**Supplementary Table S1:** Baseline characteristics of young healthy adults with (BATpos) and without (BATneg) active brown adipose tissue.

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **BATpos** | **BATneg** | ***p*-value** |
| age (years) | 30.4 ± 1.8 | 29.9 ± 2.2 | 0.860 |
| sex (m:f) | 3:5 | 5:3 | 0.317 |
| BMI (kg/m2) | 24.4 ± 1.8 | 24.4 ± 1.3 | 0.992 |
| WHR | 0.8 ± 0.1 | 0.8 ± 0.1 | 0.932 |
| BAT volume (cm3) at thermoneutrality | 2.1 ± 0.8 | 0.8 ± 0.3 | 0.156 |

**Supplementary Table S2:** Water temperature of the cooling garment during the 90min cold exposure period in BATpos and BATneg subjects.

|  |  |  |  |
| --- | --- | --- | --- |
| **BATpos subjects** | **Water temperature (°C)** | **BATneg subjects** | **Water temperature (°C)** |
| 1 | 10 | 9 | 15 |
| 2 | 16 | 10 | 15 |
| 3 | 15 | 11 | 14 |
| 4 | 14 | 12 | 15 |
| 5 | 10 | 13 | 10 |
| 6 | 16,5 | 14 | 14 |
| 7 | 10 | 15 | 15 |
| 8 | 14 | 16 | 15,5 |
|  | 13,2 ± 1 |  | 14,2 ± 1 |

**Supplementary Table S3:** Exact mass and retention time (RT) of identified lipid species

|  |  |  |
| --- | --- | --- |
| **ID** | **m/z** | **RT** |
| a - linolenic acid | 277.2173 | 12.10 |
| Linoleic Acid | 279.1966 | 12.72 |
| Oleic Acid | 281.2486 | 13.46 |
| 9(R) \_13(R)-HODE\_EPOME mix | 295.2279 | 11.10 |
| EPA | 301.2173 | 12.12 |
| AA | 303.2330 | 12.69 |
| 9/10-DiHOME | 313.2384 | 8.56 |
| 12/13-DiHOME | 313.2384 | 8.40 |
| 15d-PGJ2 | 315.1966 | 9.56 |
| 11-HEPE | 317.2122 | 9.61 |
| 18-HEPE | 317.2122 | 9.37 |
| 5-HEPE | 317.2122 | 9.91 |
| 5-Oxo-ETE | 317.2122 | 11.25 |
| 11-HETE | 319.2279 | 10.38 |
| 12-HETE | 319.2279 | 10.52 |
| 15-HETE | 319.2279 | 10.21 |
| 20-HETE | 319.2279 | 9.60 |
| 5-HETE | 319.2279 | 10.72 |
| 9-HETE | 319.2279 | 10.63 |
| DHA | 327.2330 | 10.52 |
| DPA | 329.2486 | 12.80 |
| PGJ2 | 333.2071 | 7.35 |
| 11,12-DiHETrE | 337.2384 | 9.08 |
| 14,15-DiHETrE | 337.2384 | 8.80 |
| 5,6-DiHETrE | 337.2384 | 9.59 |
| 8,9-DiHETrE | 337.2384 | 9.29 |
| 13,16,17-HDoHE mix | 343.2279 | 10.30 |
| 14-HDoHE\_10-HDoHE mix | 343.2279 | 10.40 |
| 20-HDoHE | 343.2279 | 10.00 |
| 4-HDoHE | 343.2279 | 10.90 |
| 13,14-dihydro-15-keto-PGF2a | 353.2333 | 6.45 |

