Smell and Taste Disorders

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Preface

This smell and taste disorders aims to provide neuroscientists, physicians, dentists, and psychologists with concise, practical, and authoritative information for understanding, testing, and managing disorders of taste and smell. Nearly 3 percent of Americans under the age of 65 suffer from some form of chronic olfactory or gustatory dysfunction – a percentage that rises to more than 50 percent of those over 65 years of age and is likely much higher in areas of the world where air and water pollution are prevalent. Despite such statistics, the chemical senses remain neglected by the majority of medical practitioners. Such oversight stems from a number of sources, not least of which is the lack of understanding or trivialization of these senses and the belief that their accurate assessment cannot be made in the clinic. Less-than-total dysfunction is rarely brought to the attention of the physician and, when aberrations are found, many are unsure of how to proceed.

Although practical quantitative tests of smell function are now widely available, the majority of neurologists test only cranial nerves II through XII. This continues, despite the fact that olfactory testing has been recommended by the Quality Standards Committee of the American Academy of Neurology for inclusion in the diagnostic criteria for Parkinson's disease (Suchowersky et al., 2006). Similar suggestions have been made for inclusion of smell testing as an aid in the diagnosis of Alzheimer's disease (Foster et al., 2008). There is evidence that smell tests can be useful in differential diagnosis of several disorders (e.g., depression vs. Alzheimer's disease; Parkinson's disease vs. progressive supranuclear palsy and essential tremor). Moreover, they may assist the detection of malingering. Loss of smell or taste has considerable medico-legal importance, commanding major financial compensation for those who are victims of head injury or exposure to toxic agents, particularly for the young and persons whose livelihoods depend upon chemosensation. As this book emphasizes, there are no longer excuses for neglecting the chemical senses in medical practice.

Smell and taste are regularly lumped together, particularly by lay people. While both are chemical senses and contribute to the flavor of foods and beverages, in the embryo these two systems develop independently and are completely separate at subcortical level and merge only at the anterior insula. Olfaction is seemingly more ancient, developing first phylogenetically; taste, as an oral chemosensory system, is a relatively new thalamic-dependent system. It is important to recognize, however, that both olfactory and gustatory receptor proteins are found outside of the nose and oral cavity, suggesting that these proteins are ubiquitous and have functions beyond those of transducing the conscious perception of tastes and smells. For example, olfactory receptor proteins have been found in the tongue, brain, prostate, enterochromaffin cells, pulmonary neuroendocrine cells, and spermatozoa. Taste receptors have now been reported in the epiglottis, larynx, respiratory epithelium, stomach, pancreas, and colon, where they influence such processes as digestion, chemical absorption, insulin release, and protection of the epithelium from xenobiotic agents. Olfaction is more plastic than taste, and it is damaged more readily from head trauma, viruses, and exposure to xenobiotics. Inborn mechanisms largely determine the meaning of taste experiences, whereas learning plays a much greater role for the sense of smell. Nonetheless, these primary sensory modalities intermingle both with each other and other sensory systems at the cortical level – interactions that in some cases are influenced greatly by learning. Such interplay is only just beginning to be understood.

Many chemosensory systems have evolved in mammals, including the vomeronasal system, but the senses of taste and smell are the most prominent in humans. In Chapters 1 and 2 we emphasize the anatomy and physiology of these two modalities, beginning with olfaction, which as noted above is typically more compromised than taste by injury and disease. In subsequent chapters we review methods to measure smell (Chapter 3) and taste (Chapter 4), what factors influence these modalities, and, from a clinical perspective, the nature and major causes of their dysfunction with an emphasis on neurological disorders (Chapters 5, 6, and 7). Our goal is to provide up-to-date information about these senses in health and disease, and to guide the practitioner in the assessment, treatment, and management of patients with chemosensory disturbances (Chapter 8).

We express our gratitude to the editors of Cambridge University Press who agreed to an update of our earlier work *The Neurology of Olfaction* (2009) and to include taste complaints. We hope that this compendium will serve the needs of a broad array of clinicians and scientists who recognize the unique role that the chemical senses play in medicine and everyday life.

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