Supplemental Table 1. Summary of Domestic NSQAP SUAC Proficiency Testing Program Participant-reported Cutoffs by Method, 2008 ― 2014.

|  |  |  |  |
| --- | --- | --- | --- |
| **Method Description** | **Year** | **# Labs** | **Mean (µM)** |
| Derivatized MS/MS non-kit | 2008 | 7 | 2.96 |
| 2009 | 10 | 2.94 |
| 2010 | 10 | 3.05 |
| 2011 | 9 | 2.82 |
| 2012 | 9 | 2.52 |
|  | 2013 | 9 | 2.74 |
|  | 2014 | 9 | 2.70 |
| PerkinElmer NeoBase™ kit | 2008 | - | - |
| 2009 | 1 | 3.00 |
| 2010 | 11 | 3.00 |
| 2011 | 18 | 3.07 |
| 2012 | 18 | 3.01 |
|  | 2013 | 18 | 2.98 |
|  | 2014 | 18 | 3.00 |

N/A: not applicable

Supplemental Table 2. Summary of Domestic NSQAP Tyrosine Proficiency Testing Program Participant-reported Cutoffs by Method, 2008 ― 2014.

|  |  |  |  |
| --- | --- | --- | --- |
| **Method Description** | **Year** | **# Labs** | **Mean (µM)** |
| Derivatized MS/MS non-kit | 2008 | 11 | 329.7 |
| 2009 | 11 | 346.1 |
| 2010 | 11 | 338.2 |
| 2011 | 10 | 342.0 |
| 2012 | 10 | 342.0 |
|  | 2013 | 10 | 342.0 |
|  | 2014 | 10 | 342.0 |
| PerkinElmer NeoBase™ kit | 2008 | - | - |
| 2009 | - | - |
| 2010 | 7 | 475.7 |
| 2011 | 12 | 423.1 |
| 2012 | 13 | 429.0 |
|  | 2013 | 13 | 425.9 |
|  | 2014 | 13 | 425.9 |

N/A: not applicable

Supplemental Table 3. Summary of Participation in NSQAP SUAC Proficiency Testing Surveys, 2008 ― 2014.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Quarter** | **Year** | **Total Labs** | **US** | **International** | **Manufacturers** |
| 4 | 2008 | 33 | 8 | 23 | 2 |
| 4 | 2009 | 39 | 11 | 26 | 2 |
| 4 | 2010 | 55 | 21 | 31 | 3 |
| 4 | 2011 | 69 | 27 | 40 | 2 |
| 4 | 2012 | 74 | 27 | 44 | 3 |
| 4 | 2013 | 84 | 28 | 53 | 3 |
| 1 | 2014 | 85 | 29 | 53 | 3 |

Supplemental Table 4. Summary of Participation in NSQAP Tyrosine Proficiency Testing Surveys, 2008 ― 2014.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Quarter** | **Year** | **Total Labs** | **US** | **International** | **Manufacturers** |
| 4 | 2008 | 189 | 52 | 127 | 10 |
| 4 | 2009 | 201 | 53 | 138 | 10 |
| 4 | 2010 | 206 | 53 | 143 | 10 |
| 4 | 2011 | 239 | 54 | 176 | 9 |
| 4 | 2012 | 259 | 53 | 197 | 9 |
| 4 | 2013 | 269 | 53 | 207 | 9 |
| 1 | 2014 | 272 | 54 | 208 | 10 |

