**Supplemental Data Table 1.** Identity and coordinates of participating laboratories.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name of the laboratory** | **Name of professional representing his/her laboratory in this study** | **City** | **Country** |
| Biomnis Ireland | Jean-Sebastien Charles | Dublin | Ireland |
| Bon Secours Hospital | Andrew Kenny | Cork | Ireland |
| Clinical chemistry laboratory Ryhov | Lina Zaar | Jönköping | Sweden |
| Clinical Institute for Medical Biochemistry and Laboratory Medicine | Zlata Flegar-Mestric | Zagreb | Croatia |
| Cliniques Universitaires St-Luc et Université Catholique de Louvain | Marianne Philippe | Brussels | Belgium |
| Conolly Hospital  | Gemma Farrell | Dublin | Ireland |
| CORE Laboratory, Hospital Clínic | Nayra Rico Santana |  Barcelona | Spain |
| Fimlab Laboratories | Paivi Holm | Tampere | Finland |
| Fimlab Laboratories | Maritta Nevala | Hämeenlinnna | Finland |
| Fimlab Laboratories | Kristiina Kainulainen | Jämsä | Finland |
| Forssa Hospital Laboratory | Juha Horsti | Forssa | Finland |
| Frederiksberg Hospital | Dorte Jespersen | Frederiksberg | Denmark |
| HUSLAB | Arja Rostedt | Porvoo | Finland |
| HUSLAB | Siv Gustavsson | Espoo | Finland |
| HUSLAB | Pirjo Juutilainen | Vantaa | Finland |
| HUSLAB | Ritva Mäntykoski | Hyvinkää | Finland |
| Institut de Biologie Clinique - ULB - IBC | Jacqueline Vandewalle | Watermael-Boitsfort | Belgium |
| ISLAB | Lea Kaasinen | Joensuu | Finland |
| ISLAB | Aini Vartiainen-Laakkonen | Savonlinna | Finland |
| ISLAB | Sari Väisanen | Kuopio | Finland |
| ISLAB | Ulla Suistomaa | Mikkeli | Finland |
| Kaarina Health Care Centre | No name | Kaarina | Finland |
| Klaipeda University Hospital, Clinical Diagnostics Laboratory | Rasa Augliené | Klaipeda | Lithuania |
| Klinisch Laboratorium ZNA Middelheim  | Annick Wauters | Antwerpen | Belgium |
| Kurikka Health Care Centre | Eija Ojala | Kurikka | Finland |
| Kuusiokuntien terveyskuntayhtymä | Irmeli Kukkola | Alavus | Finland |
| Kymenlaakso Central Hospital | Tiina Noronkoski | Kotka | Finland |
| Laboratorium Analiz Lekarskich SP ZOZ  | Hanna Czaplińska | Dzialdowo | Poland |
| Laboratorium Van Poucke  | Xavier Van Poucke | Kortrijk | Belgium |
| Laboratorium voor Klinische Chemie - AZ Jan Palfijn Gent | Bruno Heyndrickx | Gent  | Belgium |
| Laboratorium voor Klinische Chemie - AZ Sint Lucas | Johan Robbrecht | Brugge | Belgium |
| Laboratorium voor Klinische Chemie - AZ Nikolaas | Geert Mistiaen | Sint-Niklaas | Belgium |
| Laboratorium voor Klinische Chemie - AZ Sint Jozef Malle | Koenraad Gijbels | Malle | Belgium |
| Laboratory of Clinical Chemistry - University Hospital of the Free University Brussels | Manuella Martin | Brussels | Belgium |
| Medilab | Dominique Cuigniez | Gent | Belgium |
| Medyczne Laboratorium Diagnostyczne COM | Barbara Kopala-Jeźowska | Jaroslaw | Poland |
| NordLab | Maria Kunnari | Rovaniemi | Finland |
| NordLab | Seppo Laitinen | Kajaani | Finland |
| NordLab | Sinikka Liimatainen | Oulu | Finland |
| PI Republic Panevezys Hospital | Nijole Sapeliauskiene | Panevezys | Lithuania |
| PI Republic Siauliai Hospital | Gintaras Makstutis | Siauliai  | Lithuania |
| Porvoo Health Care Centre | Heli Virtanen | Porvoo | Finland |
| Quattromed HTI Laborid | Piret Kedars | Talinn | Estonia |
| Regionshospitalet Holstebro | Tove Rask Søndergaard | Holstebro | Denmark |
| South Karelia Central Hospital | Riitta Lindholm | Lappeenranta | Finland |
| Southern Ostrobothnia Central Hospital | Kaija Viitala | Seinäjoki | Finland |
| Tampereen Työterveys ry | Kari Lohtander | Tampere | Finland |
| The Occupational Health Centre, City of Helsinki | Riitta Varsio | Helsinki | Finland |
| TYKSLAB  | Taina Katajamäki | Turku | Finland |
| TYKSLAB  | Heidi Berghäll | Uusikaupunki | Finland |
| Unilabs | May Norman | Eskilstuna | Sweden |
| Unilabs  | Jonas Lindborg | Skövde | Sweden |
| Unilabs, Capio S:t Görans Hospital | Gitta Hellberg | Stockholm | Sweden |
| United Medix Laboratories  | Arto Katajamäki | Espoo | Finland |
| Vaasa Central Hospital | Matti Väisänen | Vaasa | Finland |
| Vita Laboratorio | Airi Rakkolainen | Helsinki | Finland |
| VRCP, Vilnius District Central Policlinic | Jurate Velickiene | Vilnius | Lithuania |
| VUH Santariskiu Clinics Center of Laboratory Medicine | Aldona Lujiene | Vilnius | Lithuania |
| Zaklad Diagnostyki Laboratoryjnej i Immunologii Klinicznej Wieku Rozwojowego | Marzena Modzelewska | Warzawa | Poland |

