



Part Four - Flavor Perception and Physiological Status

Marie-Christine Lacroix, Nicola Kuszewski, Christine Baly, P. Duchamp-Viret

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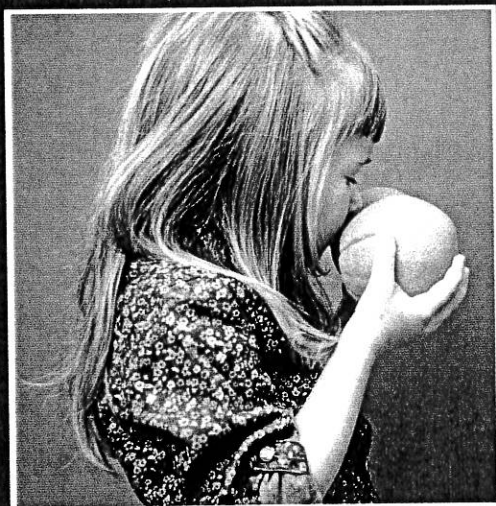
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Flavor

From Food to Behaviors,
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Edited by Patrick Etievant, Elisabeth Guichard,
Christian Salles and Andrée Voilley

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List of Contributors

Knaapila Antti Department of Biochemistry, Food Chemistry and Food Development, University of Turku, Turku, Finland

Niliüfer Z. Aydmoglu Koç University, Istanbul, Turkey

Christine Baly NBO, INRA, Université Paris-Saclay, Jouy-en-Josas, France

Loïc Briand Center for Taste and Feeding Behaviour (CSGA), CNRS, INRA, Université de Bourgogne Franche-Comté, Dijon, France

Marie-Claude Brindisi Center for Taste and Feeding Behaviour (CSGA), CNRS, INRA, Université de Bourgogne Franche-Comté, Dijon; Endocrinology, CHU Dijon, France

Laurent Brondel Center for Taste and Feeding Behaviour (CSGA), CNRS, INRA, Université de Bourgogne Franche-Comté, Dijon; Hepato-Gastro-Enterology, CHU Dijon, France

Ilona Croy Smell and Taste Clinic, Department of Otorhinolaryngology, TU Dresden; Department of Psychosomatic Medicine, TU Dresden, Dresden, Germany

Patricia Duchamp-Viret Neuroscience Research Center of Lyon (CRNL), University of Lyon, Lyon, France

Ciarán G. Forde Clinical Nutrition Research Centre (CNRC); Singapore Institute for Clinical Sciences, Agency for Science, Technology and Research (A*STAR); National University of Singapore, Department of Physiology, Yong Loo Lin-School of Medicine, Singapore

Elisabeth Guichard Center for Taste and Feeding Behaviour (CSGA), CNRS, INRA, Université de Bourgogne Franche-Comté, Dijon, France

Antje Haehner Smell and Taste Clinic, Department of Otorhinolaryngology, TU Dresden, Dresden, Germany