Supplemental Table 5. Selected NSQAP SUAC Quality Control Survey Results, 2010.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **SUAC Quality Control Lot (Enrichment)** | **N** | **Mean (µM)** | **Average Within Lab SD** | **Total SD** | **Y- Intercept** | **Slope** |
| **Lot 021 (0 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 198 | 0.84 | 0.31 | 0.97 | 0.96 | 0.6 |
| Non-derivatized - MS/MS non-kit | 30 | 3.19 | 0.53 | 2.80 | 3.26 | 0.8 |
| Non-derivatized - MS/MS PE NeoBase | 90 | 0.74 | 0.19 | 0.44 | 0.75 | 0.2 |
|  |  |  |  |  |  |  |
| **Lot 022 (2.5 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 197 | 2.72 | 0.46 | 1.69 | 0.96 | 0.6 |
| Non-derivatized - MS/MS non-kit | 29 | 5.20 | 0.40 | 1.24 | 3.26 | 0.8 |
| Non-derivatized - MS/MS PE NeoBase | 90 | 1.19 | 0.25 | 0.48 | 0.75 | 0.2 |
|  |  |  |  |  |  |  |
| **Lot 023 (5 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 200 | 4.75 | 0.63 | 2.61 | 0.96 | 0.6 |
| Non-derivatized - MS/MS non-kit | 30 | 8.37 | 0.80 | 1.55 | 3.26 | 0.8 |
| Non-derivatized - MS/MS PE NeoBase | 90 | 1.70 | 0.28 | 0.57 | 0.75 | 0.2 |
|  |  |  |  |  |  |  |
| **Lot 024 (10 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 201 | 8.30 | 1.15 | 4.83 | 0.96 | 0.6 |
| Non-derivatized - MS/MS non-kit | 30 | 12.47 | 0.76 | 1.02 | 3.26 | 0.8 |
| Non-derivatized - MS/MS PE NeoBase | 90 | 2.63 | 0.42 | 0.67 | 0.75 | 0.2 |

Supplemental Table 6. Selected NSQAP SUAC Quality Control Survey Results, 2011.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **SUAC Quality Control Lot (Enrichment)** | **N** | **Mean (µM)** | **Average Within Lab SD** | **Total SD** | **Y- Intercept** | **Slope** |
| **Lot 025 (0 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 231 | 0.66 | 0.26 | 0.68 | 0.62 | 0.8 |
| Non-derivatized - MS/MS non-kit | 37 | 1.99 | 0.30 | 2.35 | 1.88 | 0.6 |
| Non-derivatized - MS/MS PE NeoBase | 170 | 0.43 | 0.15 | 0.30 | 0.44 | 0.2 |
|  |  |  |  |  |  |  |
| **Lot 026 (2.5 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 230 | 2.54 | 0.49 | 1.50 | 0.62 | 0.8 |
| Non-derivatized - MS/MS non-kit | 38 | 3.43 | 0.65 | 2.22 | 1.88 | 0.6 |
| Non-derivatized - MS/MS PE NeoBase | 170 | 0.92 | 0.22 | 0.30 | 0.44 | 0.2 |
|  |  |  |  |  |  |  |
| **Lot 027 (5 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 237 | 4.37 | 0.82 | 3.01 | 0.62 | 0.8 |
| Non-derivatized - MS/MS non-kit | 38 | 4.57 | 0.95 | 2.32 | 1.88 | 0.6 |
| Non-derivatized - MS/MS PE NeoBase | 170 | 1.38 | 0.27 | 0.37 | 0.44 | 0.2 |
|  |  |  |  |  |  |  |
| **Lot 028 (10 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 239 | 8.30 | 1.35 | 5.57 | 0.62 | 0.8 |
| Non-derivatized - MS/MS non-kit | 40 | 7.97 | 2.39 | 4.09 | 1.88 | 0.6 |
| Non-derivatized - MS/MS PE NeoBase | 171 | 2.34 | 0.38 | 0.65 | 0.44 | 0.2 |
|  |  |  |  |  |  |  |

