Published in final edited form as:

Curr Opin Food Sci. 2017 June ; 15: 56–60. doi:10.1016/j.cofs.2017.05.004.

Sensory Functioning in Older Adults: Relevance for Food Preference

Claire Murphy^{1,2} and Rochelle Vertrees¹

¹San Diego State University, San Diego, CA 92120-4913

²SDSU/UCSD Joint Doctoral Program, San Diego, CA 92120-4913

Abstract

The world's population is aging and older adults represent the fastest growing segment of the consumer market. Changes in sensory, perceptual and cognitive function in this segment of the population have been described psychophysically, however, more is known about the young-old than the old-old or oldest-old. Only now are we exploring the potential for neuroimaging tools to probe the changes in central nervous system function related to taste and smell that are relevant to sensory perception, reward value, anticipation of and consumption of food stimuli. There is real potential for brain imaging to provide a greater understanding of older adults' consumer behavior.

Introduction

More than 15% of the US population is over 65 and that proportion is expected to increase to 22% by 2050¹. Similar and even larger increases in the proportion of older adults are impacting global population trends. In Europe some 17% are over 65 now and 28% are projected to be over 65 in 2050. In Japan, more than 40% of the population is expected to be over 65 in 2050¹. Understanding the changing needs of older adults and how those needs interface with those of consumers across the lifespan is a critical first step to designing consumer products that meet the growing demand for appropriate food choices for older adults in the changing population.

A clearer picture of the chemosensory world of adults over 65 will emerge as we focus not only on peripheral changes in chemosensory perception, but central changes in how the older brain responds to stimuli and initiates and directs food choice and consumption. A neuroscience approach to understanding the older adult's sensory, perception and cognitive responses and his consumer behavior can reveal complementary information not available from conscious awareness and self report.

Corresponding Author: Dr. Claire Murphy, SDSU/UCSD Joint Doctoral Program, 6363 Alvarado Ct., Suite 101, San Diego, CA 92120-4913, cmurphy@mail.sdsu.edu.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

The authors declare no conflicts of interest.

Segmenting the older adult consumer marker

For the purposes of this review, older adults are defined as 65 and older with many studies reporting a mean age in the early seventies and a range from 65–85. Information about chemosensory aging and food intake has largely targeted older adults as a group. The gerontology literature refers to segments of the older adult populations as the young-old (65–74), the old-old (75–84) and the oldest-old (85+). A few studies have begun to consider chemosensory and consumer behavior in the old-old and oldest-old groups. There have been some surprises. Centenarians, for example, performed much better than expected in a study of odor threshold². Rather than making assumptions about how individuals in these upper age groups sense, perceive, and act on information about foods and beverages, it is critical to study the old-old and oldest-old in detail. As the population ages, their numbers are rapidly increasing.

Women live longer than men and are represented in greater number in these older age groups. This suggests that aging occurs differently in older men and women and that gender will be an important variable as we study the old-old, and the oldest-old to better understand their behavior as consumers of foods and beverages. In older segments of the population larger percentages of males than females were more likely to smoke, though that is changing in younger cohorts. These differences also suggest that gender differences in consumption will be amplified in these older age groups.

Claire Sulmont-Rosse, Sylvie Issanchou and others have investigated factors other than age that may be important in addressing the differences among the young-old, the old-old and the oldest-old. They found that the degree of dependency (defined as living at home independently, living at home with assistance and living in a nursing home) was associated with chemosensory function³. Indeed, the direction of the relationship between health and chemosensory function in the oldest-old is an empirical question since longitudinal data on this issue are largely lacking. As we consider how to investigate chemosensory function and consumer behavior in these older old, these investigations will be most powerful if they coonside age, dependency and consumer behavior: Older adults living independently make more consumer decisions than older adults living dependently in settings where others shop for and prepare meals or, certainly, institutionalized older adults. The frontier of studying the old-old and oldestold demands new methods, such as neuroimaging, for studying and interpreting chemosensory function and consumer behavior.

