

Obese Subjects With Specific Gustatory Papillae Microbiota And Salivary Cues Display An Impairment To Sense Lipids

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Table 1: Analysis of four blocks of predictors (*i.e.* selected biological determinants. resting saliva. stimulated saliva and microbiota composition) aggregating 42 variables in function of BMI (NW vs O) or fatty taste sensitivity (T vs NT and OT vs ONT).

| | Obese (O) | | Normal Weight (NW) | | Taster (T) | | Non Taster (NT) | | Obese Taster (OT) | | Obese Non Taster (ONT) | |
|--------------------------------|-----------|------|--------------------|------|------------|------|-----------------|------|-------------------|------|------------------------|------|
| | n=17 | | n=21 | | n=26 | | n=12 | | n=9 | | n=8 | |
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Physiological Variables | | | | | | | | | | | | |
| BMI | 34.5 | 3.51 | 22.3 | 1.7 | 27.2 | 7.13 | 29 | 5.69 | 36.3 | 3.02 | 32.5 | 2.97 |
| Waist circumference (m) | 1.15 | 0.1 | 0.86 | 0.09 | 0.98 | 0.19 | 1.01 | 0.12 | 1.21 | 0.07 | 1.08 | 0.06 |
| LA detection threshold (% w/w) | 2.24 | 3.89 | 0.37 | 0.74 | 0.04 | 0.07 | 3.72 | 3.99 | 0.03 | 0.03 | 4.72 | 4.61 |
| Blood LPS (ng/ml) | 27.2 | 7.92 | 24.8 | 4.32 | 25.5 | 6.84 | 26.8 | 4.74 | 28.6 | 9.84 | 25.7 | 5.23 |
| Age | 52.4 | 11.5 | 51.5 | 14.6 | 50.9 | 13.5 | 54.1 | 12.5 | 50.8 | 9.18 | 54.1 | 14.1 |
| Stimulated Saliva | | | | | | | | | | | | |
| Flux (ml) | 0.47 | 0.21 | 0.57 | 0.28 | 0.48 | 0.24 | 0.64 | 0.26 | 0.38 | 0.13 | 0.57 | 0.24 |
| Prot (mg/ml) | 0.56 | 0.19 | 0.5 | 0.19 | 0.55 | 0.21 | 0.49 | 0.14 | 0.60 | 0.21 | 0.52 | 0.15 |
| Amyl (UI/ml) | 674 | 326 | 1411 | 3051 | 1290 | 2741 | 629 | 373 | 712 | 275 | 633 | 391 |
| Lipo (mUI/ml) | 1.75 | 1.48 | 1.37 | 0.88 | 1.59 | 1.22 | 1.42 | 1.16 | 2.17 | 1.57 | 1.27 | 1.31 |
| Proteo (UI/ml) | 349 | 340 | 285 | 260 | 300 | 270 | 345 | 355 | 253 | 275 | 457 | 390 |
| Lyso (U/ml) | 148 | 103 | 201 | 170 | 197 | 166 | 134 | 70.1 | 178 | 126 | 114 | 59.5 |