**Supplementary Table S4 A-C:** Prediction for diHOME candidates using CFM-ID 3.0

1. Candidate list for DiHOME predictions

|  |  |  |
| --- | --- | --- |
| **ID** | **SMILES** | **Systematic Name** |
| 10-HpOME | C(CCCCCC/C=C/C(OO)CCCCCCCC)(=O)O | 10-hydroperoxy-8E-octadecenoic acid |
| 12,13-DiHOME(9) | C(/CC(O)C(O)CCCCC)=C\CCCCCCCC(=O)O | 12,13-dihydroxy-9-octadecenoic acid |
| 12,13-DiHOME | C(/CC(O)C(O)CCCCC)=C\CCCCCCCC(=O)O | 12,13-dihydroxy-9Z-octadecenoic acid |
| 5S,8R-DiHOME | C(CCC[C@H](O)CC[C@@H](O)/C=C\CCCCCCCC)(=O)O | 5S,8R-dihydroxy-9Z-octadecenoic acid |
| 7S,10S-DiHOME | C(CCCCC[C@H](O)/C=C/[C@@H](O)CCCCCCCC)(=O)O | 7S,10S-dihydroxy-8E-octadecenoic acid |
| 7S,8S-DiHOME(9Z) | OC(=O)CCCCC[C@H](O)[C@@H](O)/C=C\CCCCCCCC | 7S,8S-dihydroxy-9Z-octadecenoic acid |
| 8R,11S-DiHOME | C(CCCCCC[C@@H](O)/C=C\[C@@H](O)CCCCCCC)(=O)O | 8R,11S-dihydroxy-9Z-octadecenoic acid |
| 9,10-DiHOME(12) | C(O)(C/C=C/CCCCC)C(O)CCCCCCCC(=O)O | 9,10-dihydroxy-12-octadecenoic acid |
| 9,10-DiHOME | OC(=O)CCCCCCCC(O)C(O)C/C=C\CCCCC | 9,10-dihydroxy-12Z-octadecenoic acid |
| 9,13-DiHOME(10) | C(=C/CC(O)CCCCC)\C(O)CCCCCCCC(=O)O | 9,13-dihydroxy-10-octadecenoic acid |
| 9,13-DiHOME(11) | C(/C=C/C(O)CCCCC)C(O)CCCCCCCC(=O)O | 9,13-dihydroxy-11-octadecenoic acid |

1. Evaluation 9,10-DiHOME standard

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Score** | **ID** | **Smiles** |
| 1 | 0.74 | 910DiHOME | OC(=O)CCCCCCCC(O)C(O)C/C=C\CCCCC |
| 2 | 0.62 | 910DiHOME12 | C(O)(C/C=C/CCCCC)C(O)CCCCCCCC(=O)O |
| 3 | 0.60 | 8R11SDiHOME | C(CCCCCC[C@@H](O)/C=C\[C@@H](O)CCCCCCC)(=O)O |
| 4 | 0.56 | 913DiHOME10 | C(=C/CC(O)CCCCC)\C(O)CCCCCCCC(=O)O |
| 5 | 0.56 | 913DiHOME11 | C(/C=C/C(O)CCCCC)C(O)CCCCCCCC(=O)O |
| 6 | 0.55 | 7S10SdiHOME | C(CCCCC[C@H](O)/C=C/[C@@H](O)CCCCCCCC)(=O)O |
| 7 | 0.48 | 10HpOME | C(CCCCCC/C=C/C(OO)CCCCCCCC)(=O)O |
| 8 | 0.47 | 5S8RDiHOME | C(CCC[C@H](O)CC[C@@H](O)/C=C\CCCCCCCC)(=O)O |
| 9 | 0.41 | 7S8SDiHOME9Z | OC(=O)CCCCC[C@H](O)[C@@H](O)/C=C\CCCCCCCC |
| 10 | 0.30 | 1213DiHOME9 | C(/CC(O)C(O)CCCCC)=C\CCCCCCCC(=O)O |

1. Output for DiHOME\_10.81

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Score** | **ID** | **Smiles** |
| 1 | 0.75 | 8R11SDiHOME | C(CCCCCC[C@@H](O)/C=C\[C@@H](O)CCCCCCC)(=O)O |
| 2 | 0.75 | 913DiHOME10 | C(=C/CC(O)CCCCC)\C(O)CCCCCCCC(=O)O |
| 3 | 0.75 | 913DiHOME11 | C(/C=C/C(O)CCCCC)C(O)CCCCCCCC(=O)O |
| 4 | 0.74 | 10HpOME | C(CCCCCC/C=C/C(OO)CCCCCCCC)(=O)O |
| 5 | 0.74 | 7S10SdiHOME | C(CCCCC[C@H](O)/C=C/[C@@H](O)CCCCCCCC)(=O)O |
| 6 | 0.73 | 5S8RDiHOME | C(CCC[C@H](O)CC[C@@H](O)/C=C\CCCCCCCC)(=O)O |
| 7 | 0.66 | 910DiHOME | OC(=O)CCCCCCCC(O)C(O)C/C=C\CCCCC |
| 8 | 0.66 | 7S8SDiHOME9Z | OC(=O)CCCCC[C@H](O)[C@@H](O)/C=C\CCCCCCCC |
| 9 | 0.62 | 1213DiHOME9 | C(/CC(O)C(O)CCCCC)=C\CCCCCCCC(=O)O |
| 10 | 0.62 | 1213DiHOME | C(/CC(O)C(O)CCCCC)=C\CCCCCCCC(=O)O |