**Supplemental Data Table 2.** Description of the examined manufacturers/test systems, system types, assays and measurement

principles.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Manufacturer** | **Measurement principle** | **Abbott** | **Beckman Coulter** | **Ortho Clinical Diagnostics** | **Roche Diagnostics** | **Siemens** | **Thermo Fisher Scientifics** |
| **Platform** |  | Architect | AU | Vitros | Cobas | Advia | Konelab |
| **System types** |  | C8000, ci8200, c16000,ci16200 | 400, 640, 680, 2700 | 350, 4600, 5600, 5,1FS | 6000 c501, 8000 c702 | 1800, 2400 | 60i |
| **Cholesterol** | Enzymatic, colorimetric | CE + CHOD + POD(500 nm) | CE + CHOD + POD(540/600 nm) | CE + CHOD + POD(540 nm) | CE + CHOD + POD(505 nm)2nd generation | CE + CHOD + POD(505 nm) | CE + CHOD + POD(500-550 nm) |
| **Creatinine** | Enzymatic,Colorimetric | creatininase + creatinase + SOD + POD | creatininase + creatinase + SOD + POD(600/700 nm) | creatine amidinohydrolase + SOD + POD(670 nm) | creatininase + creatinase + SOD + POD(546 nm) | Creatininase + creatinase + SOD + POD | creatininase + creatinase + SOD + POD(540 nm) |
| **Glucose**  | Enzymatic,UV or colorimetric | HK + G6P-DH(340 nm) | HK + G6P-DH(340 nm) | GOD + POD(540 nm) | HK + G6P-DH(340 nm)2nd or 3th generation | HK + G6P-DH(340 nm) | HK + G6P-DH(340 nm) |
| **HDL-cholesterol** | Enzymatic, colorimetric | Two reagent format (selective detergent)CE + CHOD + POD | Two reagent format (selective detergent)CE + CHOD + POD(600 nm) | Precipitation of non-HDL with PTA and MgCl2CE + CHOD + POD(670 nm) | PEG modified enzymesCE + CHOD + POD(600 nm)3th generation | Two reagent format (selective detergent with catalase elimination of LDL reaction)CE + CHOD + POD(596 nm) | PEG modified enzymesCE + CHOD + POD |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **LDL-cholesterol** | Enzymatic,colorimetric | Two reagent format (selective detergent)CE + CHOD + POD | Two reagent format (selective detergent)CE + CHOD + POD(540/660 nm) | Two reagent format (selective detergent with catalase elimination of HDL reaction)CE + CHOD + POD | Non-ionic detergent + sugar compoundCE + CHOD + POD2nd generation | Two reagent format (selective detergent with catalase elimination of HDL reaction)CE + CHOD + POD | Non-ionic detergent + sugar compoundCE + CHOD + POD |
| **Phosphate** | Alkaline reaction, UV or colorimetric | Phospho-molybdate(340 nm) | Phospho-molybdate(340 nm) | Heteropoly-molybdenum blue complex(670-680 nm) | Phospho-molybdate(340 nm) | Phospho-molybdate(340 nm) | Phospho-molybdate(340 nm) |
| **Triglycerides** | Enzymatic, colorimetric | LPL + GK + GPO + POD | LPL + GK + GPO + POD(660/800 nm) | LPL + GK + GPO + POD(540 nm) | LPL + GK + GPO + POD(505 nm) | LPL + GK + GPO + POD(505/654 nm) | LPL + GK + GPO + POD(510 nm) |
| **Uric acid** | Enzymatic, colorimetric | Uricase + POD(548 nm) | Uricase + POD(660/800 nm) | Uricase + POD(670 nm) | Uricase + POD(546 nm) | Uricase + POD(545/694 nm) | Uricase + POD(540 nm) |