| TAC (μmol/ml) | 792 | 470 | 759 | 403 | 839 | 481 | 633 | 245 | 920 | 573 | 648 | 291 |
| CA-VI (ng/ml) | 5.47 | 3.05 | 5.78 | 4.77 | 5.6 | 4.27 | 5.74 | 3.66 | 3.91 | 2.27 | 7.22 | 2.96 |
| Cysta (ng/ml) | 210 | 152 | 189 | 148 | 197 | 145 | 201 | 162 | 235 | 188 | 182 | 105 |
| Total LPS (ng/ml) | 46.4 | 28.8 | 48.1 | 34.4 | 50.2 | 34.2 | 41.1 | 25.5 | 50.8 | 32.6 | 41.5 | 25.2 |
| Resting Saliva | | | | | | | | | | | | |
| Flux (ml) | 0.15 | 0.07 | 0.14 | 0.09 | 0.12 | 0.07 | 0.19 | 0.09 | 0.11 | 0.06 | 0.18 | 0.06 |
| Prot (ml) | 1.26 | 0.74 | 0.99 | 0.41 | 1.09 | 0.56 | 1.15 | 0.67 | 1.20 | 0.79 | 1.34 | 0.73 |
| Amyl (UI/ml) | 2202 | 2914 | 1320 | 1723 | 1454 | 1799 | 2279 | 3247 | 1405 | 1733 | 3098 | 3773 |
| Lipo (mUI/ml) | 4.06 | 5.3 | 2.14 | 1.68 | 2.8 | 3.49 | 3.41 | 4.61 | 4.0 | 5.43 | 4.12 | 5.52 |
| Proteo (UI/ml) | 472 | 384 | 594 | 754 | 571 | 692 | 472 | 407 | 325 | 320 | 637 | 401 |
| Lyso (U/ml) | 479 | 281 | 630 | 321 | 630 | 320 | 417 | 233 | 545 | 338 | 405 | 193 |
| TAC (μmol/ml) | 1532 | 842 | 1558 | 684 | 1645 | 778 | 1333 | 658 | 1625 | 950 | 1426 | 752 |
| CA-VI ng/ml) | 5.21 | 3.35 | 5.15 | 3.14 | 4.62 | 3.1 | 6.39 | 3.18 | 3.9 | 3.27 | 6.71 | 2.94 |
| Cysta (ng/ml) | 745 | 592 | 611 | 561 | 647 | 582 | 724 | 570 | 698 | 576 | 798 | 644 |
| Microbiota (Family - %) | | | | | | | | | | | | |
| Anaeroplasmataceae | 0.25 | 0.3 | 0.18 | 0.33 | 0.19 | 0.31 | 0.26 | 0.35 | 0.20 | 0.20 | 0.31 | 0.39 |
| Bacteroidaceae | 3.35 | 5.9 | 2.46 | 2.12 | 1.94 | 1.93 | 4.86 | 6.69 | 0.90 | 0.67 | 6.10 | 7.92 |
| Bifidobacteriaceae | 0.3 | 0.53 | 0.08 | 0.13 | 0.12 | 0.32 | 0.3 | 0.48 | 0.23 | 0.52 | 0.39 | 0.57 |
| Coriobacteriaceae | 0.35 | 0.21 | 0.29 | 0.15 | 0.31 | 0.18 | 0.33 | 0.18 | 0.37 | 0.21 | 0.33 | 0.21 |
| Deferribacteraceae | 0.09 | 0.19 | 0.16 | 0.38 | 0.16 | 0.37 | 0.06 | 0.13 | 0.15 | 0.25 | 0.02 | 0.03 |
| Desulfovibrionaceae | 0.84 | 0.91 | 1.44 | 2.02 | 0.97 | 1.58 | 1.61 | 1.72 | 0.73 | 1.01 | 0.96 | 0.82 |
