

Corrigendum

Corrigendum to: More Than Smell—COVID-19 Is Associated With Severe Impairment of Smell, Taste, and Chemesthesis

Valentina Parma¹, Kathrin Ohla^{2, id}, Maria G. Veldhuizen³, Masha Y. Niv⁴, Christine E. Kelly⁵, Alyssa J. Bakke⁶, Keiland W. Cooper⁷, Cédric Bouysset⁸, Nicola Pirastu⁹, Michele Dibattista¹⁰, Rishemjit Kaur¹¹, Marco Tullio Liuzza^{12, id}, Marta Y. Pepino¹³, Veronika Schöpf¹⁴, Veronica Pereda-Loth¹⁵, Shannon B. Olsson¹⁶, Richard C. Gerkin^{17, id}, Paloma Rohlfs Domínguez¹⁸, Javier Albayay¹⁹, Michael C. Farruggia²⁰, Surabhi Bhutani²¹, Alexander W. Fjaeldstad^{22, id}, Ritesh Kumar²³, Anna Menini²⁴, Moustafa Bensafi^{25, id}, Mari Sandell^{26,27}, Iordanis Konstantinidis²⁸, Antonella Di Pizio²⁹, Federica Genovese³⁰, Lina Öztürk³, Thierry Thomas-Danguin³¹, Johannes Frasnelli³², Sanne Boesveldt³³, Özlem Saatci³⁴, Luis R. Saraiva^{30,35, id}, Cailu Lin^{30, id}, Jérôme Golebiowski⁸, Liang-Dar Hwang³⁶, Mehmet Hakan Ozdener³⁰, Maria Dolors Guàrdia³⁷, Christophe Laudamiel³⁸, Marina Ritchie³⁹, Jan Havlíček⁴⁰, Denis Pierron⁴¹, Eugeni Roura^{42, id}, Marta Navarro⁴², Alissa A. Nolden⁴³, Juyun Lim^{44, id}, Katherine L. Whitcroft⁴⁵, Lauren R. Colquitt³⁰, Camille Ferdenzi^{25, id}, Evelyn V. Brindha⁴⁶, Aytug Altundag⁴⁷, Alberto Macchi⁴⁸, Alexia Nunez-Parra⁴⁹, Zara M. Patel⁵⁰, Sébastien Fiorucci⁸, Carl M. Philpott^{51, id}, Barry C. Smith^{52, id}, Johan N. Lundström^{30,53, id}, Carla Mucignat⁵⁴, Jane K. Parker⁵⁵, Mirjam van den Brink⁵⁶, Michael Schmucker²³, Florian Ph. S. Fischmeister⁵⁷, Thomas Heinbockel⁵⁸, Vonnie D. C. Shields⁵⁹, Farhoud Faraji⁶⁰, Enrique Santamaría⁶¹, William E.A. Fredborg⁶², Gabriella Morini⁶³, Jonas K. Olofsson^{62, id}, Maryam Jaleesi⁶⁴, Noam Karni⁶⁵, Anna D'Errico⁶⁶, Rafieh Alizadeh^{67, id}, Robert Pellegrino⁶⁸, Pablo Meyer⁶⁹, Caroline Huart⁷⁰, Ben Chen⁷¹, Graciela M. Soler⁷², Mohammed K. Alwashahi⁷³, Antje Welge-Lüssen⁷⁴, Jessica Freiherr^{75, id}, Jasper H. B. de Groot⁷⁶, Hadar Klein⁴, Masako Okamoto⁷⁷, Preet Bano Singh⁷⁸, Julien W. Hsieh⁷⁹, GCCR Group Author, Danielle R. Reed³⁰, Thomas Hummel⁸⁰, Steven D. Munger^{81,82} and John E. Hayes^{6, id}

¹Department of Psychology, Temple University, 1701 N 13th St, Philadelphia, PA 19122, USA,

²Institute of Neuroscience and Medicine (INM-3), Research Center Jülich, Wilhelm-Johnen-Straße, 52428 Jülich, Germany,

³Department of Anatomy, Faculty of Medicine, Mersin University, Çiftlikköy Campus, Yenisehir, 33343 Mersin, Turkey,

⁴Institute of Biochemistry, Food Science and Nutrition, The Hebrew University of Jerusalem, PO Box 12, Rehovot 7610001, Israel,

⁵AbScent, 14 London Street, Andover, Hampshire SP10 2PA, UK,

⁶Department of Food Science, The Pennsylvania State University, Erickson Food Science Building, University Park, PA 16802, USA,

