Age-Related Deficits in Taste and Smell

Richard L. Doty, PhD

KEYWORDS

• Olfaction • Gustation • Taste • Smell • Age • Geriatrics • Psychophysics

KEY POINTS

- Taste and smell decline markedly with age, greatly impacting safety, food intake, and quality of life.
- In the case of smell, more than one-half of the population between 65 and 80 years have demonstrable loss; over 80 years this increases to more than three quarters.
- Environmental factors play a significant role in producing age-related smell loss and likely swamp genetic factors later in life. Smell loss in older populations significantly impacts the likelihood of mortality over the course of 4 to 5 years.
- Reasons for age-related smell loss include cumulative damage to the olfactory receptor cells, ossification of the foramina of the cribriform plate, and changes in neural responsiveness.
- Several age-related neurodegenerative diseases exhibit smell loss, most notably Alzheimer's and Parkinson's diseases. Such loss occurs, in many cases, decades before the classic diagnostic phenotype.

INTRODUCTION

The ability to taste and smell significantly declines later in life.[1,2] This phenomenon is perhaps best illustrated for the sense of smell; more than one-half of those between the ages of 65 and 80 years, and more than 75% of those over the age of 80 years, have a demonstrable decline.[3] Such dysfunction impacts quality of life, including the flavor of foods and beverages, as well as safety. In a study of 750 consecutive patients presenting to the University of Pennsylvania Smell and Taste Center for evaluation, 68% reported a decreased quality of life, 46% a change in appetite or body weight, and 56% a negative impact on daily living or psychological well-being.[4] A study of more than 1000 patients conducted at the Medical College of Virginia found

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Smell and Taste Center, Department of Otorhinolaryngology, Head and Neck Surgery, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA 19104, USA
E-mail address: doty@mail.med.upenn.edu

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that those who could not smell (anosmics) were 3 times more likely than normosmics to have experienced a potentially life-threatening event at some point in their lives, including ingestion of spoiled food or the failure to detect smoke or leaking natural gas.[5] Remarkably, healthy older anosmics are also 3 times more likely to die over a subsequent 4- to 5-year period than their normosmic peers, although the cause of this difference is unknown.[6,7] The same risk also occurs in acutely hospitalized older patients with significant taste loss.[8]

This review describes the basic anatomy and physiology of the senses of smell and taste and discusses the functional and pathophysiologic changes that occur in these senses in the later years of life. The goal is to provide the clinician with a fundamental understanding of these changes and information for evaluating, treating, and counseling older patients with chemosensory disturbances.

BASIC ANATOMY OF THE TASTE AND SMELL SYSTEMS

The Taste System

Tastants are sensed by specialized microvillus receptor cells found in approximately 8000 taste buds located throughout the oral cavity. Most taste buds, which also contain supporting and basal cells from which the other cells are derived (**Fig. 1**),[9] are embedded within the fungiform, foliate, and circumvallate papillae of the tongue.

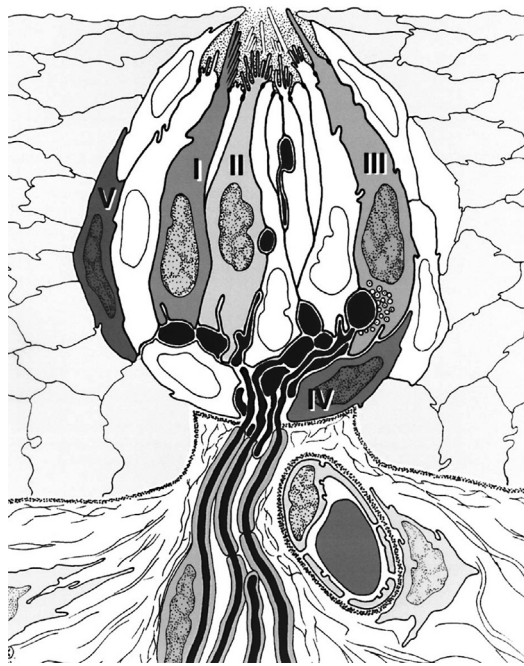

Fig. 1. Idealized drawing of longitudinal section of a mammalian taste bud. Cells of types I, II, and III are elongated. These cells have different types of microvilli within the taste pit and may reach the taste pore. Type IV are basal cells and type V are marginal cells. Classically defined synapses occur only between type III cells and nerve fibers. Many of the connecting taste nerves have myelin sheaths. (*From* Witt M, Reutter K. Anatomy of the tongue and taste buds. In: Doty RL, editor. Handbook of Olfaction and Gustation. 3rd edition. Hoboken (NJ): John Wiley & Sons; 2015. p. 638; with permission.)