

## **Attachment 6**

### **Additional Information on Biospecimens**

**PATH Biospecimen Analytes by Specimen and Biomarker**

| Analyte   | Preferred Matrix             | Biomarker                            |
|---|------------------------------|--------------------------------------|
| <b>Tobacco Biomarkers in Tobacco Users and Non-tobacco Users</b>  |                              |                                      |
| Nicotine and nicotine metabolites<br><b>Tobacco user:</b> cotinine and trans-3'-hydroxycotinine<br><b>Non-tobacco user:</b> cotinine  | Serum                        | Exposure                             |
| Nicotine and nicotine metabolites<br><b>Tobacco user:</b> cotinine, trans-3'-hydroxycotinine, cotinine N-oxide, nicotine N-oxide, nornicotine, norcotinine; analogues: anabasine, anatabine<br><b>Non-tobacco user:</b> cotinine and trans-3'-hydroxycotinine | Urine                        | Exposure                             |
| Tobacco specific nitrosamines (TSNAs): NNAL, NNN, NNA, NAT, NAB, NNK  | Urine                        | Exposure                             |
| Polycyclic aromatic hydrocarbons (pyrene, naphthalene, phenanthrene, fluorene)  | Urine                        | Combustion                           |
| Cadmium, cobalt, uranium, lead, strontium, beryllium, manganese, and thallium   | Urine, prescreened container | Toxicity                             |
| Speciated arsenic (As III, As V, dimethylarsinic acid (DMA), and monomethylarsonic acid (MMA))  | Urine, prescreened container | Toxicity                             |
| Creatinine  | Urine                        | For correction                       |
| 4-ABP hemoglobin  | Red blood cells, EDTA        | Toxicity                             |
| VOCs metabolites  | Urine                        | Combustion                           |
| Volatile nitrosamines   | Urine                        | Combustion                           |
| Aromatic amines   | Urine                        | Combustion                           |
| Cyanide   | Urine                        | Combustion                           |
| <b>Other Biomarkers in Tobacco Users and Non-tobacco Users</b>  |                              |                                      |
| C-reactive protein  | Serum, red top or SST        | Inflammation;<br>Cardiovascular risk |
| Fibrinogen  | Plasma, citrate              | Cardiovascular risk                  |
| Interleukin 6   | Plasma                       | Inflammation                         |
| sICAM (soluble intercellular adhesion molecule)   | Plasma, EDTA or Serum, SST   | Cardiovascular risk                  |
| F2-isoprostane / 8-epi-prostaglandin F2a  | Urine                        | Oxidative stress                     |

Population Assessment of Tobacco and Health (PATH) Study (NIDA)

|                              |              |                        |
|------------------------------|--------------|------------------------|
| MicroRNA profile             | Plasma       | Epigenetic effects     |
| Metabolomic profile          | Plasma, EDTA | Metabolic effects      |
| Proteomic profile            | Plasma       | Toxicity, risk, stress |
| DNA (genotyping, sequencing) | Buffy coat   | Role of genetics       |
| RNA (gene expression)        | PAXgene      | Epigenetic effects     |
| Metabolomic profile          | Urine        | Metabolic effects      |
| microRNA, total RNA          | Buccal cells | Epigenetic effects     |
| Epigenetic marks             | Buccal cells | Epigenetic effects     |