⁷Center for the Neurobiology of Learning and Memory, University of California and Qureshey Research Laboratory, 506 C Student Center, Irvine, CA 92697-0001, USA,

⁸Institut de Chimie de Nice, UMR CNRS 7272, Université Côte d'Azur, 28 Avenue Valrose, 06108 Nice, France,

⁹Centre for Global Health Research, Usher Institute, The University of Edinburgh, Old Medical School, Teviot Place, Edinburgh EH8 9AG, UK,

¹⁰Department of Basic Medical Sciences, Neuroscience and Sensory Organs, Università degli Studi di Bari A. Moro, P.zza G. Cesare 11, Bari 70124, Italy,

¹¹CSIR-Central Scientific Instruments Organisation, Sec 30-C, Chandigarh 160030, India,

¹²Department of Medical and Surgical Sciences, "Magna Graecia" University of Catanzaro, Viale Europa (Loc. Germaneto), 88100 Catanzaro, Italy,

¹³Department of Food Science and Human Nutrition and Division of Nutritional Sciences, University of Illinois at Urbana Champaign, 905 South Goodwin Avenue, Urbana, IL 61801, USA,

¹⁴Department of Biomedical Imaging and Image-guided Therapy, Medical University of Vienna, Währinger Gürtel 18-20, 1090 Vienna, Austria,

¹⁵Laboratoire d'Anthropologie Moléculaire et Imagerie de Synthèse, UMR 5288 CNRS, Université de Toulouse, 31073 Toulouse, France,

¹⁶National Centre for Biological Sciences, Tata Institute of Fundamental Research, GKVK Campus, Bellary Road, Bengaluru 560065, India,

¹⁷School of Life Sciences, Arizona State University, PO Box 874501, Tempe, AZ 85287, USA,

¹⁸Department of Psychology and Anthropology, University of Extremadura, Avenida de la Universidad, s/n, 10003 Cáceres, Spain,

¹⁹Department of General Psychology, University of Padova, Via Venezia 8, 35131 Padova, Italy,

²⁰Department of Psychiatry, Yale University School of Medicine, 300 George Street, New Haven, CT 06511, USA,

²¹School of Exercise and Nutritional Sciences, 5500 Campanile Drive, San Diego State University, San Diego, CA 92182, USA,

²²Flavour Clinic, Department of Otorhinolaryngology, Regional Hospital West Jutland, Central Denmark Region, Laegaardvej 12, 7500 Holstebro, Denmark,

²³Biocomputation Group, Department of Computer Science, University of Hertfordshire, Hatfield AL10 9AB, UK,

²⁴Neuroscience Area, International School for Advanced Studies, SISSA, Via Bonomea 265, 34136 Trieste, Italy,

²⁵Neuropop Team, Lyon Neuroscience Research Center, CNRS UMR5292—INSERM U1028—University Claude Bernard Lyon 1, 95 bd Pinel, 69500 Bron, France,

²⁶Department of Food and Nutrition, University of Helsinki, PO Box 66, FI-00014 Helsinki, Finland,