Sensitivity to low concentrations of odor and flavor in older adults

Studies have reported for decades that the older adult is less sensitivity to low concentrations of odorants than the younger adult^{4,5}. One important observation is that there is much greater variability in thresholds in older than in younger adults^{6,7}. Epidemiological and multi-center larger studies are revealing, for example, that significant numbers of older adults perform as well as young adults do. This segment of the population is attracting research attention as the effects of aging are distinguished from the effects of poor health⁵, drugs⁸, and dependency (i.e., living at home vs living in a nursing home)³. Research is needed to understand the factors that drive better sensory function in older adults. A clearer

understanding of these factors will be helpful in predicting future trends in sensory function and consumer choice. In the Beaver Dam epidemiological study^{5,9}, a number of factors appear to be contributing to better olfactory function over time in the population. For example, the use of statins to lower cholesterol may be producing better olfactory function as people age¹⁰. We might also speculate that the use of nasal steroids and antibiotics to treat nasal sinus disease may minimize smell loss from nasal disease in future cohorts¹⁰. Emerging cohorts may well be more sensitive to subtle odors and flavors than older generations.

Odor Identification by older adults: Variability

Sensitivity is necessary for the ability to identify odors, though many factors impact odor identification ability. Enjoying an appetizing dinner of complex flavors typically involves identifying the components of the appetizer, main dish, dessert, etc. Flavor, of course, includes not only tastes (sweet, salty, sour, bitter, umami, fat) but also the volatiles that stimulate the olfactory system, enhance pleasantness and intake, and contribute to food recognition. Odor identification is the most studied and one of the most robust indicators of olfactory impairment in older adults^{6,11,12,13,14}. The effect has been replicated in the US⁵, Europe¹⁴, Sweden^{15,16}, Japan¹⁷. Recent attention has been focused on understanding the underlying mechanisms for this loss. Odor identification studies indicate wide variability in how adults over 60 are able to identify common odors. It is likely that many epidemiological studies include older participants with a wide range of cognitive function. Many studies do not have the resources to diagnose Alzheimer's disease (AD) or Parkinson's disease (PD), though some have included a diagnosis of dementia. Both AD and PD begin decades before clinical manifestation. Olfactory dysfunction is an early characteristic of both of these diseases and has even been suggested as a biomarker of pre-clinical neurodegenerative disease¹⁸. Thus, it seems likely that some of the variability in odor identification in these large population based studies may be due to participants in varying stages of pre-clinical decline. More research is needed to better understand this phenomenon. Determining the odor identification ability of a typically aging older adult compared to a normal young adult, without the influence of disease, particularly diseases related to olfactory impairment due to central nervous system degeneration, is important if we wish to understand the sensory world of a normally aging, independently-living consumer.

Taste function in aging: How best to capture factors that drive food choice

Taste threshold shows less impairment with age than olfactory threshold, though it is taste quality specific: bitter>sour>salty>sweet^{19,20}. There is a considerable body of literature on psychophysics and sensory evaluation that provides useful information about the ratings and magnitude estimations of intensity and pleasantness given by older adults and how these ratings and estimates agree or do not with those of younger adults. A number of studies have indicated that older adults prefer higher concentrations of sugar and salt than younger subjects do²¹, though this finding is not without exception²². This is in line with nutrition surveys that show increased consumption of sugar and salt by older adults²³.

One of the most dramatic advancements in the field has been the adaptation of neuroimaging methods that reveal brain activity during processing of a stimulus to better understand the chemosensory world of the older consumer^{24,25,26,27}. Since psychophysical ratings provide information about subject's ratings and brain imaging provides information about activity in different brain areas that process different types of information (e.g., intensity, pleasantness, reward value, cognitive effort, etc.) neuroimaging data nicely complement information that can be gained from psychophysics.

In healthy, young adult subjects psychophysical data are often correlated with brain activation^{28,29}. Older adults show brain activation that is different from activation in young people in some areas and this is modulated by body weight^{30,31}. They show less activation to sweet, overall, in primary taste, reward and memory areas²⁷. Importantly, areas such as the caudate, the orbital frontal cortex and the nucleus accumbens that process information about reward have shown less activation, suggesting that the older brain perceives less reward from some concentrations of sweet stimuli, thus, we might expect that older adults might increase their intake of sweet foods to experience the same reward value from the diet as they did as younger adults, in line with nutrition surveys that demonstrate greater intake of sugar in older adults²³.

