that Korean style breakfast. There is little interest in western style breakfast.

Non-traditional Snacks and Traditional Korean Style Snacks

Rice cakes and spicy rice cake dishes were the most popular Korean snack food with 38% of the total responses. Western style bakery products (27.1%) and pizza (19.5%) were found to be popular non-traditional snack foods.

Selection Criteria For Food Purchase Decisions

Table 1 shows that **taste** is considered to be the most important driver of food purchase, with a mean importance rating (8.94). The subjects considered promotional **sample tasting** the *least* important factor when purchasing foods.

Age-Specific Drivers of Choice

The raw data from the food purchase driver questions were further analysed to determine whether there were any statistically significant differences at the 5% confidence level between the young (15-25), the middle (26-40) and the old (40+) age groups. The statistical method used involved using the F-test for variances followed by t-test for samples assuming equal variances.

Firstly, whether or not the product's packaging is environmentally friendly was significantly more important to the middle group (26-40) than the youngest (15-25) age group. Similarly, analysis showed that the middle group also considered both preparation time and genetically modified (GM) components to be significantly more important than the youngest age group. The middle group's mean score for functional properties was significantly higher than that of the youngest age group. The middle group considered GM content more important than young and older subjects.

The older age group considered having had a chance to try the product to be an more important consideration for food purchase, compared to the mean rating given by the middle group. This point reinforces that younger consumers (both young (15-25) and middle (26-40)) are more inclined to try new and novel products compared to older consumers.

Furthermore, the size that the product comes in is significantly more important to the older age group compared to the middle age group.

Implications

Based on the results above, prospective exporters should use different promotional tactics to target each specific age group. For example, to target young Korean consumers (15-25), heavier emphasis should be placed on promoting the taste of the product.

For the middle age group (26-40), products should demonstrate the manufacturer's environmental initiatives, promote convenience of preparing the food and emphasise the product's "GM-free" quality.

Finally, in-store products tasting or sample give aways should be directed especially at the older consumer.

Interviews

A number of interviews were also conducted in Korea. The key points from these meetings are summarized below.

Table 1. Mean Food Purchase Drivers Among Korean Consumers from the Young (15-25), the Middle (26-40) and the Older (40+) Age Groups. The greater value denotes greater rated importance of the attribute (max = 10)

Product Attribute	*Young (15-25)*	*Middle (26-40)*	*Old (40+)*	*Whole Group Mean*
Brand Familiarity	6.36	6.29	6.87	6.51
Perceived Brand Quality	7.73	6.95	7.77	7.48
Taste	9.09	8.90	8.71	8.90
Nutritional Value	8.09	8.87	8.68	8.55
Attractiveness of the packaging	5.73	5.77	6.58	6.03
Endorsement by a recognised health organization	7.09	8.07	8.13	7.76
Informative Labelling	6.45	7.25	7.58	7.09
Cost	7.64	7.52	7.81	7.66
Have tried it before	5.09	5.20	6.08	5.46
Size of the product	5.64	5.80	6.71	6.05
Have environmentally friendly packaging	7.09	8.30	7.90	7.76
Preparation time	5.18	6.49	6.03	5.90
GM content	5.27	8.07	7.32	6.89
Product have desired functional properties	4.27	6.59	6.61	5.82
Is Korean-made	7.09	7.06	7.10	7.08

- Strong demand for many consumer goods, including white goods, cars, food and especially value added food products is predicted to as Korean household disposable income recovers. Koreans have a strong desire to be 'self sufficient'; therefore potential exportable goods from Australia must stand out from competing products and be something that would fully satisfy what the

cont. pg 7

to Korea continued

market demands. Koreans have always placed more emphasis on price relative to quality.

- There remains three main nutrient deficiencies in the population of Korea, namely calcium, vitamin A and iron. There is insufficient nutrition fortification directed at children.
- Korea's economic crisis was marked by consumer over-reaction. The collapse in domestic consumption started a vicious cycle on the economy, however, the recovery was the most rapid in Asia and is now complete.

Other observations in the Field

Taste Preferences

Korean taste preferences have evolved since the 1980s from a liking for very intense spicy, chilli flavours to "softer" more westernised tastes. Growing popularity for fusion cuisine (Matchuk, 1999). Many fusion restaurants were seen especially in the more affluent areas of Seoul. The most common of these blends Chinese with Italian cuisine.

Low Fat

Korean consumers do not like products that carry fat free or low fat labels because to them, it implies that the taste of the product is compromised.

Functional Foods

Korean consumers are becoming increasingly health conscious and in particular many are fascinated with foods that claim to perform specific functions on the body, for example, anti-cancer properties, improving stamina and improving intelligence.

Internet Shopping

The use of Internet grocery shopping in Seoul has begun. Prospective exporters may consider this as an alternative to more conventional distribution channels.

GM Concerns

Korean food scientists emphasised the strong resistance of Korean consumers GM ingredients.