- ²⁷Functional Foods Forum, University of Turku, FI-20014 Turku, Finland,
- ²⁸2nd Academic Otorhinolaryngology Department, Aristotle University, Efkarpia Ring Road, PO Box 56403, Thessaloniki, Greece,
- ²⁹Leibniz-Institute for Food Systems Biology at the Technical University of Munich, Lise-Meitner-Str. 34, 85354 Freising, Germany,
- ³⁰Monell Chemical Senses Center, 3500 Market St, Philadelphia, PA 19104, USA,
- ³¹CSGA—Centre for Taste and Feeding Behavior, INRAE, CNRS, AgroSup Dijon, Université Bourgogne Franche-Comté, 17 rue Sully, F-21000 Dijon, France,
- ³²Department of Anatomy, Université du Québec à Trois-Rivières, 3351, boul. des Forges, Trois-Rivières, QC, Canada G8Z 4M3,
- ³³Division of Human Nutrition and Health, Wageningen University, Stippeneng 4, 6708 WE Wageningen, the Netherlands,
- ³⁴Department of Otorhinolaryngology, Medical Science University, Namik Kemal Street, No:7 Emek, Sancaktepe-İstanbul 34785, Turkey,
- ³⁵Sidra Medicine, Out Patient Clinic, C6-111, PO Box 26999, Doha, Qatar,
- ³⁶The University of Queensland Diamantina Institute, The University of Queensland, 37 Kent St, Woolloongabba, QLD 4102, Australia,
- ³⁷IRTA-Food Technology Programme, IRTA, Finca Camps i Armet, E-17121 Monells, Girona, Spain,
- ³⁸DreamAir LLC, Department of Scent Engineering, 1181 Broadway, New York, NY 10001, USA,
- ³⁹Department of Neurobiology and Behavior, University of California, Irvine, 519 Ring Rd, Irvine, CA 92697-4545, USA,
- ⁴⁰Department of Zoology, Charles University, Viničná 1594, 128 00 Nové Město, Czechia,
- ⁴¹Équipe de Médecine Evolutive, UMR5288 CNRS/Université Toulouse III, faculté de chirurgie dentaire, 3 Chemin des Maraîchers, Toulouse 31400, France,
- ⁴²Centre for Nutrition and Food Sciences, Queensland Alliance for Agriculture and Food Innovation, The University of Queensland, St Lucia, QLD 4072, Australia,
- ⁴³Department of Food Science, University of Massachusetts, 102 Holdsworth Way, Amherst, MA 01003, USA,
- ⁴⁴Department of Food Science and Technology, Oregon State University, Corvallis, OR 97331, USA,
- ⁴⁵Ear Institute, University College London, 332 Grays Inn Rd, London WC1X 8EE, UK,
- ⁴⁶Department of Electrical and Electronics Engineering, Karunya Institute of Technology and Sciences, Karunya Nagar, Coimbatore, Tamilnadu, India,
- ⁴⁷Otorhinolaryngology Department, Biruni University, 10.Yil Street, Protokol Yolu No: 45, 34010 Topkapi, Zeytinburnu, Istanbul, Turkey,
- ⁴⁸Italian Academy of Rhinology Asst Settelaighi—University of Insubriae, via Guicciardini 9, Varese 21100, Italy,
- ⁴⁹Department of Biology, Universidad de Chile, Las Palmeras 3425, Santiago 7800003, Chile,
- ⁵⁰Department of Otolaryngology—Head and Neck Surgery, Stanford University School of Medicine, 900 Blake Wilbur Drive, 3rd Floor, Palo Alto, CA 94304-2201, USA,
- ⁵¹The Norfolk Smell and Taste Clinic, University of East Anglia, Norwich Research Park, Norwich NR4 7TJ, UK,
- ⁵²Centre for the Study of the Senses, Institute of Philosophy, School of Advanced Study, University of London, Malet Street, London WC1E 7HU, UK,
- ⁵³Department of Clinical Neuroscience, Karolinska Institutet, Nobels väg 9, 17177 Stockholm, Sweden,
- ⁵⁴Department of Molecular Medicine, University of Padova, via Marzolo 3, 35131 Padova, Italy,
- ⁵⁵Department of Food and Nutritional Sciences, University of Reading, Whiteknights, Reading RG6 6AP, UK,
- ⁵⁶Laboratory of Behavioural Gastronomy, Maastricht University Campus Venlo, Nassaustraat 36, 5911 BV Venlo, the Netherlands,
- ⁵⁷Institute of Psychology, University of Graz, Universitätsplatz 2, 8010 Graz, Austria,
- ⁵⁸Department of Anatomy, College of Medicine, Howard University, 520 'W' St., N.W., Washington, DC 20059, USA,
- ⁵⁹Biological Sciences Department, Fisher College of Science and Mathematics, Towson University, 8000 York Road, Towson, MD 21252 USA,
- ⁶⁰Division of Otolaryngology, Head & Neck Surgery, University of California San Diego Health, 9300 Campus Point Drive, MC 7895 La Jolla, CA 92037-7895, USA,
- ⁶¹Clinical Neuroproteomics Unit, Navarrabiomed, Complejo Hospitalario de Navarra (CHN), Universidad pública de Navarra (UPNA), Instituto de Investigación Sanitaria de Navarra (IDISNA), Proteored-ISCIII, Irunlarrea Street, 31008 Pamplona, Spain,
- ⁶²Department of Psychology, Stockholm University, Frescativägen, SE11419 Stockholm, Sweden,
- ⁶³University of Gastronomic Sciences, Piazza Vittorio Emanuele II 9, Bra, Pollenzo 12042, CN, Italy,
- ⁶⁴Skull Base Research Center, The Five Senses Institute, Iran University of Medical Sciences, Rasoul Akram Hospital, Niayesh Str., Sattarkhan Ave., Tehran, Iran,
- ⁶⁵Internal Medicine Department, Hadassah Medical Center, Kiryat Hadassah, PO Box 12000, Jerusalem 91120, Israel,
- ⁶⁶Department of Molecular and Cellular Neurobiology, Goethe Universität Frankfurt, Goethe Universität Frankfurt, Max von Laue Strasse 13, 60438 Frankfurt am Main, Germany,
- ⁶⁷ENT and Head and Neck Research Center and Department, Hazrat Rasoul Hospital, The Five Senses Institute, Iran University of Medical Sciences, Iran University of Medical Sciences, Shahid Hemmat Highway, Tehran 1449614535, Iran,
- ⁶⁸Food Science Department, University of Tennessee, 2510 River Dr., Knoxville, TN 37996, USA,
- ⁶⁹Health Care and Life Sciences, IBM T. J. Watson Research Center, 1101 Kitchawan Road, Yorktown Heights, NY 10598, USA,
- ⁷⁰Department of Otorhinolaryngology, Cliniques Universitaires Saint-Luc, Avenue Hippocrate 10, 1200 Brussels, Belgium,
- ⁷¹Department of Psychiatry, The Affiliated Brain Hospital of Guangzhou Medical University, No. 36, Mingxin Road, Liwan District, Guangzhou City 510370, China,
- ⁷²Department of Otorhinolaryngology, Buenos Aires University and GEOG (Grupo de Estudio de Olfato y Gusto), Calle Paraguay 1896, Piso 3. CABA (Ciudad Autónoma de Buenos Aires) C1121ABB, Argentina,
- ⁷³Surgery Department, ENT Division, Sultan Qaboos University Hospital, Al Khoud, Box 38, 123 Muscat, Oman,
- ⁷⁴Department of Otorhinolaryngology, University Hospital Basel, Petersgraben 4, 4031 Basel, Switzerland,
- ⁷⁵Department of Psychiatry and Psychotherapy, Friedrich-Alexander-Universität Erlangen-Nürnberg, Schwabachanlage 6, 91054 Erlangen, Germany,
- ⁷⁶Department of Psychology, Utrecht University, Heidelberglaan 1, 3584 CS Utrecht, The Netherlands,
- ⁷⁷Department of Applied Biological Chemistry, The University of Tokyo, 1-1-1, Yayoi, Bunkyo-ku, Tokyo 113-8657, Japan,
- ⁷⁸Department of Oral Surgery and Oral Medicine, Faculty of Dentistry, University of Oslo, 1109 Blindern, 0317 Oslo, Norway,
- ⁷⁹Rhinology—Olfactology Unit, ENT Department, Geneva University Hospitals, Rue Gabrielle-Perret-Gentil 4, 1205 Geneva, Switzerland,
- ⁸⁰Department of Otorhinolaryngology, TU Dresden, Helmholtzstr. 10, 01069 Dresden, Germany,
- ⁸¹Center for Smell and Taste, University of Florida, 1149 Newell Drive, Rm LG-101D, Gainesville, FL 32610-0127, USA,