| Eubacteriaceae | 0.01 | 0.02 | 0.01 | 0.02 | 0.01 | 0.02 | 0.01 | 0.03 | 0.01 | 0.02 | 0.00 | 0.01 |
| Helicobacteraceae | 4.59 | 4.18 | 4.54 | 4.33 | 5.12 | 4.41 | 3.36 | 3.6 | 5.30 | 4.41 | 3.78 | 4.03 |

| | | | | | | | | | | | | |
|---------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lachnospiraceae | 42.9 | 9.66 | 44 | 11.4 | 42.7 | 9.78 | 45.3 | 12.2 | 41.0 | 2.97 | 45.1 | 13.9 |
| Lactobacillaceae | 3.57 | 3.59 | 4.37 | 3.91 | 4.58 | 4.01 | 2.77 | 2.86 | 4.09 | 4.15 | 2.98 | 3.00 |
| Porphyromonadaceae | 23 | 6.98 | 22.5 | 6.23 | 23.1 | 6.14 | 22 | 7.42 | 25.1 | 4.77 | 20.6 | 8.58 |
| Prevotellaceae | 2.55 | 2.21 | 2.35 | 2.28 | 2.11 | 1.66 | 3.15 | 3.09 | 1.70 | 1.08 | 3.51 | 2.81 |
| Rikenellaceae | 2.52 | 2.57 | 2.39 | 1.65 | 2.6 | 2.41 | 2.13 | 1.1 | 2.89 | 3.38 | 2.11 | 1.29 |
| Ruminococcaceae | 6.67 | 1.81 | 6.91 | 2.23 | 7.11 | 2.08 | 6.13 | 1.8 | 6.85 | 1.76 | 6.47 | 1.98 |
| Sphingomonadaceae | 0.01 | 0.01 | 0.01 | 0.02 | 0.01 | 0.01 | 0.02 | 0.03 | 0.00 | 0.01 | 0.02 | 0.02 |
| Sutterellaceae | 0.46 | 0.59 | 0.37 | 0.33 | 0.32 | 0.29 | 0.62 | 0.67 | 0.36 | 0.28 | 0.58 | 0.82 |
| TM7_family_incertae_sedis | 0.17 | 0.24 | 0.38 | 0.53 | 0.38 | 0.49 | 0.07 | 0.16 | 0.22 | 0.28 | 0.10 | 0.19 |
| unclassified | 7.45 | 4.37 | 6.98 | 4.06 | 7.41 | 4.02 | 6.73 | 4.56 | 8.54 | 3.60 | 6.23 | 5.07 |

| ID | Age | Group | BMI | Waist circumference (m) | Fasting glycemia (mmol/l) | Total Chol (mmol/l) | LDL (mmol/l) | HDL (mmol/l) | TG (mmol/l) | HbA1c (%) | LA detection threshold (% w/w) | Taster |
|----|-----|-------|------|-------------------------|---------------------------|---------------------|--------------|--------------|-------------|-----------|--------------------------------|--------|
| 3 | 76 | Lean | 28.2 | 0.98 | 4.70 | 3.81 | 1.98 | 1.57 | 0.58 | 5.6 | 1.5811 | N |
| 4 | 45 | Obese | 36.3 | 1.20 | 5.14 | 4.67 | 2.59 | 1.12 | 2.11 | 5.2 | 0.00889 | Y |
| 6 | 54 | Obese | 39.1 | 1.20 | 5.42 | 4.99 | 2.96 | 1.41 | 1.37 | 5.4 | 0.05 | Y |