CE: cholesterol esterase; CHOD: cholesterol oxidase; POD: peroxidase; SOD: sarcosine oxidase; HK: hexokinase; G6P-DH: glucose-6-phosphate dehydrogenase; GOD: glucose oxidase; PTA: phosphotungstic acid; LPL: lipoprotein lipase; GK: glycerolkinase; GPO: glycerol-3-phosphate oxidase

**Supplemntal Data Table 3.** Fixed limits (%) used for assessment of assay peer performance.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | CHOL | CREA | GLU | HDL | LDL | PHOS | TRIGL | UA |
| Sy/x | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| Peer CV | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| TE | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 |

**Supplemental Data Table 4**. Fixed limits (%) used for assessment of laboratory peer performance.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | CHOL | CREA | GLU | HDL | LDL | PHOS | TRIGL | UA |
| Sy/x | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| Bias | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| TE | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |

**Supplemental Data Table 5.** Fixed limits (%) used for assessment of assay and laboratory AMTM/REF performance.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | CHOL# | CREA# | GLU | HDL | LDL | PHOS | TRIGL | UA# |
| Sy/x | 2 | 2 | 2 | 3 | 3 | 2 | 2.5 | 2 |
| Bias | 4 | 4 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4 |
| TE | 7.5 | 7.5 | 8 | 9.5 | 9.5 | 8 | 8.5 | 7.5 |

#: all estimates refer to REF targets.

**Supplemental Data Table 6**. Optimal bias limits derived from the biological variation concept (diagnosis model). These limits are included in the % difference plots in Figures 1 and 2.

|  |  |  |
| --- | --- | --- |
|  | Biological Variation | Optimal from diagnosis |
|  |  |  |  | **B (%)** |
| Analyte | **CVw** | **CVg** | **CVbt** | **0.125\*CVbt** |
| Cholesterol | 5.4 | 15.2 | 16 | 2.0 |
| Creatinine | 6 | 14.7 | 16 | 2.0 |
| Glucose | 6.1 | 6.1 | 9 | 1.1 |
| HDL-Chol | 7.1 | 19.7 | 21 | 2.6 |
| LDL-Chol | 8.3 | 25.7 | 27 | 3.4 |
| Phosphate | 8.5 | 9.4 | 13 | 1.6 |
| Triglycerides | 20.9 | 37.2 | 43 | 5.3 |
| Urate | 9 | 17.6 | 20 | 2.5 |

CVw: within-subject; CVg: group, or between-subject; CVbt: total biological variation.

**Supplemental Data Figure 1.** Graphical illustration of the Sy/x-, bias- and total error estimates, exemplified for the Ortho Vitros phosphate peer group against the AMTM.



The blue line represents the regression line for the peer group data to the AMTM (y = 0.939 x + 0.165; % Sy/x (relative to the mean concentration) = 1.1%). The red broken line is the line of equality (y = x). The Sy/x is estimated by a formula utilizing the y-residuals (vertical distance of the y-values (blue diamonds) to the blue regression line) and represents the random error in the y-direction. In the example, the scatter about the best fit line is small, reflecting low combined imprecision. Note that the ortho‘median AMTM Sy/x’ in Supplemental Data Table 9 (1.5%) is the median of the individual ‘(Ortho) laboratories AMTM Sy/x’ estimates. The vertical black dotted lines at 3 concentrations represent the respective biases of the peer group to the AMTM (Supplemental DataTable 9). The bias is most pronounced at the low concentration end (14.6%, vs 8.9% and 6.7% at mid and high concentration). This points to a standardization/ calibration issue of the Ortho assay. The formula for calculation of the ‘assay AMTM total error’ is given in the plot and is for this case most influenced by the bias. For the description of how the assay peer CV, median peer Sy/x and peer TE were derived, we refer to the main text (“Quality indicators and performance limits”), while Supplemental Data Table 7 gives the numerical values.