Supplemental Table 7. Selected NSQAP SUAC Quality Control Survey Results, 2012.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **SUAC Quality Control Lot (Enrichment)** | **N** | **Mean (µM)** | **Average Within Lab SD** | **Total SD** | **Y- Intercept** | **Slope** |
| **Lot 221 (0 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 178 | 0.83 | 0.27 | 0.69 | 0.85 | 0.6 |
| Non-derivatized - MS/MS non-kit | 40 | 2.09 | 0.50 | 1.82 | 2.22 | 0.8 |
| Non-derivatized - MS/MS PE NeoBase | 259 | 0.47 | 0.16 | 0.29 | 0.47 | 0.2 |
|  |  |  |  |  |  |  |
| **Lot 222 (2.5 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 167 | 2.48 | 0.51 | 1.65 | 0.85 | 0.6 |
| Non-derivatized - MS/MS non-kit | 40 | 4.28 | 0.53 | 2.18 | 2.22 | 0.8 |
| Non-derivatized - MS/MS PE NeoBase | 260 | 0.94 | 0.16 | 0.30 | 0.47 | 0.2 |
|  |  |  |  |  |  |  |
| **Lot 223 (5 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 178 | 4.08 | 0.83 | 2.83 | 0.85 | 0.6 |
| Non-derivatized - MS/MS non-kit | 40 | 6.32 | 0.96 | 3.18 | 2.22 | 0.8 |
| Non-derivatized - MS/MS PE NeoBase | 255 | 1.41 | 0.25 | 0.42 | 0.47 | 0.2 |
|  |  |  |  |  |  |  |
| **Lot 224 (10 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 180 | 7.27 | 1.18 | 5.31 | 0.85 | 0.6 |
| Non-derivatized - MS/MS non-kit | 37 | 10.07 | 1.01 | 4.13 | 2.22 | 0.8 |
| Non-derivatized - MS/MS PE NeoBase | 255 | 2.33 | 0.34 | 0.68 | 0.47 | 0.2 |

Supplemental Table 8. Selected NSQAP SUAC Quality Control Survey Results, 2013.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **SUAC Quality Control Lot (Enrichment)** | **N** | **Mean (µM)** | **Average Within Lab SD** | **Total SD** | **Y- Intercept** | **Slope** |
| **Lot 1225 (0 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 198 | 0.80 | 0.31 | 0.55 | 0.80 | 0.5 |
| Non-derivatized - MS/MS non-kit | 48 | 0.83 | 0.37 | 0.46 | 1.1 | 0.4 |
| Non-derivatized - MS/MS PE NeoBase | 246 | 0.45 | 0.14 | 0.25 | 0.45 | 0.2 |
|  |  |  |  |  |  |  |
| **Lot 1226 (2.5 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 189 | 2.22 | 0.34 | 1.12 | 0.80 | 0.5 |
| Non-derivatized - MS/MS non-kit | 50 | 2.28 | 0.4 | 1.13 | 1.1 | 0.4 |
| Non-derivatized - MS/MS PE NeoBase | 245 | 0.87 | 0.18 | 0.28 | 0.45 | 0.2 |
|  |  |  |  |  |  |  |
| **Lot 1227 (7.5 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 187 | 4.77 | 0.48 | 2.41 | 0.80 | 0.5 |
| Non-derivatized - MS/MS non-kit | 50 | 4.78 | 0.56 | 3.24 | 1.1 | 0.4 |
| Non-derivatized - MS/MS PE NeoBase | 245 | 1.74 | 0.29 | 0.55 | 0.45 | 0.2 |
|  |  |  |  |  |  |  |
| **Lot 1228 (15 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 190 | 8.99 | 0.72 | 4.62 | 0.80 | 0.5 |
| Non-derivatized - MS/MS non-kit | 48 | 7.43 | 0.74 | 5.58 | 1.1 | 0.4 |
| Non-derivatized - MS/MS PE NeoBase | 243 | 3.02 | 0.32 | 0.91 | 0.45 | 0.2 |
|  |  |  |  |  |  |  |