The Next Step

A general consensus from this study is that although Korean consumers still have a strong partiality towards native Korean flavours, they are becoming increasingly open to new and more novel food products. Australian food exporters should attain a firm grasp of the target market's culture, consumer psychology, needs and wants, consumption potential and obtain regular updates on the economic situation of the target market. It is also important to be creative in product design and adaptation to Korean needs and tastes.

In the Korean market, loyalty is taken seriously, so food exporters can earn customer loyalty by demonstrating that they also care about their customers' interests, and not motivated by business profit alone.

ACKNOWLEDGEMENT

This research formed part of the requirements for the 4 year degree of B.Sc. (Food Science and Technology) UNSW. My thanks go to A/Prof. Graham Bell and staff of the Centre for supervision of the project and the Centre's finacial contribution to the field trip.

REFERENCES

Anonymous. (1999) Seoul restaurant to put Australia on the menu. *Business Asia* 7(5): 7.

DFAT (1999) *Korea Rebuilds: From Crisis to Opportunity*. Canberra: EEAU, Department of Foreign Affairs and Trade.

Employment Figures: By Sex, Term (Quarter: 2000 4/4), National Statistics Office. http://www.nso.go.kr:8001/cgi-bin/sws_999.cg

Karahadian, C. (1995) Impact of Global Markets on Sensory Testing Programs. Food Technology, 49(2): 77-78.

Matchuk, J. (1999) *Experimenting with Fusion*, Weeks Publishing Co. http://www.foodproductdesign.com/archive/1999/0499cc.html

STA Annual Data Base (2000) Supermarket to Asia: Trade Statistics (on-line) http://ww.supermarkettoasia.com.au/trade/stats.htm.

Pilot Plants for Product Development

Product Development features very high in the Corporate Philosophy. This could take many forms, for example: offering customers a wide variety of products to choose from, trying lower cost ingredients, developing brand new products or trying to meet specific demands in the market place. Food and Pharmaceutical product developers come across such situations regularly. It is true that a majority of this work can be done on a laboratory scale but the product developers constantly face the following problems:

- The samples produced are too small to do any meaningful market feedback trials.
- All processes need to be scaled up, and often the laboratory process cannot be scaled up. The residence time, heat treatment, etc, are not represented in the laboratory scale.
- The laboratory equipment does not represent the real equipment. A powder produced in the lab oven is totally different to the one produced in a spray dryer.

Plant Trials

Inevitably, Plant Trials have to be carried out. The plant needs to be taken off line and cleaned. This disrupts the production and upsets the Production Manager. Senior management in the organization gets involved and wastes time in evaluating the true worth of trial. This in itself can act as a deterrent to development. Additional and large quantities of raw materials need to be organised. If the product does not meet the requirements, a large quantity of product becomes downgraded. The Product Development manager was not interested in 4 tons of product. He was only interested in 4 Kg of it. Everything about a full-scale trial is negative. Lots of great ideas are lost due to these negatives. The possibility of savings by using a cheaper ingredient cannot be proven because the production manager cannot spare the plant. The prohibitive cost of downgrade and involvement required of senior management in every trial effects the motivation of the Product Development manager.

The cost of the Plant Trials has to include

- The lost production cost
- Cleaning cost
- Material cost
- Disposal cost of the product
- Time required for adjusting the plant to suit the trial needs and undoing these after the trials
- Manpower resources required to man the trial
- Time of the senior management
- Lack of co-operation by the Production Manager

The Pilot Plant Option

All these could be resolved only if we had the Pilot Plants. This work would be much easier and produce better results for the organization. The pilot plant can

- Provide sufficient samples for testing and market response
- Reduce the cost of trials considerably
- Give the Product Development Manager the freedom to run trials when he needs to
- Reduce the scaling-up risks. A pilot plant can be designed to perform much more closely to the industrial scale.
- Reduce the grief the full plant trials cause to the Production Manager
- Eliminate the involvement of top management in every trial.

Saurin has a fully operational and continuously expanding test facilities, consisting of two Spray Dryers, Ring Dryer, Pasteuriser, UHT pilot plant, Fluid bed, Pilot evaporator and liquid mixing system. The units are available for purchase, Lease or Hire. The equipment can also be used to prepare product for taste trials on a daily basis to ensure the quality of incoming raw material is consistent.

For more information:

Rakesh Aggarwal, General Manager,
Saurin Technologies, Australia.
Tel +61 3 9791 2985,
Fax +61 3 9791 2990,
E-mail saurin@bigpond.com,
www.saurin.com.au

the main issue of controversy. Should olfactory evoked potentials reach the level of credibility and acceptability that similar tests in the auditory system have, one is still left with the fact that clinical centers prepared to perform this evaluation are few in number around the world. In the meantime, many chemical senses clinicians rely on a set of olfactory tests that can assess identification, detection, and/or discrimination, either unilaterally, or bilaterally. Each of these tasks can suggest different levels or forms of dysfunction, or in fact, different locations of damage. For example, if detection thresholds are normal, but identification and discrimination are affected, one can feel confident that olfactory neurons are connected to the olfactory bulb. But the subtleties of different measures of olfactory function, while interesting to as psychophysicists or clinical specialists, are often the most labor-intensive part of a court battle. What does the test measure? Why are two tests seemingly contradictory? How do we know the patient is not malingering? What level of function is a disability? These are questions one might find in a legal argument. Scrutiny of the kind applied to DNA "fingerprinting" (questioning the validity of the technique) can be, and often is, applied to the sensory data presented in a case of personal injury or malpractice claiming loss of taste or smell function. Testing techniques are less frequently questioned in cases of disability or workers' compensation, other than perhaps the issue of possible malingering.