⁸²Department of Pharmacology and Therapeutics, University of Florida, 1200 Newell Drive, ARB R5-234, Gainesville, FL 32610-0267, USA

Correspondence to be sent to John E. Hayes, Department of Food Science, Pennsylvania State University, 220 Erickson Food Science Building, University Park, PA 16802, USA. e-mail: jeh40@psu.edu

Chem. Senses (2020) doi: 10.1093/chemse/bjaa041

This is a correction notice for article bjaa041 (DOI: <https://doi.org/10.1093/chemse/bjaa041>), published 20 June 2020.

An incorrect version of the caption to Figure 5 was mistakenly included in the published paper. An updated version is given below. Neither the data nor the paper's conclusions were affected by this correction. The authors sincerely apologize for the error.

(A) Correlations between the 3 principal components with respect to changes in 3 chemosensory modalities (i.e., taste, smell, and chemesthesis). Shades of gray indicate positive correlation, whereas shades of red indicate negative correlations.

White denotes no correlation. (B) Clusters of participants identified by k-means clustering. The scatterplot shows each participant's loading on dimension 1 (degree of smell and taste loss, PC1 on x-axis) and dimension 2 (degree of chemesthesis loss, PC2 on y-axis). Based on the centroid of each cluster, participants in cluster 1 (blue, N = 1767; top left) are generally characterized by significant smell, taste and chemesthesis loss. Participants in cluster 2 (orange, N = 1724; bottom center) are generally characterized by ratings that reflect smell/taste loss with preserved chemesthesis. Loadings for participants in cluster 3 (green, N = 548; right side) are generally characterized by reduced smell and taste loss, and preserved chemesthesis.