Supplemental Table 9. Selected NSQAP Tyrosine Quality Control Survey Results, 2010.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Tyrosine Quality Control Lot (Enrichment)** | **N** | **Mean (µM)** | **Average Within Lab SD** | **Total SD** | **Y- Intercept** | **Slope** |
| **Lot 021 (0 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 710 | 58.13 | 5.57 | 10.40 | 61.49 | 0.8 |
| Non-derivatized - MS/MS non-kit | 139 | 69.74 | 6.32 | 13.71 | 73.73 | 0.9 |
| Non-derivatized - MS/MS PE NeoBase | 194 | 71.10 | 5.83 | 8.97 | 75.42 | 0.9 |
|  |  |  |  |  |  |  |
| **Lot 022 (276 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 702 | 282.54 | 23.63 | 42.64 | 61.49 | 0.8 |
| Non-derivatized - MS/MS non-kit | 148 | 334.74 | 24.10 | 70.01 | 73.73 | 0.9 |
| Non-derivatized - MS/MS PE NeoBase | 193 | 343.56 | 24.22 | 47.40 | 75.42 | 0.9 |
|  |  |  |  |  |  |  |
| **Lot 023 (497 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 695 | 441.15 | 34.53 | 65.20 | 61.49 | 0.8 |
| Non-derivatized - MS/MS non-kit | 148 | 540.74 | 43.23 | 115.47 | 73.73 | 0.9 |
| Non-derivatized - MS/MS PE NeoBase | 196 | 537.55 | 42.65 | 75.77 | 75.42 | 0.9 |
|  |  |  |  |  |  |  |
| **Lot 024 (773 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 690 | 659.00 | 51.76 | 98.10 | 61.49 | 0.8 |
| Non-derivatized - MS/MS non-kit | 149 | 790.57 | 58.18 | 157.90 | 73.73 | 0.9 |
| Non-derivatized - MS/MS PE NeoBase | 198 | 800.30 | 64.53 | 112.05 | 75.42 | 0.9 |

Supplemental Table 10. Selected NSQAP Tyrosine Quality Control Survey Results, 2011.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Tyrosine Quality Control Lot (Enrichment)** | **N** | **Mean (µM)** | **Average Within Lab SD** | **Total SD** | **Y- Intercept** | **Slope** |
| **Lot 025 (0 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 795 | 48.71 | 4.61 | 8.05 | 47.71 | 0.7 |
| Non-derivatized - MS/MS non-kit | 194 | 54.57 | 4.83 | 11.20 | 53.00 | 0.8 |
| Non-derivatized - MS/MS PE NeoBase | 334 | 59.78 | 4.96 | 7.40 | 57.71 | 0.9 |
|  |  |  |  |  |  |  |
| **Lot 026 (250 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 789 | 223.89 | 18.49 | 34.52 | 47.71 | 0.7 |
| Non-derivatized - MS/MS non-kit | 191 | 252.06 | 16.43 | 39.57 | 53.00 | 0.8 |
| Non-derivatized - MS/MS PE NeoBase | 335 | 270.36 | 23.39 | 35.64 | 57.71 | 0.9 |
|  |  |  |  |  |  |  |
| **Lot 027 (500 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 783 | 393.77 | 31.22 | 56.95 | 47.71 | 0.7 |
| Non-derivatized - MS/MS non-kit | 193 | 448.43 | 30.89 | 72.89 | 53.00 | 0.8 |
| Non-derivatized - MS/MS PE NeoBase | 322 | 488.03 | 39.42 | 57.63 | 57.71 | 0.9 |
|  |  |  |  |  |  |  |
| **Lot 028 (750 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 790 | 576.65 | 46.73 | 81.29 | 47.71 | 0.7 |
| Non-derivatized - MS/MS non-kit | 194 | 654.37 | 48.68 | 106.08 | 53.00 | 0.8 |
| Non-derivatized - MS/MS PE NeoBase | 335 | 705.40 | 51.71 | 86.20 | 57.71 | 0.9 |
|  |  |  |  |  |  |  |