Olfactory testing in these cases is required, but proper evaluation also includes a careful patient history of symptoms. It is important for the patient to understand enough about the differences between taste and smell to describe accurately their complaint. In head trauma, for example, taste nerves are not often affected, and so the patient needs to understand that "true" taste function may be intact, without diminishing the importance of olfactory loss to food "flavor". Questions about what was noticed first in terms of the problem are helpful. Allowing the patient to describe what they can and cannot "taste" will provide insight into the problem, as well as save time in controversy over real and misunderstood sensory deficits. At the same time, many tests for malingering require a fairly naïve individual, and so extensive conversation about testing techniques may not be in the best interests of the patient. A patient who has a true deficit but knows a lot about testing techniques can be "accused" of knowing how to cheat, while a determined patient can learn enough about testing to be able to cheat. Both attorneys and patients have enough access to information about testing if they want to get it, so until sensory evaluation is complete, discussion about how the tests work by the clinical evaluation specialist is not always in the best interests of the patient.

Olfactory prognoses

Patients can recover from head trauma-induced anosmia, but recovery after toxic exposure or iatrogenic damage is entirely dependent on the toxin or the type of injury.

Court cases can last many years, so the issue of recovery can usually be assessed a year or so after the initial injury. If the initial evaluation itself is a few years after the injury, retesting may not be necessary. Retesting and reevaluation can suggest additional information about the injury. In some cases, however, retesting can discover malingering, when there was no doubt about the validity of the original injury. When a patient becomes involved in litigation, one can no longer be certain that recovery of function is the only concern. When recovery does occur before litigation is complete, patients do sometimes wish to conceal recovery that might result in a lost court case, when ironically, damages for the original period of dysfunction might still be relevant and possible.

Taste Loss: Causes and co-morbid conditions

Taste loss, partial ageusia or hypogeusia can also be the claim in a legal case. Dysgeusia, pain or numbness can accompany this loss.

Head or facial trauma can involve injury to the tongue or to taste nerves. The German literature contains several reports of taste loss after tonsillectomy (for example Donati et al., 1991; Arnhold-Schneider & Bernemann, 1987). Taste loss has also been reported after ear surgery and can occur after a variety of dental procedures. Information from all six taste nerve fields is largely combined in the brain, such that loss of function in one nerve may go unnoticed. Taste buds from all six nerve fields in the oral cavity are stimulated in the normal eating situation, and if sensitivity in one field is damaged, another field may increase sensitivity in compensation, preserving the total taste intensity (Bartoshuk et al., 1983). Prior to surgery there may in fact be a deficit in nerve function somewhere (unnoticed by the patient), and when another nerve is damaged in a surgical procedure the combined loss allows whole mouth taste sensation to be compromised. In ear surgery, the chorda tympani branch of the VIIth nerve can be damaged or severed, with resultant taste loss or taste phantoms (Yanigasawa et al., 1998; Lehman et al., 1995) The same may be true of tonsillectomy and the glossopharyngeal nerve. Thus, a careful history of prior medical treatments, problems (for example, viral infections) and injuries is essential in understanding the relationship between a focal taste nerve deficit and whole mouth suprathreshold taste sensation. Taste loss that occurs following dental procedures (usually involving third molar extractions) is often accompanied by pain or numbness because of the combined fibers of the chorda tympani and lingual nerves, and these symptoms may be more salient than the focal taste deficit which goes unnoticed.

Taste Function Assessment

Evaluation of taste function is perhaps more variable than olfactory sensitivity, with taste detection thresholds being used as evidence of dysfunction, as well as the more functional tests of suprathreshold taste intensity, and the critically important spatial testing of independent taste nerve fields. Sensitivity to all four qualities should be tested. Electrogustometry is not universally available or accepted as a measure of taste function. Analysis of taste testing responses will involve comparison of taste intensity ratings with normative data, but may also require analysis of the probabilities of errors and correct responses expected on the basis of chance. If dysgeusia accompanies the taste loss, additional documentation of the source of the dysgeusia may be useful.

Co-morbid conditions that can contribute to taste loss also exist, most notably medications (Doty et al., 1991; Schiffman, 1991), aging, or a rare

and Legal Issues continued

zinc deficiency. As with olfactory disorders, these co-morbid conditions should be understood when trying to completely characterize taste dysfunction claims.

Taste prognoses

Depending on the surgical techniques, taste nerves can be damaged (stretching, cautery) or severed during surgery. Damaged nerves can develop neuromas that may be responsible for abnormal taste sensations or pain; neuromas can be removed surgically. Iatrogenic damage can resolve on its own time course, but may not, and surgical interventions have a limited window-of-opportunity. Taste phantoms that are a result of nerve damage can again resolve, or may be manageable medically.

