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| **Selenium** |
| **Protocol Id** | 050901 |
| **Version #** | 1 |
| **Description of Protocol** | The analytical method for serum selenium (Se) is based on inductively coupled plasma mass spectrometry (ICP-MS) using matrix-matched calibration standards. In this method, Se (isotope mass 78 and/or mass 80), and gallium (mass 69) are measured in serum by inductively coupled plasma dynamic reaction cell spectrometry using methane as reaction gas. |
| **Specific Instructions** | Strict adherence to quality control (QC) procedures outlined in the Protocol Text is recommended. Controls should be run at the beginning of the day, and then one control analyzed again after approximately each 10 patient samples, and then all QC controls are run at the end of each day’s run. Agreement with certified or accepted QC values should be within the +2 S.D. limits. |
| **Protocol Text** | **1. Specimen Collection, Storage, and Handling Procedures; Criteria for Specimen Rejection**A. Specimen should be collected in a Red-Top tube that is prescreened for trace metal contamination. Specimen-type serum, optimal amount of specimen required is 2–3 mL, minimum volume required for analysis is about 0.8 mL.B. Specimens may reach and maintain ambient temperature during analysis. Stringent precautions should be taken to avoid external contamination by the metals to be determined.C. The criteria for unacceptable specimens are either a low volume (<0.8 mL) or suspected contamination due to improper collection procedures or collection devices. In all cases, a second specimen should be requested.D. Specimen characteristics that may compromise test results include contamination of serum by contact with dust, dirt, etc. from improper handling.E. In general, serum specimens should be transported and stored at 4°C. Once received, they can be frozen at -20°C or at -70°C until time for analysis. Portions of the sample that remain after analytical aliquots are withdrawn and should be refrozen at -20°C. Samples thawed and refrozen several times are not compromised.**2. Detection Ranges**       Reference Ranges (Normal Values) adapted from National Committee for Clinical Laboratory Standards (NCCLS) 38A(3): Selenium

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| Age | µg/L | µmol/L |
| Preterm | 35–94 | 0.44–1.19 |
| Full Term | 57–96 | 0.72–1.21 |
| 1–5 years | 96–144 | 1.22–1.82 |
| 6–9 years | 101–162 | 1.28–2.05 |
| 10–16 years | 103–186 | 1.31–2.35 |
| Adult | 109–181 | 1.38–2.29 |

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| **Selection Rationale** | This assay is sensitive enough to be used to rapidly screen serum specimens from subjects for elements of toxic and nutritional interest. The protocol is taken from the standard procedure used by the Centers for Disease Control and Prevention (CDC) Elemental Analysis Laboratory for the National Health Examination Survey (NHANES). |
| **Source** | Centers for Disease Control and Prevention, Division of Laboratory Sciences, National Center for Environmental Health Laboratory Procedure Manual for Serum Selenium, August 24, 2004.                     Lockitch, G., Fassett, J. D., Gerson, B., Nixon, D. E., Parsons, P. J., & Savory, J. (1997). *Control of pre-analytical variation in trace element determinations; Approved guideline* (NCCLS document C38-A). Wayne, PA: National Committee for Clinical Laboratory Standards. |
| **Language** | English |
| **Participant** | All ages |
| **Personnel and Training Required** | Must complete safety training seminars prior to performing any work in the Lead Poisoning/Trace Elements Laboratory. |
| **Equipment Needs** | Highly specialized equipment is necessary to perform accurate selenium measurements. |
| **Standards** |

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| **Standard** | **Name** | **ID** | **Source** |
| Common Data Elements (CDE) | Person Serum Selenium Level Number | 2946951 | [CDE Browser](https://cdebrowser.nci.nih.gov/CDEBrowser/search?elementDetails=9&FirstTimer=0&PageId=ElementDetailsGroup&publicId=2946951&version=1.0) |
| Logical Observation Identifiers Names and Codes (LOINC) | PhenX - selenium protocol | 62287-8 | [LOINC](http://s.details.loinc.org/LOINC/62287-8.html?sections=Web) |

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| **General References** | Office of Dietary Supplements, National Institutes of Health Dietary Supplement Fact Sheet: Selenium.                     Thomson, C. D. (2004). Assessment of requirements for selenium and adequacy of selenium status: A review. *European Journal of Clinical Nutrition, 58,* 391–402.Combs, G., Jr., & Gray, W. P. (1998). Chemopreventive agents: Selenium. *Pharmacology and Therapeutics, 79,* 179–192.McKenzie, R. C., Rafferty, T. S., & Beckett, G. J. (1998). Selenium: An essential element for immune function. *Immunology Today, 19,* 342–345.Centers for Disease Control and Prevention, National Center for Health Statistics. National Health and Nutrition Examination Survey (NHANES) Overview 2007–2008. |
| **Protocol Type** | Bioassay |
| **Derived Variables** | None |
| **Requirements** |

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| **Requirement Category** | **Required** |
| Average time of greater than 15 minutes in an unaffected individualAverage time of greater than 15 minutes in an unaffected individual | No |
| Major equipmentThis measure requires a specialized measurement device that may not be readily available in every setting where genome wide association studies are being conducted. Examples of specialized equipment are DEXA, Echocardiography, and Spirometry | **Yes** |
| Specialized requirements for biospecimen collectionThis protocol requires that blood, urine, etc. be collected from the study participants. | No |
| Specialized trainingThis measure requires staff training in the protocol methodology and/or in the conduct of the data analysis. | No |

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