And interestingly, some studies have shown greater activation in some areas in instances where greater cognitive effort would be involved in the taste task^{24,25}. Older adults often show compensation in a variety of tasks with a significant cognitive load, i.e., greater activation in the same area or activation in other areas indicating recruitment of additional neuronal populations to process the same information. We can expect that chemosensory tasks like judging stimulus characteristics can likewise produce greater effort in older adults. Older adults have been demonstrated to have an elevated response in the agranular insula to a complex orange flavor (Fanta)²⁵. The ability to examine activity in different brain regions that are processing different aspects of the taste stimulus (intensity, pleasantness, liking, wanting, reward value) can be extremely valuable in understanding how the older brain is processing chemosensory stimuli and making decisions about the appetitive nature of stimuli and whether to consume a food or beverage.

To gain the most information from brain imaging data, it is important to distinguish between brain response in anticipation of reward and receipt of reward. Different brain networks will be engaged as consumers view pictures of foods and are asked how much they want or like them (anticipation, vision) than when they actually receive and taste the food or beverage. And both networks will differ from those engaged when subjects self-report how much they liked a previously consumed food, judgment that requires memory. It will be of great interest to determine the relative contributions of these networks to purchase and re-purchase decisions.

FMRI data provide complementary information to psychophysical responses. Areas involved in both conscious and unconscious perceptions and intentions will be revealed with fMRI, whereas self-reported psychophysical judgments reflect conscious perception.

Psychophysical and preference studies often indicate similar or slightly reduced magnitude estimates of intensity for sweet and salty stimuli in older adults^{21,32}. As older adults experience less intensity from taste stimuli that are more potent for younger adults, their psychophysical labels for weak and strong may refer to different absolute intensities due to the changes in the context of their altered sensory worlds. We might speculate that these issues would favor similar self-reports of taste intensity in older and younger adults that would underestimate effects of age that might be revealed in differential brain response. Nutrition surveys indicate that older adults tend to consume more sugar and salt, in line with the brain imaging studies that suggest a reward deficiency syndrome evidenced by a reduced response in dopaminergic areas in older adults^{30,33}.

The reward deficiency syndrome refers to the reduction of activation in areas of the brain that produce dopamine in response to rewarding stimuli, particularly the nucleus accumbens, caudate and amygdala. Interestingly, taste and reward networks can be altered by overweight and obesity, increasing problems in the population as a whole and particularly in middle aged and aging adults. Greater activation to consumption of sweet stimuli is seen in primary taste cortex in obese subjects; whereas, reduced activation has been observed in the reward areas of nucleus accumbens and the caudate^{34,35,36}.

Older adults and obese subjects have reduced dopamine response and thus, are at particularly high risk for reward deficiency syndrome^{34,35,36}. Food reward and taste are important motivators of diet and food consumption³⁷, thus reward deficiency syndrome can lead to increased intake of rewarding stimuli, like sweet and fat tasting foods. Green et al., (2013) demonstrated the reward deficiency effect in the lentiform nucleus, caudate and putamen in middle aged adults³¹; and Jacobson et al., (2017) demonstrated the effect in the nucleus accumbens, caudate and orbital frontal cortex in older adults²⁷. In each case, the older brain showed blunted response when rating the pleasantness of sweet taste. We might speculate an increased desire for and consumption of sweet stimuli in the older adult, and particularly in older adults who have gained weight over time, to achieve the same rewarding dopamine response. At the population level, there is evidence for increased intake of sugar in nutrition surveys of older adults²³. Further research on the liking, wanting and consumption of sweet foods and beverages in older adults is warranted in order to understand the relationship between brain response and consumption.

Conclusions and implications

Older consumers are becoming a force in consumption patterns world-wide. In the US they hold more than 1/3 of the wealth³⁸. In Europe, consumption by those over 50 has increased three times as fast as those under 50. Clearly, the stereotype of an over 60 adult who is conservatively spending on food and beverages in the face of a very limited income is increasingly out of date. Older adults are not only spending more, they are healthier and the Baby Boomer generation is pushing the envelope to enjoy life longer.

While health considerations play a role in food choice in older adults, those choices are increasingly good for consumers of all ages. Managing salt consumption, consuming less sugar, cholesterol and saturated fat are considered good choices throughout life. Addressing

these issues in food choice without labeling foods as “senior fare” makes sense from a health perspective as well as from a business economics perspective. A better understanding of how to make these types of food choices highly palatable and attractive to a broad age range of consumers will benefit not only consumers but those who produce the foods and beverages that will make for a healthier society. Older adults constitute the largest consumers of print and the largest percentage of television audiences (>50%) and thus are a ready audience to absorb information about new products that leverage the new developments in food science and technology that will advance palatable food choices³⁹.