**Supplementary Table S5:** Metabolic parameters in BATpos and BATneg individuals before and after cold exposure.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **BATpos** | | **BATneg** | | ***p*-value** | | | | |
| **before CE** | **after CE** | **before CE** | **after CE** | **cold** | **BAT** | | **cold\*BAT** | |
| Glucose (mg/dL) | 82 ± 3.8 | 82 ± 3.1 | 88 ± 2.6 | 88 ± 2.2 | 0.632 | | 0.143 | | 0.777 |
| Cholesterol (mg/dL) | 175 ± 8.4 | 176 ± 7.1 | 169 ±11.7 | 171 ± 13.3 | 0.948 | | 0.765 | | 0.714 |
| Triglycerides (mg/dL) | 80 ±10.0 | 74 ± 9.5 | 98 ± 20.4 | 95 ± 20.8 | 0.129 | | 0.361 | | 0.529 |
| LDL-cholesterol (mg/dL) | 94 ± 7.2 | 96 ± 7.0 | 98 ±10.2 | 101 ± 11.4 | 0.446 | | 0.701 | | 0.749 |
| HDL-cholesterol (mg/dL) | 65 ± 6.8 | 65 ± 6.2 | 51 ± 5.3 | 51 ± 4.8 | 0.928 | | 0.098 | | 0.898 |
| TSH (µIU/mL) | 1.72 ± 0.3 | 1.33 ± 0.3 | 1.66 ± 0.2 | 1.25 ± 0.1 | 0.013 | | 0.775 | | 0.662 |
| fT3 (pg/mL) | 3.27 ± 0.2 | 3.20 ± 0.2 | 3.34 ± 0.1 | 3.27 ± 0.1 | 0.091 | | 0.760 | | 0.898 |
| fT4 (ng/dL) | 1.20 ± 0.04 | 1.17 ± 0.04 | 1.15 ± 0.06 | 1.13 ± 0.06 | 0.134 | | 0.548 | | 0.868 |
| Epinephrine (ng/L) | 33.8 ± 18.0 | 25.9 ± 9.8 | 31.8 ± 7.1 | 12.4 ± 5.0 | 0.330 | | 0.351 | | 0.580 |
| Norepinephrine (ng/L) | 215 ± 35.9 | 423 ± 57.4 | 244 ± 58.5 | 720 ± 99.2 | 0.038 | | 0.022 | | 0.057 |

