



### **OPEN ACCESS**

APPROVED BY

Frontiers Editorial Office, Frontiers Media SA, Switzerland

\*CORRESPONDENCE
Inge Huybrechts

☑ huybrechtsl@iarc.fr

RECEIVED 17 April 2023 ACCEPTED 18 April 2023 PUBLISHED 16 May 2023

#### CITATION

Huybrechts I, Rauber F, Nicolas G, Casagrande C, Kliemann N, Wedekind R, Biessy C, Scalbert A, Touvier M, Aleksandrova K, Jakszyn P, Skeie G, Bajracharya R, Boer JMA, Borné Y, Chajes V, Dahm CC, Dansero L, Guevara M, Heath AK, Ibsen DB, Papier K, Katzke V, Kyrø C, Masala G, Molina-Montes E, Robinson OJK, Santiuste de Pablos C, Schulze MB, Simeon V, Sonestedt E, Tjønneland A, Tumino R, van der Schouw YT, Verschuren WMM, Vozar B, Winkvist A, Gunter MJ, Monteiro CA, Millett C and Levy RB (2023) Corrigendum: Characterization of the degree of food processing in the European Prospective Investigation into Cancer and Nutrition: application of the Nova classification and validation using selected biomarkers of food processing. Front. Nutr. 10:1207555. doi: 10.3389/fnut.2023.1207555

### COPYRIGHT

© 2023 Huybrechts, Rauber, Nicolas, Casagrande, Kliemann, Wedekind, Biessy, Scalbert, Touvier, Aleksandrova, Jakszyn, Skeie, Bajracharya, Boer, Borné, Chajes, Dahm, Dansero, Guevara, Heath, Ibsen, Papier, Katzke, Kyrø, Masala, Molina-Montes, Robinson, Santiuste de Pablos, Schulze, Simeon, Sonestedt, Tjønneland, Tumino, van der Schouw, Verschuren, Vozar, Winkvist, Gunter, Monteiro, Millett and Levy. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

# Corrigendum: Characterization of the degree of food processing in the European Prospective Investigation into Cancer and Nutrition: application of the Nova classification and validation using selected biomarkers of food processing

Inge Huybrechts<sup>1\*</sup>, Fernanda Rauber<sup>2,3</sup>, Geneviève Nicolas<sup>1</sup>, Corinne Casagrande<sup>1</sup>, Nathalie Kliemann<sup>1</sup>, Roland Wedekind<sup>1</sup>, Carine Biessy<sup>1</sup>, Augustin Scalbert<sup>1</sup>, Mathilde Touvier<sup>4</sup>, Krasimira Aleksandrova<sup>5,6</sup>, Paula Jakszyn<sup>7,8</sup>, Guri Skeie<sup>9</sup>, Rashmita Bajracharya<sup>10</sup>, Jolanda M. A. Boer<sup>11</sup>, Yan Borné<sup>12</sup>, Veronique Chajes<sup>1</sup>, Christina C. Dahm<sup>13</sup>, Lucia Dansero<sup>14</sup>, Marcela Guevara<sup>15,16,17</sup>, Alicia K. Heath<sup>18</sup>, Daniel B. Ibsen<sup>13,19,20,21</sup>, Keren Papier<sup>22</sup>, Verena Katzke<sup>10</sup>, Cecilie Kyrø<sup>23</sup>, Giovanna Masala<sup>24</sup>, Esther Molina-Montes<sup>25,26,27,28</sup>, Oliver J. K. Robinson<sup>29</sup>, Carmen Santiuste de Pablos<sup>26,30</sup>, Matthias B. Schulze<sup>31,32</sup>, Vittorio Simeon<sup>33</sup>, Emily Sonestedt<sup>12</sup>, Anne Tjønneland<sup>23</sup>, Rosario Tumino<sup>34</sup>, Yvonne T. van der Schouw<sup>35</sup>, W. M. Monigue Verschuren<sup>11,35</sup>, Beatrice Vozar<sup>1</sup>, Anna Winkvist<sup>36,37</sup>, Marc J. Gunter<sup>1</sup>, Carlos A. Monteiro<sup>3,38</sup>, Christopher Millett<sup>2,39</sup> and Renata Bertazzi Levy<sup>2,3</sup>