Safety and Quality of Life

In assessing the impact that a taste or olfactory loss has on a patient, safety issues are the most straightforward. Disability claims and sometimes workers' compensation claims are sensitive to the changes in

life-style that chemosensory deficits must make. A patient with anosmia must attempt to ensure safety by the addition of smoke and/or natural gas detectors and develop methods to prevent ingestion of possibly spoiled food. He or she must be constantly attentive to the possible hazards at a workplace, at home, or in recreational activities. In addition, olfactory deficits may affect mood, emotion and appetite regulation, as the brain structures controlling olfaction are closely tied to the limbic system (Costanzo and Zasler, 1991). Changes in emotionality that either accompany the deficits or are a result of them must be managed, sometimes with professional counseling.

An issue related to safety is occupation - for example, a fireman may end up reassigned to office work after an olfactory deficit occurs. There are many occupations where olfactory loss cannot be allowed for safety reasons (chemical workers, the military, for example), and there are other occupations where one can no longer perform the job with the deficit (wine taster, flavorist). In these cases, occupational counseling, retraining, loss of wages and loss of position, must all be considered in evaluating the severity of the consequences of the deficit for that individual. Occupational choices will be limited by the existence of chemosensory deficits.

Quality of life is also impaired in the chemosensory loss patient, and this is the more problematic issue to describe adequately to attorneys and juries. The decrease in quality of life occurs both directly, through the loss of function and thus diminished pleasure from olfactory and taste stimulation, and indirectly, through the resulting loss of interest in food. Changes in appetite can manifest as loss, increase, or increased desire for salt and sweet (in the presence of an olfactory deficit). This can make compliance with a medical diet difficult, and create more medical problems for the patient (Duffy and Ferris, 1989; Ferris et al., 1986; Rolls, 1992).

Each patient relates to these problems differently, and those with authentic deficits can easily describe vividly the sensations they most miss. According to the Guidelines to the Evaluation of Permanent Impairment published by the American Medical Association, a complete loss of smell or taste function, bilateral detection and identification, can be assigned a 3% disability. Whether this will be modified by the new International Classification of Functioning, Disability and Health, to be released by the World Health Organization sometime in 2001, remains to be seen. Loss of enjoyment of life is recognized in the legal system as a claim (Ingram, 1991) and should be part of the documentation of injury. Not only the subtleties of food flavor and taste, but the aroma of a newborn baby, freshly cut grass, the seashore, flowers in spring, the smoke of a campfire, all can be lost with a chemosensory deficit. Those of us with completely functioning senses may find it hard to realize all of the things that we enjoy as taste or odor sensations, but conversations with patients with loss can be illuminating.

Conclusion

This article has attempted to review and summarize the issues in litigation that may arise when damage to the olfactory or gustatory systems occur. As the medical field becomes more understanding of how and why chemosensory deficits occur (and why they are important!), so must the legal field. It is necessary for the chemosensory professional to be able to accurately detail and define true sensory loss. It is just as important to be able to identify malingering accurately, as there is a common notion that since these problems aren't "important", they are easily "invented" by the patient hoping to reap financial benefit. The credibility of chemosensory testing, no matter which techniques are used, hinges on our ability to distinguish genuine loss from exaggeration. But the results of testing must be combined with a thorough explanation of causes, cures and consequences of chemosensory loss in order to ensure the most legitimate benefit to the patient, and, ultimately, to society.

REFERENCES *see pg 10*

REFERENCES

Anon. (1979) *Report of the Panel on Communicative Disorders to the National Advisory Neurological and Communicative Disorders and Stroke Council*. Washington DC: Public Health Service, (NIH publication no. 79-1914).

Anon. (1990) *Guidelines to the Evaluation of Permanent Impairment*. Third Edition (Revised), Chicago: American Medical Association, Sections 9.3c, 4.1c.

Apter, A.J., Gent, J.F. and Frank, M.E. (1999) Fluctuating olfactory sensitivity and distorted odor perception in allergic rhinitis. *Archives of Otolaryngology Head and Neck Surgery*, **125**, 1005-1010.

Arnhold-Schneider, M. and Bernemann, D. (1987) Incidence of taste disorders following tonsillectomy. *HNO*, 35, 195-198.

Bartoshuk, L.M., Gent, G., Catalanotto, F.A. and Goodspeed, R.B. (1983) Clinical evaluation of taste. *American Journal of Otolaryngology*, **4**, 257-260.

Callahan, C.D. and Hinkebein, J. (1999) Neuropsychological significance of anosmia following traumatic brain injury. *Journal of Head Trauma Rehabilitation*, **14**, 581-587.

Costanzo, R.M. (1985) Neural regeneration and functional reconnection following olfactory nerve transection in hamster. *Brain Research*, **361**, 258-266.

