**Supplemental Table 1.** The area under the curve for the trace metals on discriminating different disease groups

|  | Area under the curve (95% CI) | | |
| --- | --- | --- | --- |
| Trace metal | aMCI vs. Control | AD vs. Control | AD vs. aMCI |
| Li | 70.1 (48.2–92.0) | 63.9 (34.5–93.2) | 57.1 (29.3–84.8) |
| Be | 49.0 (25.3–72.8) | 55.6 (25.7–85.4) | 54.9 (30.2–79.6) |
| B | **97.6 (93.2–100)\*** | **100 (100–100)\*** | **69.6 (50.5–88.6)\*** |
| Al | **70.1 (51.5–88.6)\*** | 66.7 (37.0–96.3) | 57.9 (35.7–80.0) |
| Ca | **79.2 (62.6–95.9)\*** | **80.6 (58.1–100)\*** | 50.5 (26.8–74.3) |
| V | 68.8 (48.4–89.2) | 66.7 (38.6–94.8) | 57.3 (36.2–78.5) |
| Cr | 58.5 (38.1–78.8) | 48.6 (16.4–80.8) | 42.4 (14.7–70.1) |
| Mn | 63.8 (44.3–83.3) | **84.7 (60.1–100)\*** | **80.2 (61.5–98.8)\*** |
| Fe | 69.6 (47.4–91.7) | 69.4 (38.8–100) | 49.5 (24.1–74.8) |
| Co | 69.1 (47.1–91.1) | **86.1 (66.4–100)\*** | **72.3 (53.9–90.6)\*** |
| Ni | 65.2 (43.1–87.3) | 54.2 (24.5–83.9) | 69.0 (45.9–92.1) |
| Cu | **74.4 (53.9–94.9)\*** | 54.2 (24.0–84.4) | **72.8 (51.0–94.7)\*** |
| Zn | 56.0 (28.6–83.4) | 54.2 (24.5–83.8) | 52.7 (26.7–78.7) |
| Ga | 66.7 (45.7–87.6) | **88.2 (73.0–100)\*** | 62.8 (42.4–83.1) |
| Ge | 54.1 (34.7–73.6) | **66.7 (50.3–83.0)\*** | **69.6 (59.4–79.8)\*** |
| As | 58.5 (32.5–84.4) | 45.8 (15.9–75.7) | 57.9 (34.0–81.8) |
| Se | 58.7 (36.6–80.8) | 72.2 (46.1–98.4) | **81.5 (63.1–99.9)\*** |
| Rb | 54.1 (31.8–76.4) | 59.7 (27.4–92.0) | 56.5 (26.6–86.4) |
| Sr | 61.8 (40.1–83.6) | 70.8 (43.7–97.9) | 53.3 (32.0–74.5) |
| Zr | **96.6 (91.2–100)\*** | **95.8 (87.7–100)\*** | 56.0 (30.9–81.1) |
| Mo | 64.5 (43.4–85.6) | 51.4 (20.3–82.5) | 53.3 (27.3–79.2) |
| Ag | 52.2 (25.9–78.5) | 50.0 (21.5–78.5) | 56.8 (30.1–83.5) |
| Cd | 60.9 (38.0–83.8) | 55.6 (25.5–85.6) | 66.0 (46.1–86.0) |
| Sn | 44.9 (25.3–64.6) | 68.8 (48.2–89.3) | 59.8 (45.0–74.5) |
| Sb | **75.4 (52.4–98.4)\*** | 68.1 (39.5–96.6) | 46.2 (20.0–72.4) |
| Te | 60.6 (44.4–76.8) | 50.0 (33.6–66.4) | 62.0 (47.0–76.9) |
| Ba | 54.1 (30.9–77.3) | 71.5 (44.7–98.3) | **73.1 (54.5–91.7)\*** |
| W | **100 (100–100)\*** | **100 (100–100)\*** | 52.2 (47.9–56.4) |
| Pt | 36.0 (13.0–59.0) | 56.3 (37.5–75.1) | **77.5 (64.7–90.2)\*** |
| Au | 88.9 (74.5–100) | 88.9 (74.5–100) | 50.0 (50.0–50.0) |
| Hg | **80.0 (61.5–98.4)\*** | **94.4 (84.3–100)\*** | **79.9 (57.8–100)\*** |
| Tl | **73.2 (53.1–93.3)\*** | **81.9 (59.8–100)\*** | 62.0 (36.6–87.3) |
| Pb | 67.9 (46.4–89.4) | 40.3 (7.7–72.8) | **77.7 (57.2–98.3)\*** |
| Bi | **76.3 (59.8–92.9)\*** | **92.4 (78.0–100)\*** | 66.0 (44.8–87.3) |
| Th | **96.6 (91.1–100)\*** | **100 (100–100)\*** | **67.4 (57.4–77.3)\*** |
| U | **72.2 (54.1–90.4)\*** | **84.7 (65.4–100)\*** | 63.0 (39.9–86.2) |

Abbreviations: CI, confidence interval; aMCI, amnestic mild cognitive impairment; AD, Alzheimer's disease;

\* Indicated *P* <0.05.