**Supplemental Data Table 7.** Assay peer (named by manufacturer) estimates reflecting the performance for cholesterol (CHOL), creatinine (CREA), glucose (GLU), HDL- and LDL-cholesterol (HDL/LDL), phosphate (PHOS), triglycerides (TRIGL) and uric acid (UA). Note: The used fixed limits were: peer Sy/x = 1.5%, peer CV = 3%, and peer TE = 6.5%. The underlined values indicate that the limits were exceeded.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Median Peer Sy/x (%) | CHOL | CREA | GLU | HDL | LDL | PHOS | TRIGL | UA |
| Abbott | 0.6 | 0.9 | 0.7 | 1.0 | 1.0 | 0.7 | 1.4 | 0.4 |
| Beckman | 0.6 | 0.7 | 0.7 | 0.9 | NA\* | 0.7 | 0.7 | 0.5 |
| Ortho | 1.2 | 1.3 | 0.7 | 1.7 | NA | 0.8 | 1.3 | 0.7 |
| Roche | 0.9 | 1.6 | 0.8 | 0.8 | 0.9 | 1.0 | 1.3 | 0.9 |
| Siemens | 0.8 | 0.8 | 0.7 | 0.7 | 1.1 | 1.1 | 1.3 | 0.9 |
| Thermo Scientific | 1.2 | 1.1 | 1.1 | 1.5 | 1.3 | NA | 1.1 | 1.0 |
| Median | 0.8 | 1.0 | 0.7 | 1.0 | 1.0 | 0.8 | 1.3 | 0.8 |
| Peer CV Mid (%) | **CHOL** | **CREA** | **GLU** | **HDL** | **LDL** | **PHOS** | **TRIGL** | **UA** |
| Abbott | 0.9 | 2.1 | 2.0 | 4.0 | 1.9 | 1.4 | 2.6 | 2.0 |
| Beckman | 2.5 | 1.9 | 2.2 | 2.2 | NA | 1.3 | 3.4 | 1.3 |
| Ortho | 2.7 | 2.8 | 1.4 | 1.9 | NA | 2.4 | 1.6 | 0.8 |
| Roche | 1.8 | 3.4 | 1.9 | 2.2 | 1.8 | 2.6 | 1.5 | 2.3 |
| Siemens | 1.6 | 2.2 | 1.9 | 2.8 | 3.1 | 1.7 | 2.6 | 3.1 |
| Thermo Scientific | 2.0 | 2.5 | 2.2 | 2.3 | 2.9 | NA | 2.1 | 1.6 |
| Median | 1.9 | 2.3 | 2.0 | 2.3 | 2.4 | 1.7 | 2.3 | 1.8 |
| Peer CV Low (%) | **CHOL** | **CREA** | **GLU** | **HDL** | **LDL** | **PHOS** | **TRIGL** | **UA** |
| Abbott | 1.0 | 3.3 | 2.2 | 5.8 | 1.6 | 2.3 | 6.9 | 2.2 |
| Beckman | 2.5 | 2.8 | 2.0 | 2.7 | NA | 2.0 | 6.0 | 1.4 |
| Ortho | 2.4 | 5.3 | 1.8 | 3.8 | NA | 3.0 | 2.1 | 2.0 |
| Roche | 2.3 | 3.2 | 2.3 | 2.6 | 2.4 | 3.1 | 3.9 | 2.6 |
| Siemens | 1.8 | 2.5 | 2.0 | 4.1 | 3. 2 | 2.8 | 5.9 | 4.1 |
| Thermo Scientific | 2.4 | 3.0 | 2.3 | 2.8 | 1.9 | NA | 4.4 | 1.9 |
| Median | 2.3 | 3.1 | 2.1 | 3.3 | 2.2 | 2.8 | 5.2 | 2.1 |
| Peer CV High (%) | **CHOL** | **CREA** | **GLU** | **HDL** | **LDL** | **PHOS** | **TRIGL** | **UA** |
| Abbott | 1.0 | 1.4 | 1.9 | 3.0 | 2.2 | 1.2 | 1.3 | 2.0 |
| Beckman | 2.5 | 1.5 | 2.4 | 2.2 | NA | 1.2 | 2.7 | 1.2 |
| Ortho | 2.9 | 1.5 | 1.9 | 2.2 | NA | 2.3 | 1.6 | 0.7 |
| Roche | 1.7 | 3.8 | 1.5 | 2.2 | 1.6 | 2.5 | 0.7 | 2.3 |
| Siemens | 1.7 | 2.3 | 1.9 | 2.1 | 3.1 | 1.5 | 2.1 | 2.5 |
| Thermo Scientific | 2.1 | 2.3 | 2.2 | 2.1 | 3.6 | NA | 3.0 | 1.5 |
| Median | 1.9 | 1.9 | 1.9 | 2.2 | 2.7 | 1.5 | 1.9 | 1.8 |
| Peer TE (%) | **CHOL** | **CREA** | **GLU** | **HDL** | **LDL** | **PHOS** | **TRIGL** | **UA** |
| Abbott | 2.1 | 4.5 | 4.1 | 8.1 | 4.3 | 3.1 | 5.7 | 4.1 |
| Beckman | 5.0 | 3.9 | 4.5 | 4.6 | NA | 3.0 | 6.8 | 2.7 |
| Ortho | 5.8 | 6.1 | 3.1 | 5.0 | NA | 4.9 | 4.0 | 2.2 |
| Roche | 3.9 | 7.4 | 4.1 | 4.7 | 3.9 | 5.5 | 3.9 | 4.9 |
| Siemens | 3.5 | 4.5 | 3.9 | 5.7 | 6.5 | 4.0 | 5.7 | 6.4 |
| Thermo Scientific | 4.6 | 5.3 | 4.7 | 5.4 | 6.2 | NA | 4.7 | 3.7 |
| Median | 4.2 | 4.9 | 4.1 | 5.2 | 5.3 | 4.0 | 5.2 | 3.9 |