Costanzo, R.M. (1991) Regeneration of olfactory receptor cells. *Ciba Foundation Symposium*, **160,** 233-248

Costanzo, R.M. and Becker, D.P. (1986) Smell and taste disorders in head injury and neurosurgery patients. In Meiselman HL, Rivlin RS, (Eds.) *Clinical Measurement of Taste and Smell*. New York: Macmillan, 565-578.

Costanzo, R.M., DiNardo, L.J. and Zasler, N.D. (1995) Head injury and taste. In Doty RL, (Ed.) *Handbook of Olfaction and Gustation*. New York: Marcel Dekker Inc, 775-783.

Costanzo, R.M. and Zasler, N.D. (1991) Head trauma. In Getchell T.V., Doty R.L., Bartoshuk L.M. and Snow J.B. Jr. (Eds.) *Smell and Taste in Health and Disease*. New York: Raven, 711-730.

Cowart, B.J., Flynn-Rodden, K., McGready, S.J. and Lowry, L.D. (1993) Hyposmia in allergic rhinitis. *Journal of Allergy and Clinical Immunology*, **91**, 747-751.

Ditraglia, G.M., Press, D.S., Butters, N., Jernigan, T.L., Cermak, L.S., Velin, R.A., Shear, P.K., Irwin, M. and Schuckit, M. (1991) Assessment of olfactory deficits in detoxified alcoholics. *Alcohol*, **8**, 109-115.

Donati, F., Pfammatter, J.P., Mauderli, M. and Vassella, F. (1991). Neurological complications following tonsillectomy. *Schweiz Med Wochenschr*, **121**, 1612-1617.

Doty, R.L., Bartoshuk, L.M. and Snow, J.B., Jr. (1991) Causes of Olfactory and gustatory disorders. In Getchell, T.V., Doty, R.L., Bartoshuk, L.M. and Snow, J.B. Jr. (Eds.) *Smell and Taste in Health and Disease*. New York: Raven Press, 449-462.

Duffy, V.B. and Ferris, A.M. (1989) Nutritional management of patients with chemosensory disturbances. *Ear Nose and Throat Journal*, **68**,395-397.

Duncan, H.J. (1997) Postviral olfactory loss. In Seiden A.M. (Ed.) *Taste and Smell Disorders*. New York: Thieme, 72-78.

Ferris, A.M., Schlitzer, J.L. and Schierberl, M.J. (1986) Nutrition and taste and smell deficits: a risk factor or an adjustment? In Meiselman, H.L. and Rivlin, R.S. eds. *Clinical Measurement of Taste and Smell*. New York: Macmillan, 264-278.

Friedman, M., Tanyeri, H., Landsberg, R. and Caldarelli, D. (1999) Effects of middle turbinate medialization on olfaction. *Laryngoscope*, **109**, 1442-1445.

Frye, R.E., Schwartz, B.S. and Doty, R.L. (1990) Dose-related effects of cigarette smoking on olfactory function. *Journal of the American Medical Association*, **263**, 1233-1236.

Hastings, L. and Miller, M. (1997) Olfactory loss secondary to toxic exposure. In Seiden, A.M. (Ed.) *Taste and Smell Disorders*. New York: Thieme, 88-106.

Ingram, J.D. (1991) 24 *John Marshall Law Review*, **423**, 431.

Lehman, C.D., Bartoshuk, L.M., Catalanotto, F.C., Kveton, J.F. and Lowlicht, R.A. (1995) Effect of anesthesia of the chorda tympani nerve on taste perception in humans. *Physiology and Behavior*, **57**, 943-951.

Moll, B., Klimek, L., Eggers, G. and Mann, W. (1998) Comparison of olfactory function in patients with seasonal and perennial allergic rhinitis. *Allergy*, **53**, 297-301.

Murphy, C. (1993) Nutrition and chemosensory perception in the elderly. *Critical Reviews in Food Science Nutrition*, **33**,3-15.

Rolls, B.J. (1992) Aging and appetite. *Nutrition Review*, **50**, 422-426.

Schiffman, S.S. (1991) Drugs influencing taste and smell perception. In Getchell, GV, Doty, RL, Bartoshuk, LM, Snow, JB, Jr. (Eds.) *Smell and Taste in Health and Disease*. New York: Raven Press, 845-850.

Simola, M., and Malmberg, H. (1998) Sense of smell in allergic and nonallergic rhinitis. *Allergy*, **53**, 190-194.

Weiffenbach, J.M. (1991) Chemical senses in aging. In Getchell TV, Doty RL, Bartoshuk LM, Snow JB, Jr. (Eds.) *Smell and Taste in Health and Disease*. New York: Raven, 369-378.

Yanagisawa, K., Bartoshuk, L.M., Catalanotto, F.A., Karrer, T.A. and Kveton, J.F. (1998) Anesthesia of the chorda tympani nerve and taste phantoms. *Physiology and Behavior*, **63**, 329-335.

Zasler, N.D., McNeny, R. and Heywood, P.G. (1992) Rehabilitative management of olfactory and gustatory dysfunction following brain injury. *Journal of Head Trauma Rehabilitation*, **7**, 66-75.