Discovering healthy and attractive sugar substitutes is a critical goal. Diabetes and insulin insensitivity are increasingly prevalent not only in older adults but across the lifespan^{40,41}. Research on brain imaging is revealing brain mechanisms that drive increased intake of palatable food. A blunted response to sweet in overweight people may produce greater intake of sweets in order to produce the same rewarding dopamine brain response as those without diabetes or high BMI. It is still not known whether sugar substitutes will be effective in this syndrome. Providing sugar substitutes that achieve the goals of providing rewarding sweetness without calories or unwanted side tastes is of tremendous importance. Understanding the brain response to, as well as the sensory perceptual judgments of, these substitutes will be essential to understanding future consumption behavior.

There is real potential for brain imaging to provide a greater understanding of older adults' consumer behavior. Imaging data can sharpen the focus of sensory, perceptual and consumer research and cut through to brain response to reveal significant effects that may be less salient in self-report data. Both conscious and unconscious perceptions and intentions will be evident from neuroimaging, whereas self-reported psychophysical judgments reflect conscious perception, sometimes filtered by the consumer making the report. Distinguishing among brain networks that are activated by anticipation of foods and beverages from those involved in appreciating consumed foods and beverages will enhance the value of imaging. How these networks contribute to decisions to consume, or consume again, food and beverages will be of great interest. Making smart use of brain imaging data will be of great importance in moving the field forward in the near future.

Acknowledgments

Supported by NIH grant # R01-AG004085-26 from the National Institute on Aging to C.M. We thank Dr. Herbert Meiselman for comments on the manuscript.

References

1. He W, Goodkind D, Kowal P. An aging world: 2015. US Census Bureau. 2016:1–165.
2. Elsner RJ. Odor threshold, recognition, discrimination and identification in centenarians. Archives of gerontology and geriatrics. 2001; 33(1):81–94. [PubMed: 11461724]
3. Sulmont-Rosse C, Maitre I, Amand M, Symoneaux R, Van Wymelbeke V, Caumon E, Tavares J, Issanchou S. Evidence for different patterns of chemosensory alterations in the elderly population: impact of age versus dependency. Chemical Senses. 2015; 40(3):153–64. Thoughtful consideration of the relationship between health/dependency and chemosensory function. [PubMed: 25680371]
4. Schiffman SS. Taste and smell losses in normal aging and disease. JAMA. 1997; 278(16):1357–1362. [PubMed: 9343468]