Supplemental Table 11. Selected NSQAP Tyrosine Quality Control Survey Results, 2012.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Tyrosine Quality Control Lot (Enrichment)** | **N** | **Mean (µM)** | **Average Within Lab SD** | **Total SD** | **Y- Intercept** | **Slope** |
| **Lot 221 (0 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 832 | 53.99 | 4.74 | 8.15 | 54.68 | 0.8 |
| Non-derivatized - MS/MS non-kit | 219 | 58.69 | 4.54 | 9.40 | 60.49 | 0.8 |
| Non-derivatized - MS/MS PE NeoBase | 451 | 57.13 | 4.80 | 8.79 | 57.10 | 0.8 |
|  |  |  |  |  |  |  |
| **Lot 222 (250 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 827 | 242.92 | 19.47 | 35.21 | 54.68 | 0.8 |
| Non-derivatized - MS/MS non-kit | 226 | 269.12 | 19.88 | 39.06 | 60.49 | 0.8 |
| Non-derivatized - MS/MS PE NeoBase | 456 | 261.68 | 17.49 | 35.73 | 57.10 | 0.8 |
|  |  |  |  |  |  |  |
| **Lot 223 (500 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 840 | 431.54 | 35.31 | 66.47 | 54.68 | 0.8 |
| Non-derivatized - MS/MS non-kit | 229 | 470.96 | 33.45 | 70.40 | 60.49 | 0.8 |
| Non-derivatized - MS/MS PE NeoBase | 455 | 459.69 | 33.65 | 67.22 | 57.10 | 0.8 |
|  |  |  |  |  |  |  |
| **Lot 224 (750 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 838 | 617.18 | 51.71 | 92.33 | 54.68 | 0.8 |
| Non-derivatized - MS/MS non-kit | 228 | 676.85 | 53.42 | 106.83 | 60.49 | 0.8 |
| Non-derivatized - MS/MS PE NeoBase | 442 | 667.70 | 53.43 | 101.30 | 57.10 | 0.8 |

Supplemental Table 12. Selected NSQAP Tyrosine Quality Control Survey Results, 2013.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Tyrosine Quality Control Lot (Enrichment)** | **N** | **Mean (µM)** | **Average Within Lab SD** | **Total SD** | **Y- Intercept** | **Slope** |
| **Lot 1225 (0 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 821 | 61.93 | 3.16 | 8.39 | 51.77 | 0.8 |
| Non-derivatized - MS/MS non-kit | 276 | 54.29 | 4.52 | 9.02 | 53.28 | 0.9 |
| Non-derivatized - MS/MS PE NeoBase | 434 | 55.60 | 4.43 | 8.05 | 57.49 | 0.9 |
|  |  |  |  |  |  |  |
| **Lot 1226 (200 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 826 | 211.48 | 17.27 | 30.51 | 51.77 | 0.8 |
| Non-derivatized - MS/MS non-kit | 288 | 225.67 | 17.12 | 42.20 | 53.28 | 0.9 |
| Non-derivatized - MS/MS PE NeoBase | 437 | 232.76 | 16.31 | 32.47 | 57.49 | 0.9 |
|  |  |  |  |  |  |  |
| **Lot 1227 (400 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 825 | 380.98 | 29.48 | 54.36 | 51.77 | 0.8 |
| Non-derivatized - MS/MS non-kit | 285 | 409.14 | 30.22 | 71.27 | 53.28 | 0.9 |
| Non-derivatized - MS/MS PE NeoBase | 434 | 419.19 | 27.52 | 52.97 | 57.49 | 0.9 |
|  |  |  |  |  |  |  |
| **Lot 1228 (600 µM)** |  |  |  |  |  |  |
| Derivatized - MS/MS non-kit | 831 | 533.48 | 40.21 | 76.63 | 51.77 | 0.8 |
| Non-derivatized - MS/MS non-kit | 284 | 579.33 | 51.77 | 105.09 | 53.28 | 0.9 |
| Non-derivatized - MS/MS PE NeoBase | 434 | 582.26 | 37.69 | 75.03 | 57.49 | 0.9 |
|  |  |  |  |  |  |  |