Upcoming Events

7-8 June, 2001 Food Policy: How does it happen?
Short Course, Smart Foods Centre, University of Wollongong.
Contact: Ph. Anne McMahon/ Sharyn Denmeade/ Nicole Smede
Ph. +61 2 4221 4332 Fax: +61 2 4221 4844
smart_foods@uow.edu.au

13-15 June 2001 Miller Brewing Symposium on Cognition and the Chemical Senses: Associations, Expectations and Interactions.
Marriott Lincolnshire, Illinois USA
Contact: rao.subba@mbco.com

1-4 July 2001 34th Annual AIFST Convention and Exhibition: 2001: A Food Odyssey. Adelaide Convention Centre
Contact: AIFST Ph. (02) 9959 4499
aifst@aifst.asn.au

21-22 July 2001 Smelling, Tasting, Eating: Focus on Development
(Satelite to 4th Pangborn) Dijon, France
Contact:
www.dijon.inra.fr/aromes/pangborn/csg.htm

22-26 July 2001 4th Pangborn Sensory Science Symposium
Dijon France
Contact: www.dijon.inra.fr/aromes/pangborn

22-29 August 2001

XXVII International Ethological Conference
Eberhard-Karls Universitat, Tubingen, Germany
Contact: ethology01@unituebingen.de
Fax: +49 7071 - 294634

17-20 November 2002

The 8th Pacific Rim Biotechnology Conference
Sheraton Hotel, Auckland, New Zealand
Contact: info@biotenz.org.nz

Smart Foods Centre
ARC Key Centre of Teaching and Research
University of Wollongong

Food Policy: How does it happen?

Short Course
7 and 8 June 2001
to be held at
University of Wollongong

Who are the key instigators of food and nutrition policy?
How can it be implemented including conducting effective health promotion?

Understanding how food and nutrition policy is supported, reviewed and what is the process of consultation and evaluation.

Session Facilitators Include:

* **Ms Wendy Hodge**, ARTD
* **Ms Georgia Tarjan**, Commonwealth Department of Health and Aged Care
* **Dr Peter Williams**, University of Wollongong
* **Ms Lisa Franco**, Illawarra Area Health Service
* **Ms Barbara Eden**, Heart Foundation

The short course program provides an indepth analysis of issues that surround nutrition science, the food industry and the consumer. The program can be accredited towards a core subject in the Nutrition Management degree on successful completion of the assessments associated with each short course.

For further information:
Phone:+ 61 2 4221 4332 / 4221 4829
Fax: + 61 2 4221 4844
Email: smart_foods@uow.edu.au

Smart Foods Education Program

The Smart Foods Centre is an ARC key centre of teaching and research at the University of Wollongong. The education programs offered are focussed on supporting a food supply based on nutritional science and its application within the food industry.

Degree Programs

The formal qualifications offered include the Graduate Certificate in Nutrition Management, Masters of Nutrition Management and Masters of Science. The degree programs in nutrition management and continuing professional education would be of interest to food industry personnel, nutrition researchers, dietitians and postgraduate students.

The key research programs within the Smart Foods Centre and the University of Wollongong's, Faculty of Health and Behavourial Sciences are highlighted in the education program. This provides the opportunity for students to be exposed to cutting edge research. Course material is presented by experts in the topic area, including senior research scientists from universities, research bodies, food industry and professional organisations.

What is happening this year?

Currently there are short courses running in Food Regulation and Policy, and in the latter part of the year there will be a series on Contemporary Issues in Nutrition.

What is in the Food Regulation and Policy short courses?

This set of short courses investigate food regulation and policy issues in the Australian and New Zealand environment. Food law aims to ensure the safety of the food supply, protect public health, provide adequate information for consumers to make an informed choice, prevent misleading or deceptive conduct and provide regulations for production and promotion of foods for the food industry. Food policy determines the direction of public health priorities and health promotion initiatives Australia wide.

These short courses will look at the following issues in depth and relate them to students' work environments:

- The basic legal structure in Australia and relevant international treaties as they relate to food law.
- The structure and regulatory role of ANZFA and other key agencies
- The concept of policy and the key influences of food policy processes
- The critical analysis of the development and implementation of a national food policy

Why are these short courses needed?

The short courses are presented as two day intensive workshops and include presentations by senior researchers and experts in the area of food innovations. Students are able to build up a learning profile as their needs arise and interest grows. Short courses can be accredited towards a core subject in a Nutrition Management degree program on successful completion of the assessments associated with each course.

Date for the next short course:

June 7th and 8th -
Food Policy: How does it happen?

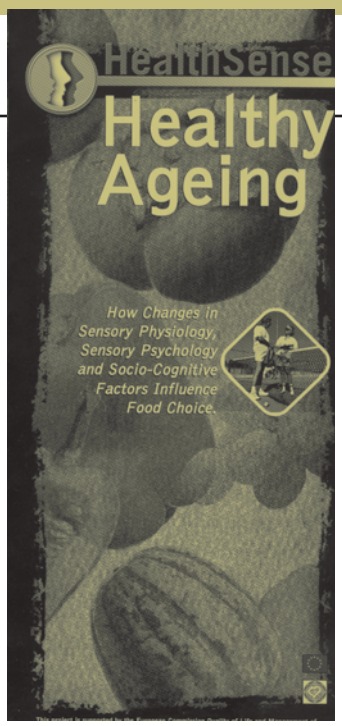
Who are the key instigators of food and nutrition policy? How these policies can be implemented, including conducting effective health promotion and understanding how food and nutrition policy is supported, reviewed and evaluated.