Remco C. Havermans Department of Clinical Psychological Science, Faculty of

- Thomas Hummel** Smell and Taste Clinic, Department of Otorhinolaryngology, TU Dresden, Dresden, Germany
- Agnès Jacquin-Piques** Center for Taste and Feeding Behaviour (CSGA), CNRS, INRA, Université de Bourgogne Franche-Comté, Dijon; Neurology CHU Dijon, France
- E.P. Köster** Helmholtz Institute, University of Utrecht, Utrecht, the Netherlands
- Nicola Kuszewski** Neuroscience Research Center of Lyon (CRNL), University of Lyon, Lyon, France
- Marie-Christine Lacroix** NBO, INRA, Université Paris-Saclay, Jouy-en-Josas, France
- Sandell Mari** Functional Foods Forum, University of Turku, Turku, Finland
- J. Mojet** Wageningen University and Research Centre, Wageningen, the Netherlands
- Thomas Mouillot** Center for Taste and Feeding Behaviour (CSGA), CNRS, INRA, Université de Bourgogne Franche-Comté, Dijon; Hepato-Gastro-Enterology, CHU Dijon, France
- Sophie Nicklaus** Center for Taste and Feeding Behaviour (CSGA), CNRS, INRA, Université de Bourgogne Franche-Comté, Dijon, France
- Laaksonen Oskar** Department of Biochemistry, Food Chemistry and Food Development, University of Turku, Turku, Finland
- Luc Pénicaud** Center for Taste and Feeding Behaviour (CSGA), CNRS, INRA, Université de Bourgogne Franche-Comté, Dijon, France
- Edmund T. Rolls** Oxford Centre for Computational Neuroscience, Oxford, United Kingdom
- Anne Saint-Eve** Microbiology and Food Process Engineering, UMR GMPA, AgroParisTech, INRA, University of Paris Saclay, Thiverval-Grignon, France
- Christian Salles** Center for Taste and Feeding Behaviour (CSGA), CNRS, INRA, Université de Bourgogne Franche-Comté, Dijon, France
- Eda Sayim** IE Business School, Madrid, Spain
- Benoist Schaal** Center for Taste and Feeding Behaviour (CSGA), CNRS, INRA, Université de Bourgogne Franche-Comté, Dijon, France
- Charlotte Sinding** Center for Taste and Feeding Behaviour (CSGA), CNRS, INRA, Université de Bourgogne Franche-Comté, Dijon, France
- Richard J. Stevenson** Department of Psychology, Macquarie University, Sydney, NSW, Australia
- Thierry Thomas-Danguin** Center for Taste and Feeding Behaviour (CSGA), CNRS, INRA, Université de Bourgogne Franche-Comté, Dijon, France
- Carole Tournier** Center for Taste and Feeding Behaviour (CSGA), CNRS, INRA, Université de Bourgogne Franche-Comté, Dijon, France
- Anne Tromelin** Center for Taste and Feeding Behaviour (CSGA), CNRS, INRA, Université de Bourgogne Franche-Comté, Dijon, France
- Hoppu Ulla** Functional Foods Forum, University of Turku, Turku, Finland
- Dominique Valentin** Center for Taste and Feeding Behaviour (CSGA), CNRS, INRA, Université de Bourgogne Franche-Comté, Dijon, France

Marie-Christine Lacroix*, Nicola Kuszewski**, Christine Baly*,

Patricia Duchamp-Viret**

*NBO, INRA, Université Paris-Saclay, Jouy-en-Josas, France; **Neuroscience Research Center of Lyon (CRNL), University of Lyon, Lyon, France

14.1 Olfactory function is under the influence of metabolic-related hormones and peptides, as well as of nutriment: neuroanatomical evidences

For 50 years, numerous efforts have been done to localize hormones/peptides and their receptors by immunohistochemistry, radioimmunoassay, radioactive or not, hormone binding assays and, more recently, molecular biology. The demonstration that most metabolic anorexigenic and orexigenic hormones and peptides receptors traditionally considered to be feeding-related are expressed in the olfactory system in many species came strongly to support the findings that odor processing can be modulated by the nutritional status; this especially in the first two levels of the olfactory system, the olfactory mucosa (OM) and the olfactory bulb (OB), and thus well before the involvement of cortical integration (Martin et al., 2009; Palouzier-Paulignan et al., 2012; Lucero, 2013).

14.1.1 Anatomical distribution of receptors to metabolic-related hormones and peptides along the olfactory pathways

14.1.1.1 Olfactory mucosa

In the mammalian OM,^a mature olfactory sensory neurons (OSNs), the key cells interacting with odorant molecules and transducing the odorant signal, express a large array of receptors related to major anorexigenic or orexigenic metabolic hormones: orexin receptor (OXR) that have been localized in the apical ends of the sensory neurons (Caillol et al., 2003; Gorojankina et al., 2007), leptin receptor (Ob-R) (Baly et al., 2007) and insulin receptor (IRs) (Lacroix et al., 2008) in dendritic knobs, ghrelin receptor (Ghr1a) (Loch et al., 2015), and endocannabinoid receptor CB1 in mature OSN (Huich et al., 2015). To a lesser extent, neuropeptide Y receptor (NPY-Y1R) is expressed in a subset of OSNs dispersed within the OE (Negroni et al., 2012).

^aThe olfactory mucosa is located in the upper region of the nasal cavity, and is made up of the olfactory epithelium (OE) and the underlying *lamina propria*, connective tissue containing fibroblasts, blood vessels, Bowman's glands, and bundles of fine axons from the olfactory neurons.