<sup>1</sup>Nutrition and Metabolism Branch, International Agency for Research on Cancer, Lyon, France, <sup>2</sup>Department of Preventive Medicine, School of Medicine, University of São Paulo, São Paulo, Brazil, <sup>3</sup>Center for Epidemiological Research in Nutrition and Health, University of São Paulo, São Paulo, Brazil, <sup>4</sup>Sorbonne Paris Nord University, INSERM U1153, INRAE U1125, CNAM, Nutritional Epidemiology Research Team (EREN), Epidemiology and Statistics Research Center, University Paris Cité (CRESS), Paris, France, <sup>5</sup>Department of Epidemiological Methods and Etiological Research, Leibniz Institute for Prevention Research and Epidemiology (BIPS), Bremen, Germany, <sup>6</sup>Human and Health Sciences, University of Bremen, Bremen, Germany, <sup>7</sup>Unit of Nutrition and Cancer, Cancer Epidemiology Research Programme, Catalan Institute of Oncology (ICO-IDIBELL), Barcelona, Spain, <sup>8</sup>Blanquerna School of Health Sciences, Ramon Llull University, Barcelona, Spain, <sup>9</sup>Department of Community Medicine, UiT the Arctic University of Norway, Tromsø, Norway, 10 German Cancer Research Center (DKFZ), Heidelberg, Germany, 11 Centre for Nutrition, Prevention and Health Services, National Institute for Public Health and the Environment (RIVM), Bilthoven, Netherlands, <sup>12</sup>Department of Clinical Sciences Malmö, Faculty of Medicine, Nutritional Epidemiology, Lund University, Lund, Sweden, <sup>13</sup>Department of Public Health, Aarhus University, Aarhus, Denmark, <sup>14</sup>Department of Clinical and Biological Sciences, Centre for Biostatistics, Epidemiology, and Public Health (C-BEPH), University of Turin, Turin, Italy, <sup>15</sup>Instituto de Salud Pública de Navarra, Pamplona, Spain, 16 Centro de Investigación Biomédica en Red de Epidemiología y Salud Pública (CIBERESP), Madrid, Spain, <sup>17</sup>Navarra Institute for Health Research (IdiSNA), Pamplona, Spain, <sup>18</sup>Department of Epidemiology and Biostatistics, School of Public Health, Imperial College London, London, United Kingdom, <sup>19</sup>Steno Diabetes Center Aarhus, Aarhus, Denmark,

Huybrechts et al. 10.3389/fnut.2023.1207555

<sup>20</sup>MRC Epidemiology Unit, University of Cambridge School of Clinical Medicine, Cambridge, United Kingdom, <sup>21</sup>Department of Nutrition, Exercise and Sports, University of Copenhagen, Frederiksberg, Denmark, <sup>22</sup>Cancer Epidemiology Unit, Nuffield Department of Population Health, University of Oxford, Oxford, United Kingdom, <sup>23</sup>Danish Cancer Society Research Center, Danish Cancer Society, Copenhagen, Denmark, <sup>24</sup>Clinical Epidemiology Unit, Institute for Cancer Research, Prevention and Clinical Network (ISPRO), Florence, Italy, <sup>25</sup>Department of Nutrition and Food Science, Campus of Cartuja, University of Granada, Granada, Spain, <sup>26</sup> CIBER of Epidemiology and Public Health (CIBERESP), Madrid, Spain, <sup>27</sup>Instituto de Investigación Biosanitaria ibs.GRANADA, Granada, Spain, <sup>28</sup>Biomedical Research Centre, Institute of Nutrition and Food Technology (INYTA) "José Mataix", University of Granada, Granada, Spain, <sup>29</sup>MRC Centre for Environment and Health, School of Public Health, Imperial College London, London, United Kingdom, <sup>30</sup>Department of Epidemiology, Murcia Regional Health Council, IMIB-Arrixaca, Murcia, Spain, 31 Department of Molecular Epidemiology, German Institute of Human Nutrition Potsdam-Rehbruecke, Nuthetal, Germany, 32 Institute of Nutritional Science, University of Potsdam, Potsdam, Germany, 33 Dipartimento di Salute Mentale e Fisica e Medicina Preventiva, Vanvitelli University, Naples, Italy, 34 Hyblean Association for Epidemiological Research, AIRE ONLUS Ragusa, Italy, 35 Julius Center for Health Sciences and Primary Care, University Medical Center Utrecht, Utrecht University, Utrecht, Netherlands, <sup>36</sup>Sustainable Health, Department Public Health and Clinical Medicine, Umea University, Umea, Sweden, 37 Department of Internal Medicine and Clinical Nutrition, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden, <sup>38</sup>Department of Nutrition, School of Public Health, University of São Paulo, São Paulo, Brazil, 39 Public Health Policy Evaluation Unit, School of Public Health, Imperial College London, London, United Kingdom