| 7 | 35 | Obese | 34.0 | 1.10 | 4.38 | 5.47 | 3.65 | 1.26 | 1.24 | 4.5 | 0.0158 | Y |
| 8 | 61 | Obese | 33.5 | 1.13 | 5.38 | 4.06 | 2.32 | 1.03 | 1.57 | 5.8 | 0.5 | N |
| 9 | 62 | Lean | 19.8 | 0.72 | 4.80 | 4.12 | 1.94 | 1.83 | 0.77 | 5.3 | 0.0281 | Y |
| 10 | 69 | Lean | 24.0 | 0.94 | 5.91 | 6.23 | 4.01 | 1.89 | 0.72 | 5.5 | 0.005 | Y |
| 12 | 69 | Obese | 32.2 | 1.04 | 5.97 | 6.32 | 4.50 | 1.07 | 1.64 | 5.8 | 0.8891 | N |
| 14 | 63 | Lean | 21.1 | 0.95 | 5.59 | 4.41 | 2.64 | 1.17 | 1.31 | 5.1 | 0.00889 | Y |
| 15 | 50 | Obese | 32.8 | 1.13 | 6.08 | 6.63 | 2.88 | 0.95 | 7.71 | 5.8 | 0.0281 | Y |
| 17 | 52 | Lean | 22.8 | 0.83 | 4.73 | 5.95 | 3.39 | 2.03 | 1.17 | 5.0 | 0.00889 | Y |
| 20 | 63 | Obese | 31.6 | 1.02 | 5.59 | 5.46 | 3.62 | 1.32 | 1.15 | 5.7 | 0.5 | N |
| 21 | 29 | Lean | 22.0 | 0.80 | 4.80 | 5.56 | 3.76 | 1.33 | 1.04 | 5.5 | 0.8891 | N |
| 22 | 62 | Lean | 24.0 | 0.84 | 4.56 | 5.64 | 3.40 | 1.54 | 1.55 | 4.9 | 0.2811 | Y |
| 23 | 49 | Obese | 38.7 | 1.18 | 5.78 | 5.32 | 3.34 | 0.92 | 2.33 | 6.0 | 0.00158 | Y |
| 24 | 58 | Lean | 22.2 | 0.91 | 5.27 | 5.69 | 3.52 | 1.76 | 0.90 | 5.9 | 0.01581 | Y |
| 26 | 20 | Lean | 24.0 | 0.75 | 4.82 | 3.95 | 2.42 | 1.17 | 0.80 | 5.1 | 0.2811 | Y |
| 29 | 61 | Obese | 38.5 | 1.31 | 4.62 | 5.84 | 3.27 | 1.80 | 1.69 | 5.4 | 0.05 | Y |
| 30 | 65 | Lean | 22.6 | 0.92 | 5.41 | 7.26 | 4.68 | 2.13 | 1.00 | 5.4 | 0.0889 | Y |
| 31 | 47 | Lean | 19.7 | 0.75 | 6.19 | 5.28 | 3.45 | 1.41 | 0.93 | 5.9 | 0.015 | Y |
| 32 | 64 | Lean | 20.8 | 1.00 | 4.67 | 5.51 | 3.55 | 1.59 | 0.81 | 5.8 | 1.581 | N |
| 33 | 63 | Lean | 20.9 | 0.81 | 5.18 | 6.29 | 3.68 | 2.30 | 0.69 | 5.3 | 0.0005 | Y |
| 34 | 64 | Lean | 24.1 | 0.93 | 4.66 | 6.05 | 3.73 | 1.98 | 0.75 | 5.3 | 0.015 | Y |
| 35 | 46 | Obese | 33.3 | 1.11 | 5.52 | 6.10 | 4.01 | 1.15 | 2.06 | 5.7 | <10 | N |
| 38 | 23 | Lean | 24.4 | 0.82 | 4.98 | 4.30 | 2.45 | 1.52 | 0.72 | 5.2 | 0.0281 | Y |
| 39 | 35 | Lean | 25.2 | 0.80 | 4.84 | 5.77 | 3.52 | 1.74 | 1.12 | 5.3 | 0.00281 | Y |
| 43 | 64 | Lean | 19.7 | 0.77 | 5.12 | 6.02 | 3.14 | 2.41 | 1.03 | 5.9 | 0.05 | Y |
