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Olfactory dysfunction is frequent; approximately 5% of the general population are without functioning sense of smell. However, despite this large number the society does not exhibit a great effort to help these people although the loss of olfactory function often results in an enormous change in quality of life. During the last years the human sense of smell has become accessible at various levels of the processing of olfactory information. Based on information from electrophysiological (e.g., olfactory event-related potentials, recordings from the mucosa of the nasal cavity), psychophysical, and imaging techniques (e.g., PET, FMRI) patients with olfactory dysfunction can be diagnosed thoroughly, which in turn also allows to monitor effects of therapeutic interventions, such as "smell training". One goal is to better understand the physiology and pathophysiology of the chemical senses, the other goal is to improve the diagnostics of patients with olfactory dysfunction and to ultimately develop effective therapeutic regimens for these patients.