5. Murphy C, Schubert CR, Cruickshanks KJ, Klein BE, Klein R, Nondahl DM. Prevalence of olfactory impairment in older adults. *JAMA*. 2002; 288(18):2307–2312. The first community based prevalence study of olfactory function in older adults in the US. [PubMed: 12425708]
6. Nordin S, Almkvist O, Berglund B. Is loss in odor sensitivity inevitable to the aging individual? A Study of “Successfully Aged” Elderly. *Chemosensory Perception*. 2012; 5(2):188–196.
7. Seow YX, Ong PK, Huang D. Odor-Specific Loss of Smell Sensitivity with Age as Revealed by the Specific Sensitivity Test. *Chemical Senses*. 2016; 41(6):487–495. [PubMed: 27001718]
8. Schiffman SS. Taste and smell losses with age. *Contemporary Nutrition (USA)*. 1991
9. Schubert CR, Cruickshanks KJ, Fischer ME, Huang GH, Klein BE, Klein R, Nondahl DM. Olfactory impairment in an adult population: the Beaver Dam Offspring Study. *Chemical senses*. 2012; 37(4):325–334. [PubMed: 22045704]
10. Smith W, Murphy C. Epidemiological Studies of Smell. *Annals of the New York Academy of Sciences*. 2009; 1170(1):569–573. [PubMed: 19686194]
11. Hoffman HJ, Rawal S, Li CM, Duffy VB. New chemosensory component in the US National Health and Nutrition Examination Survey (NHANES): first-year results for measured olfactory dysfunction. *Reviews in Endocrine and Metabolic Disorders*. 2016; 17(2):221–240. [PubMed: 27287364]
12. Rawal S, Hoffman HJ, Chapo AK, Duffy VB. Sensitivity and specificity of self-reported olfactory function in a home-based study of independent-living, healthy older women. *Chemosensory perception*. 2014; 7(3–4):108–116. [PubMed: 25866597]
13. Wehling EI, Wollschlaeger D, Nordin S, Lundervold AJ. Longitudinal changes in odor identification performance and neuropsychological measures in aging individuals. *Neuropsychology*. 2016; 30(1):87. Longitudinal study of odor identification and neuropsychological performance in the elderly in Sweden. [PubMed: 26076320]
14. Joussain P, Bessy M, Faure F, Bellil D, Landis BN, Hugentobler M, Tuorila H, Mustonen S, Vento SI, Delphin-Combe F, Krolak-Salmon P, Rouby C, Bensafi M. Application of the European Test of olfactory capabilities in patients with olfactory impairment. *European Archives of Otorhinolaryngology*. 2016; 273(2):381–390. Demonstrates olfactory impairment with age and Alzheimer’s disease in a European sample. [PubMed: 25711735]
15. Hedner M, Larsson M, Arnold N, Zucco GM, Hummel T. Cognitive factors in odor detection, odor discrimination, and odor identification tasks. *Journal of Clinical and Experimental Neuropsychology*. 2010; 32(10):1062–1067. [PubMed: 20437286]
16. Larsson M, Finkel D, Pedersen NL. Odor identification influences of age, gender, cognition, and personality. *The Journals of Gerontology Series B. Psychological Sciences and Social Sciences*. 2000; 55(5):P304–P310.
17. Sugiyama E, Ayabe-Kanamura S, Okabe Y, Konioko Y, Miyake Y. ISOT XVII. Yokohama; Japan: 2016. Development of a new odor identification test for Japanese elderly people: A comparison of olfactory functions between elderly and young adults.
18. Albers MW, Gilmore GC, Kaye J, Murphy C, Wingfield A, Bennett DA, et al. At the interface of sensory and motor dysfunctions and Alzheimer’s disease. *J. Alzheimer’s Disease*. 2015; (Epub ahead of print). Review paper which evolved from an NIH Workshop on sensory and motor changes in Alzheimer’s disease (AD), with a detailed discussion of olfactory dysfunction in AD. doi: 10.1016/j.jalz.2014.04.514
19. Murphy C. The effects of age on taste sensitivity. Han SS, Coons DH, editors *Special Senses in Aging*. University of Ann Arbor, Institute of Gerontology; Ann Arbor, MI: 1979. 21–33.
20. Schiffman SS. Effects of aging on the human taste system. *Annals of the new york Academy of Sciences*. 2009; 1170(1):725–729. [PubMed: 19686219]
21. Murphy C, Withee J. Age-related differences in the pleasantness of chemosensory stimuli. *Psychology and aging*. 1986; 1(4):312. [PubMed: 3267412]
22. Mojet J, Christ-Hazelhof E, Heidema J. Taste perception with age: pleasantness and its relationships with threshold sensitivity and supra-threshold intensity of five taste qualities. *Food Quality and Preference*. 2005; 16(5):413–423.