**Supplemental Table 2**. The optimal cutoff of selected trace metals and the corresponding sensitivity/specificity on discriminating different disease groups

| Contrasting disease groups / Trace metal | Cutoff | Sensitivity, %  (95% CI) | Specificity, %  (95% CI) |
| --- | --- | --- | --- |
| aMCI vs. Control |  |  |  |
| B | ≤73.1 | 91.3 (72.0 – 98.9) | 100.0 (66.4 – 100.0) |
| Al | ≤14.5 | 52.2 (30.6 – 73.2) | 88.9 (51.8 – 99.7) |
| Ca | >88483 | 73.9 (51.6 – 89.8) | 77.8 (40.0 – 97.2) |
| Cu | >843 | 78.3 (56.3 – 92.5) | 66.7 (29.9 – 92.5) |
| Zr | ≤0.71 | 82.6 (61.2 – 95.0) | 100.0 (66.4 – 100.0) |
| Sb | ≤7.80 | 87.0 (66.4 – 97.2) | 66.7 (29.9 – 92.5) |
| W | ≤4.29 | 100.0 (85.2 – 100.0) | 100.0 (66.4 – 100.0) |
| Hg | ≤2.63 | 87.0 (66.4 – 97.2) | 66.7 (29.9 – 92.5) |
| Tl | ≤0.05 | 87.0 (66.4 – 97.2) | 55.6 (21.2 – 86.3) |
| Bi | ≤0.03 | 52.2 (30.6 – 73.2) | 100.0 (66.4 – 100.0) |
| Th | ≤1.12 | 91.3 (72.0 – 98.9) | 100.0 (66.4 – 100.0) |
| U | ≤0.01 | 56.5 (34.5 – 76.8) | 88.9 (51.8 – 99.7) |
| AD vs. Control |  |  |  |
| B | ≤47.1 | 100.0 (63.1 – 100.0) | 100.0 (66.4 – 100.0) |
| Ca | >87064 | 87.5 (47.3 – 99.7) | 66.7 (29.9 – 92.5) |
| Mn | ≤0.71 | 87.5 (47.3 – 99.7) | 88.9 (51.8 – 99.7) |
| Co | ≤0.17 | 100.0 (63.1 – 100.0) | 77.8 (40.0 – 97.2) |
| Ga | ≤0.04 | 87.5 (47.3 – 99.7) | 77.8 (40.0 – 97.2) |
| Ge | ≤0.00 | 100.0 (63.1 – 100.0) | 33.3 (7.5 – 70.1) |
| Zr | ≤1.29 | 100.0 (63.1 – 100.0) | 77.8 (40.0 – 97.2) |
| W | ≤0.00 | 100.0 (63.1 – 100.0) | 100.0 (66.4 – 0.0) |
| Hg | ≤1.42 | 87.5 (47.3 – 99.7) | 88.9 (51.8 – 99.7) |
| Tl | ≤0.01 | 62.5 (24.5 – 91.5) | 100.0 (66.4 – 100.0) |
| Bi | ≤0.03 | 87.5 (47.3 – 99.7) | 88.9 (51.8 – 99.7) |
| Th | ≤0.00 | 100.0 (63.1 – 100.0) | 100.0 (66.4 – 100.0) |
| U | ≤0.01 | 62.5 (24.5 – 91.5) | 100.0 (66.4 – 100.0) |
| AD vs. aMCI |  |  |  |
| B | ≤47.1 | 100.0 (63.1 – 100.0) | 52.2 (30.6 – 73.) |
| Mn | ≤0.71 | 87.5 (47.3 – 99.7) | 69.6 (47.1 – 86.8) |
| Co | >0.17 | 100.0 (63.1 – 100.0) | 52.2 (30.6 – 73.2) |
| Cu | ≤797 | 62.5 (24.5 – 91.5) | 82.6 (61.2 – 95.0) |
| Ge | ≤0.00 | 100.0 (63.1 – 100.0) | 39.1 (19.7 – 61.5) |
| Se | ≤143.0 | 50.0 (15.7 – 84.3) | 100.0 (85.2 – 100.0) |
| Ba | ≤0.97 | 87.5 (47.3 – 99.7) | 56.5 (34.5 – 76.8) |
| Pt | ≤0.01 | 100.0 (63.1 – 100.0) | 56.5 (34.5 – 76.8) |
| Hg | ≤1.02 | 75.0 (34.9 – 96.8) | 91.3 (72.0 – 98.9) |
| Pb | ≤1.24 | 87.5 (47.3 – 99.7) | 69.6 (47.1 – 86.8) |
| Th | ≤0.00 | 100.0 (63.1 – 100.0) | 34.8 (16.4 – 57.3) |

Abbreviations: CI, confidence interval; aMCI, amnestic mild cognitive impairment; AD, Alzheimer's disease.