KEYWORDS

food processing, Nova, EPIC, biomarkers, elaidic acid, syringol

### A corrigendum on

Characterization of the degree of food processing in the European Prospective Investigation into Cancer and Nutrition: Application of the Nova classification and validation using selected biomarkers of food processing

by Huybrechts, I., Rauber, F., Nicolas, G., Casagrande, C., Kliemann, N., Wedekind, R., Biessy, C., Scalbert, A., Touvier, M., Aleksandrova, K., Jakszyn, P., Skeie, G., Bajracharya, R., Boer, J. M. A., Borné, Y., Chajes, V., Dahm, C. C., Dansero, L., Guevara, M., Heath, A. K., Ibsen, D. B., Papier, K., Katzke. V., Kyrø, C., Masala, G., Molina-Montes, E., Robinson, O. J. K., Santiuste de Pablos, C., Schulze, M. B., Simeon, V., Sonestedt, E., Tjønneland, A., Tumino, R., van der Schouw, Y. T., Verschuren, W. M. M., Vozar, B., Winkvist, A., Gunter, M. J., Monteiro, C. A., Millett, C., and Levy, R. B. (2022). Front. Nutr. 9:1035580. doi: 10.3389/fnut.2022.1035580

In the published article, there was an error in Table 4 as published. A column subheading was inserted in the middle of the table by mistake. Furthermore, two values in the "R (Unadjusted association)" column were not rounded. This subheading was removed. The corrected Table 4 appears below.

The authors apologize for this error and state that this does not change the scientific conclusions of the article in any way. The original article has been updated.

# Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

Huybrechts et al. 10.3389/fnut.2023.1207555

TABLE 4 Unadjusted associations of urinary methylsyringol sulfate with the daily grams, energy, % grams and % energy intake from the 4 different Nova groups and middle bound scenario (N = 417).

Middle bound	Pearson correlation		Spearman correlation			
	R (Unadjusted association)	p-value (unadjusted)	R (Unadjusted association)	<i>p</i> -value (unadjusted)		
Expressed in g/day						
Unprocessed or minimally processed foods—G1	0.16	0.001	0.22	<0.0001		
Processed culinary ingredients—G2	-0.20	0.0001	-0.30	<0.0001		
Processed foods—G3	0.13	0.007	0.12	0.01		
Processed foods—G3 excluding alcohol intake	-0.07	0.14	-0.04	0.44		
Ultra-processed foods—G4	0.35	<0.0001	0.40	<0.0001		
Ultra-processed foods—G4 excluding alcohol intake	0.35	<0.0001	0.39	<0.0001		
Expressed in kcal/day						
Unprocessed or minimally processed foods—G1	-0.24	<0.0001	-0.27	<0.0001		
Processed culinary ingredients—G2	-0.30	<0.0001	-0.36	<0.0001		
Processed foods—G3	0.06	0.26	0.10	0.03		
Processed foods—G3 excluding alcohol intake	0.03	0.55	0.08	0.10		
Ultra-processed foods—G4	0.37	<0.0001	0.41	<0.0001		
Ultra-processed foods—G4 excluding alcohol intake	0.37	<0.0001	0.40	< 0.0001		
Expressed in % g/day	including alcohol intake					
Unprocessed or minimally processed foods—G1	-0.06	0.23	-0.07	0.18		
Processed culinary ingredients—G2	-0.37	<0.0001	-0.41	<0.0001		
Processed foods—G3	-0.07	0.172	-0.07	0.15		
Ultra-processed foods—G4	0.25	<0.0001	0.29	<0.0001		
Expressed in % kcal/c	lay including alcohol intake					
Unprocessed or minimally processed foods—G1	-0.33	<0.0001	-0.37	<0.0001		
Processed culinary ingredients—G2	-0.39	<0.0001	-0.42	<0.0001		
Processed foods—G3	0.04	0.36	0.07	0.15		
Ultra-processed foods—G4	0.41	<0.0001	0.43	<0.0001		
Expressed in % g/day	Expressed in % g/day excluding alcohol intake					
Unprocessed or minimally processed foods—G1	-0.0003	0.996	-0.02	0.75		

(Continued)

Huybrechts et al. 10.3389/fnut.2023.1207555

## TABLE 4 (Continued)

Middle bound	Pearson correlation		Spearman correlation			
	R (Unadjusted association)	p-value (unadjusted)	R (Unadjusted association)	<i>p</i> -value (unadjusted)		
Processed culinary ingredients—G2	-0.36	<0.0001	-0.39	<0.0001		
Processed foods—G3	-0.26	<0.0001	-0.24	< 0.0001		
Ultra-processed foods—G4	0.27	<0.0001	0.32	<0.0001		
Expressed in % kcal/day excluding alcohol intake						
Unprocessed or minimally processed foods—G1	-0.32	<0.0001	-0.36	<0.0001		
Processed culinary ingredients—G2	-0.38	<0.0001	-0.41	<0.0001		
Processed foods—G3	0.02	0.70	0.05	0.35		
Ultra-processed foods—G4	0.42	<0.0001	0.43	<0.0001		