23. Food Standards Agency. Public Health England, Food Standards Agency; 2014. National Diet and Nutrition Survey: Results from Years 1, 2, 3 and 4 (combined) of the Rolling Programme (2008/2009–2011/2012). food.gov.uk [accessed 2/2017]
24. Jacobson A, Green E, Murphy C. Age-related functional changes in gustatory and reward processing regions: An fMRI study. *Neuroimage*. 2010; 53(2):602–610. [PubMed: 20472070]
25. Rolls ET, Kellerhals MB, Nichols TE. Age differences in the brain mechanisms of good taste. *NeuroImage*. 2015; 113:298–309. Neuroimaging study of beverages (flavor) demonstrating differences in brain response as a function of age. [PubMed: 25842291]
26. Hoogeveen HR, Dalenberg JR, Renken RJ, ter Horst GJ, Lorist MM. Neural processing of basic tastes in healthy young and older adults—an fMRI study. *NeuroImage*. 2015; 119:1–12. [PubMed: 26072251]
27. Jacobson A, Green E, Haase L, Szajer J, Murphy C. Age-related Changes in Gustatory, Homeostatic, Reward, and Memory Processing of Sweet Taste in Metabolic Syndrome: an fMRI Study. *Perception*. 2017 E-pub ahead of print. Neuroimaging study of brain response during pleasantness evaluation of sucrose in young and older adults with and without the metabolic syndrome.
28. Kringelbach ML, O'Doherty J, Rolls ET, Andrews C. Activation of the human orbitofrontal cortex to a liquid food stimulus is correlated with its subjective pleasantness. *Cerebral cortex*. 2003; 13(10):1064–1071. [PubMed: 12967923]
29. Small DM, Jones-Gotman M, Dagher A. Feeding-induced dopamine release in dorsal striatum correlates with meal pleasantness ratings in healthy human volunteers. *Neuroimage*. 2003; 19(4):1709–1715. [PubMed: 12948725]
30. Green E, Jacobson A, Haase L, Murphy C. Reduced nucleus accumbens and caudate nucleus activation to a pleasant taste is associated with obesity in older adults. *Brain Research*. 2011; doi: 10.1016/j.brainres.2011.02.071
31. Green E, Haase L, Jacobson A, Murphy C. Can age-related CNS taste differences be detected as early as middle age? Evidence from fMRI. *Neuroscience*. 2013; 232:194–203. doi.org/10.1016/j.neuroscience.2012.11.027. [PubMed: 23211563]
32. Simpson EE, Rae G, Parr H, O'Connor JM, Bonham M, Polito A, Strain JJ. Predictors of taste acuity in healthy older Europeans. *Appetite*. 2012; 58(1):188–195. [PubMed: 21986182]
33. Sergi G, Bano G, Pizzato S, Veronese N, Manzato E. Taste loss in the elderly: possible implications for dietary habits. *Critical reviews in food science and nutrition*, (just-accepted). 2016:00–00. Highlights the importance of taste impairment with age and its potential link to increased consumption of salt and sugar in the elderly.
34. Dang LC, Samanez-Larkin GR, Castellon JJ, Perkins SF, Cowan RL, Zald DH. Associations between dopamine D2 receptor availability and BMI depend on age. *NeuroImage*. 2016; 138:176–183. [PubMed: 27208860]
35. Stice E, Spoor S, Ng J, Zald DH. Relation of obesity to consummatory and anticipatory food reward. *Physiology & behavior*. 2009; 97(5):551–560. [PubMed: 19328819]
36. Volkow ND, Gur RC, Wang GJ, Fowler JS, Moberg PJ, Ding YS, Logan J. Association between decline in brain dopamine activity with age and cognitive and motor impairment in healthy individuals. *American Journal of psychiatry*. 1998; 155(3):344–349. [PubMed: 9501743]
37. Spector AC, le Roux CW, Munger SD, Travers SP, Scalfani A, Mennella JA. Proceedings of the 2015 ASPEN Research Workshop—Taste Signaling: Impact on Food Selection, Intake, and Health. *Journal of Parenteral and Enteral Nutrition*. 2017; 41(1):113–124. Review article considering important determinants of food selection, consumption and health. [PubMed: 26598504]
38. Srinivas V, Goradia U. [Retrieved March 22, 2017] The future of wealth in the United States. 2015. Nov 9, from <https://dupress.deloitte.com/dup-us-en/industry/investment-management/us-generational-wealth-trends.html>
39. Yoon C, Cole CA. Aging and consumer behavior. *Handbook of consumer psychology*. 2008:247–270.
40. Rathmann W, Giani G. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. *Diabetes care*. 2004; 27(10):2568–2569. [PubMed: 15451946]

41. Shaw JE, Sicree RA, Zimmet PZ. Global estimates of the prevalence of diabetes for 2010 and 2030. *Diabetes research and clinical practice*. 2010; 87(1):4–14. [PubMed: 19896746]

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Nutrition surveys suggest increased consumption of sugar and salt in older adults.

Brain imaging is revealing differences in how the older brain processes chemosensory stimuli and makes decisions about intake.

Making smart use of brain imaging data will be of great importance in moving the field forward in the near future.

Emerging cohorts may well be more sensitive to subtle odors and flavors than older generations.