**Supplementary Table S6:** Exact mass and retention time (RT) of oxylipin candidates

|  |  |  |
| --- | --- | --- |
| **ID** | **m/z** | **RT** |
| 265\_8.38 | 265.1803 | 8.38 |
| Tetranor-12-HETE\_8.38 | 265.1803 | 8.38 |
| 265\_9.08 | 265.1803 | 9.08 |
| Stearidonic Acid\_11.63 | 275.2017 | 11.63 |
| Stearidonic Acid\_12.00 | 275.2017 | 12.00 |
| g - linolenic acid\_12.44 | 277.2173 | 12.44 |
| Linolenic acid\_12.66 | 277.2173 | 12.66 |
| HHTrE\_8.96 | 279.1966 | 8.96 |
| HHTrE\_9.01 | 279.1966 | 9.01 |
| Linoleic acid\_12.82 | 279.1966 | 12.82 |
| 9-HOTrE\_9.26 | 293.2122 | 9.26 |
| 3-HOTrE\_9.39 | 293.2122 | 9.39 |
| 293\_9.73 | 293.2122 | 9.73 |
| 305\_13.04 | 305.2486 | 13.04 |
| 305\_13.12 | 305.2486 | 13.12 |
| 305\_13.33 | 305.2486 | 13.33 |
| 305\_13.47 | 305.2486 | 13.47 |
| HpODE\_7.71 | 311.2228 | 7.71 |
| HpODE\_8.72 | 311.2228 | 8.72 |
| 9-HpODE\_9.91 | 311.2228 | 9.91 |
| HpODE\_10.04 | 311.2228 | 10.04 |
| HpODE\_10.22 | 311.2228 | 10.22 |
| 313\_8.04 | 313.2384 | 8.04 |
| 313\_8.24 | 313.2384 | 8.24 |
| 313\_10.40 | 313.2384 | 10.40 |
| 313\_10.45 | 313.2384 | 10.45 |
| 313\_10.75 | 313.2384 | 10.75 |
| DiHOME\_10.81 | 313.2384 | 10.81 |
| 313\_12.27 | 313.2384 | 12.27 |
| 313\_12.47 | 313.2384 | 12.47 |
| 313\_12.63 | 313.2384 | 12.63 |
| 317\_8.69 | 317.2122 | 8.69 |
| 317\_9.38 | 317.2122 | 9.38 |
| 317\_9.61 | 317.2122 | 9.61 |
| 13-OxoODE\_10.22 | 317.2122 | 10.22 |
| 317\_10.65 | 317.2122 | 10.65 |
| HETE\_9.57 | 319.2279 | 9.57 |
| 319\_10.31 | 319.2279 | 10.31 |
| 319\_11.07 | 319.2279 | 11.07 |
| 319\_11.45 | 319.2279 | 11.45 |
| 319\_11.47 | 319.2279 | 11.47 |
| 15-HETrE\_10.67 | 321.2435 | 10.67 |
| 15-HETrE\_10.77 | 321.2435 | 10.77 |
| DPA\_12.90 | 329.2486 | 12.90 |
| DPA\_12.97 | 329.2486 | 12.97 |
| 331\_8.85 | 331.1915 | 8.85 |
| Adrenic Acid\_13.26 | 331.2643 | 13.26 |
| 333\_9.2 | 333.2071 | 9.20 |
| 335\_6.88 | 335.2228 | 6.88 |
| 335\_7.02 | 335.2228 | 7.02 |
| 6trans-LTB4\_7.98 | 335.2228 | 7.98 |
| Hepoxilin B3\_9.45 | 335.2228 | 9.45 |
| 335\_9.77 | 335.2228 | 9.77 |
| 335\_9.86 | 335.2228 | 9.86 |
| 335\_9.93 | 335.2228 | 9.93 |
| 335\_10.47 | 335.2228 | 10.47 |
| 335\_10.53 | 335.2228 | 10.53 |
| 337\_9.84 | 337.2384 | 9.84 |
| 343\_10.07 | 343.2279 | 10.07 |
| 348\_8.03 | 347.1864 | 8.03 |
| 349\_7.21 | 349.2002 | 7.21 |
| 349\_7.81 | 349.2020 | 7.81 |
| 349\_8.1 | 349.2020 | 8.10 |
| metPGE2\_6.35 | 351.2177 | 6.35 |
| 351\_9.2 | 351.2177 | 9.20 |
| 351\_9.3 | 351.2177 | 9.30 |
| 359\_9.96 | 359.2229 | 9.86 |
| 359\_9.88 | 359.2229 | 9.88 |

**Supplementary Table S7:** Inclusion list used for fragmentation

|  |
| --- |
| **Mass [m/z] Polarity** |
| 254.2245 |
| 275.2011 |
| 277.2167 |
| 279.2324 |
| 281.2480 |
| 283.2637 |
| 293.2122 |
| 295.2279 |
| 301.2168 |
| 303.2330 |
| 311.2228 |
| 315.1966 |
| 317.2122 |
| 319.2279 |
| 321.2435 |
| 327.2324 |
| 327.2781 |
| 329.2480 |
| 333.2071 |
| 335.2222 |
| 337.2384 |
| 343.2279 |
| 348.3069 |
| 349.2020 |
| 351.2177 |
| 353.2328 |
| 355.2428 |
| 357.2585 |
| 359.2222 |
| 367.3576 |
| 375.2171 |