| 44 | 47 | Obese | 29.8 | 0.99 | 5.11 | 6.34 | 3.97 | 1.04 | 4.31 | 5.4 | 5 | N |
| 45 | 43 | Lean | 20.2 | 0.99 | 4.00 | 5.39 | 3.04 | 2.04 | 0.68 | 5.3 | 0.00889 | Y |
| 48 | 54 | Lean | 22.9 | 0.98 | 3.96 | 6.61 | 4.28 | 1.88 | 0.99 | 5.4 | 2.812 | N |
| 49 | 35 | Lean | 21.6 | 0.78 | 4.26 | 4.55 | 2.59 | 1.72 | 0.52 | 5.0 | 0.0281 | Y |
| 50 | 40 | Lean | 23.9 | 0.92 | NA | 5.17 | 3.58 | 1.02 | 1.26 | 5.5 | 0.005 | Y |
| 52 | 59 | Obese | 31.6 | 1.32 | NA | 5.54 | 3.62 | 1.24 | 1.50 | NA | 0.005 | Y |
| 55 | 63 | Obese | 30.9 | 1.13 | 5.59 | 7.22 | 4.52 | 2.00 | 1.55 | 5.5 | 0.8891 | N |
| 56 | 26 | Obese | 38.9 | 1.13 | NA | NA | NA | NA | NA | NA | <10 | N |
| 72 | 58 | Obese | 29.6 | 1.06 | 5.19 | 5.20 | 2.85 | 1.94 | 0.90 | 5.6 | <10 | N |
| 73 | 61 | Obese | 35.7 | 1.24 | 6.06 | 6.39 | 3.71 | 2.00 | 1.50 | 6.0 | 0.0889 | Y |
| 79 | 43 | Obese | 40.1 | 1.24 | 4.88 | 5.03 | 3.06 | 1.33 | 1.40 | 5.0 | 0.0158 | Y |

Table 2 (supplemented data) : Main characteristics of subjects included in the study

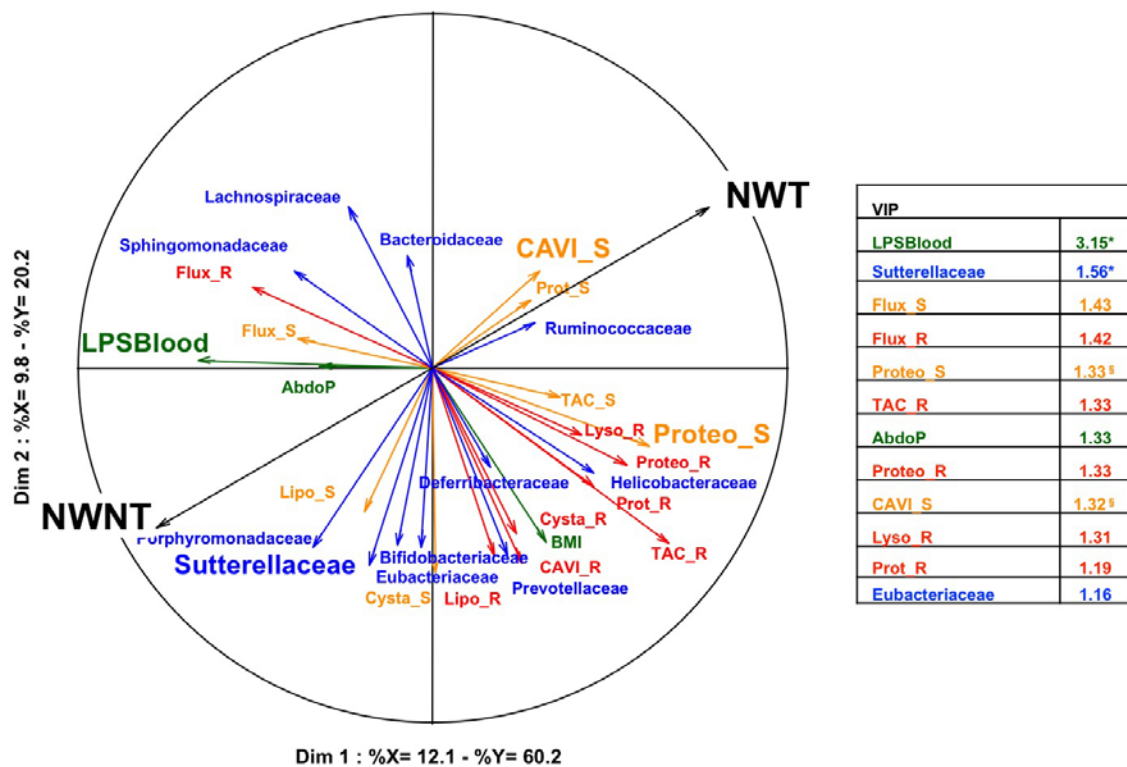


Fig. S1: supplemented data: Partial Least Squares-Multiblocs-Discriminant Analysis (PLS-MB-DA) in NWT and NWNT. PLS-MB-DA was used to determine what predictor variables, (*i.e.* biological determinants, stimulated saliva, resting saliva or microbiota = X blocks) were the most discriminant to characterize the subjects according to variables to be explained (orosensory sensitivity to lipids = Y blocks). Comparison between normal-weight tasters (NWT, n= 4) and normal-weight non-tasters (NWNT, n= 17). Discriminant selection of variables was done using variable importance in the projection (VIP) with a threshold of 1. Mann & Whitney test was used to determine parameters that differed significantly between NWT & NWNT. Means± SEM. §, P<0.1; *, P<0.05. Amyl, amylase; CA-IV, carbonic anhydrase; Lipo, lipolysis; Lyso, lysozyme; LPS, lipopolysaccharides; Prot, protein amount; TAC, total anti-oxidant capacity.