For further information please contact: Smart foods Centre University of Wollongong, Anne McMahon, Sharyn Denmeade or Nicole Smede +
Phone:
612 4221 4332/ +612 4221 4829
Fax: + 612 4221 4844
Email: smart_foods@uow.edu.au or anne_mcmahon@uow.edu.au

NEWS

Aging Tastes

European Community initiates massive chemosensory project for the older person.



Europeans have realised their populations are growing old. Soon there will be more Europeans over age 60 than under 20. Understanding the food needs and how to design products for older people is now seen as an imperative by the EC. So much so, that the EC has provided around AUD$12 Million for a multi-lab project called *HealthSense* to study the relationship between sensory physiology and food preferences; the degredation of sensory capability in aging and its effects on the older person's food preferences and general well-being; and how they deal with issues of food choice. The project will publish the findings in a format which can be used by policy makers, the food industry and consumer organisations who support the elderly.

Twelve main tasks and objectives have been identified. These include:

- Determine the influence of age-changes in perceived texture, mouthfeel, olfaction and taste on changes in food perception
- Understand the role of sensory memory in food perception
- Determine the effect of changes in sensory capability on food appreciation and food intake in different situations
- Detail the impact of sensory physiological and psychological aging on food choice
- Understand attitudes of older people toward food choice and how these affect their behaviour
- Determine the special needs for providing and designing food products for older people
- Understand the relative importance of various drivers of food choice in older people from different cultures and demographics
- Identify how food products can be improved to increase acceptance of them by older people.

The expected benefits of the project include improved dietary intakes, health and quality of life among older EU consumers; information to drive innovation and maintenance of market share in the aging consumer segment by the European food industry; a more effective coupling of European scientists to market needs; development of health policy that realises the potential socio-economic benefits of promoting health through food; and sustaining the EC population effectively into older age.

The study involves 25 capable scientific groups from 10 countries. This in itself will create a healthy dialogue between several disciplines. We can expect a surge of valuable information accruing to knowledge and understanding of the chemical senses, passing in due course into the global public domain.

The project is supported by the EC Quality of Life and Management of Living Resources Fifth Framework Program.

For more information: http://healthsense.ucc.ie

New Sweetner Set to Whey-in

A new sweetner, tagalose, made from dairy whey (the stuff Miss Muffet liked) is about to impact globally after obtaining crucial saftey approval for sale in the USA as a food (reports Foodonline.com).

Tagalose, the invention of Spherix Biosphere Inc, is licenced to Swedish dairy giant Arla Foods (revenue AUD$ 8 Bn p.a.). It is a low-calorie full-bulk sweetner derived from lactose, out of whey.

Regulatory approvals are now likely to be pursued in Europe, Japan, and Asia, including Australia and New Zealand. The inventors are confident that tagalose confers both taste and health benefits to foods and beverages.

USA allergy code includes flavours

A new USA "Code of Practice" for the management of food allergens by food processors demands labeling of major food allergens in ingredient declarations including those that are part of natural and artificial flavours.

The Code was released in April 2001 for members of the National Food Processors Association (NFPA), which represents the USA's AUD$920 Billion food processing industry.

In future, members must:

- label major food allergens in terms that consumers can easily understand and provide supplementary information if there is risk of allergen cross contact
- use strategies including training, separation, sanitation and scheduling, to manage and minimise cross contact of the major food allergens
- continue to develop processing, analytical and operational strategies to further reduce risk to allergic consumers of ingesting food allergens.

The major USA food allergens are allergenic proteins, contained in or derived from the following foods: egg, fish, milk, peanuts, shellfish, including crustacea (e.g., crab, crayfish, lobster and shrimp) and molluscs (e.g., clams, mussels and oysters) soy, tree nuts (e.g., almonds, Brazil nuts cashews, hazelnuts/filberts, macadamias, pecans, pine nuts, pistachios and walnuts) and wheat. Ingredients made from these foods that do not contain protein are not allergenic.

The Code aims to ensure that all potential allergens are clearly labeled on food packages, and that no allergens are contained inadvertently in food products.

Source: Food Online

For more information visit NFPA: http://www.nfpa-food.org

NEWS

Centre's school lunches project makes big splash

As kids head back to school the battle over what to put in their school lunches begins again. So it was with great excitement that the media recently greeted the research finding of the Centre for ChemoSensory Research: when it comes to school lunches kids often know best!

Among the print and radio interest, Australian media icons Geraldine Doogue and Alan Jones wanted to know why children's choices for ideal school lunch add up to better nutrition than what their parents want them to have.

When the chips are down...

The study found that 80% of parents are pack their kids' lunches and only one in 20 kids are happy with their lunches. Even though school lunch provides one third of the child's energy and nutrition requirements, parents do not appear to trust the school canteen to provide an adequate lunch for their offspring. However, the "lunch order" is a universal favourite with the children. They say they like it because it is freshly prepared and is hot.

The kinds of foods kids want differ widely from what their parents think they should have. Chips are anathema to parents, yet included in the lunch, it lifts the energy levels to the right required daily intake. Parents' formulations were deficient in 9 essential intake components including energy. Dads thought tuna would make a great lunch for the kids: luckily the mums, mostly, pack the lunches, because tuna is at bottom of the kids' choices. If they don't like their food, children throw it away, trade it or leave it to fester in the school bag. Parents know only a fraction of what goes on.

Contrary to the parents' ideas, the kids prefer non-fizzy drinks to the sweet carbonated kind and are happy with water as a drink with lunch.

Despite the parents' best intentions, the lunch is usually in a poor condition by the time it has to be eaten: it has endured four to six hours of squashing and warming.

More questions raised

Having identified these needs, what solutions should be tried? Better designed lunch boxes, refrigerators to store the lunches in and microwave ovens to heat them in at school deserve consideration by the relevant authorities. More input from the children when the lunch is packed, may make a difference. Food companies should take note and brief their product designers. More research would be sensible.

The study used questionnaires, focus groups and computer presentations of lunch components (running on Moskowitz's Ideamap tm) followed by conjoint analysis to identify the ideal and optimal lunch formulations for 8-12 year old children (the consumers) and parents (the providers).

For more information

Check the Centre's web site (www.chemosense.com), or ChemoSense, 3(1), November, 2000, 6-10, for the article by Clara Yoon, or contact Graham Bell on g.bell@unsw.edu.au for information.

Coming up in ChemoSense

Air We Breathe
Fragrance
News of Meetings

* Visit us at our website
http://www.chemosensory.com

ChemoSense (ISSN 1442-9098)

is published quarterly by the Centre for ChemoSensory Research, University of New South Wales, Australian Technology Park, Sydney, Australia 1430. Fax (+61 2) 9209 4081; Ph. (+61 2 9209 4086). Web: http://www.chemosensory.com

Production Team: Editor: Graham Bell; **Advertising:** Brian Crowley; **Subscriptions:** Marilyn Styles, **Production Assistance:** Hae-Jin Song; **Design and Layout:** Lawton Design.

THE UNIVERSITY OF NEW SOUTH WALES

E-MAIL from France

Don Barnett
Centre for ChemoSensory Research, UNSW

Don Barnett, locating Truffles with an E-Nose and dog-nose.

Here in southwest France is the place for a chemosensory expedition. I am staying in the Dordogne village of Vergt which is locally claimed to be the 'Capitale de la fraisiculture' (fraises being strawberries). It may be true - the strawberries are a magnificent variety and are served in one way or another with every meal (yum).

Also cultivated, and incidentally the object of my visit, are black truffles. These subterranean mushrooms are collected here from November until the end of March, the winter months, and have been sought for centuries using pigs or dogs. I am now attempting to assist in the harvesting by using an electronic nose. The emergent truffles are very difficult to see in the rough ground under or around host oak and hazelnut trees. However, trained dogs are able to readily locate them by tracking the remarkable truffle odour (although some of the crop may be eaten in the process!).

Buyers come from the main cities and larger restaurants, especially from Paris, to buy truffles at the local special market. This year, they were paying about 4,500 Francs (A$1,100) per kilo for top quality melanosporum truffles.

I have been fortunate enough to enjoy some extra experimental truffles courtesy of my hosts. They were thinly sliced and toasted on buttered slices of baguette in front of a log fire. (Delicious!). They also go well in omelettes made with very yellow free-range eggs but are they worth the price? Well only a connesieour can decide.

The French countryside is always very beautiful and even in winter has a special character. Some of the truffle growers I have visited live in a variety of architectural modes ranging from a converted flourmill, complete with an enclosed millstream in the lounge room, to a wing of a chateau 400years old.

I have been lucky to stay in small friendly family hotel in the village of Vergt. Nobody seems to mind my schoolboy French and I think I am even understood sometimes. Of course, in France you must be preoccupied with eating and it is not difficult or expensive to enjoy. I have been able to get a four-course lunch, with wine and cheese for the equivalent of $A20 in a small country restaurant not surprisingly patronised by many of the local outdoor workers.

There are no fast food outlets here although I believe Bordeaux (120km) has a few for the desperate! The civilised French people here believe in eating slowly and well. Sunday lunch eaten out usually can take several hours and allows for wine sampling and good conversation. Unfortunately, road safety is a loser as a result and you need to watch out on the winding country roads. Scare campaigns do not seem to be effective with locals often blaming tourists rushing through on their way to northern Spain - I wonder!

I am about to visit Bergerac (nothing to do with Cyrano de Bergerac really) and a winery on the way but it will be too cold today for the 'pique nique' mentioned in tourist leaflets.

All for now.

Au revoir!