\*NA: not applicable.

**Supplemental Data Table 8.** Regression and correlation data of the peer group results against the AMTM/REF.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cholesterol | Slope | Intercept | *r* |  | Creatinine | Slope | Intercept | *r* |
| Abbott | 1.016 | 0.040 | 0.998 |  | Abbott | 1.011 | 2.0 | 0.999 |
| Beckman | 1.059 | -0.093 | 0.998 |  | Beckman | 1.025 | -1.6 | 0.998 |
| Ortho | 1.012 | -0.050 | 0.994 |  | Ortho | 1.004 | 0.7 | 0.994 |
| Roche | 1.005 | 0.088 | 0.998 |  | Roche | 1.028 | -0.1 | 0.999 |
| Siemens | 0.986 | 0.061 | 0.998 |  | Siemens | 0.982 | -1.9 | 0.998 |
| Thermo Scientific | 1.033 | -0.033 | 0.998 |  | Thermo Scientific | 1.021 | -1.8 | 0.999 |
| Glucose | **Slope** | **Intercept** | ***r*** |  | **HDL-Chol.** | **Slope** | **Intercept** | ***r*** |
| Abbott | 1.008 | -0.053 | 1.000 |  | Abbott | 0.934 | 0.066 | 0.988 |
| Beckman | 1.012 | 0.040 | 1.000 |  | Beckman | 0.961 | 0.000 | 0.994 |
| Ortho | 0.981 | -0.051 | 0.999 |  | Ortho | 1.016 | -0.047 | 0.988 |
| Roche | 0.996 | -0.011 | 1.000 |  | Roche | 1.147 | -0.155 | 0.985 |
| Siemens | 0.999 | 0.058 | 1.000 |  | Siemens | 1.061 | -0.063 | 0.991 |
| Thermo Scientific | 1.004 | 0.017 | 1.000 |  | Thermo Scientific | 1.150 | -0.221 | 0.983 |
| LDL-Chol. | **Slope** | **Intercept** | ***r*** |  | **Phosph.** | **Slope** | **Intercept** | ***r*** |
| Abbott | 1.033 | -0.036 | 0.963 |  | Abbott | 0.998 | 0.003 | 0.999 |
| Beckman | 1.018 | 0.416 | 0.958 |  | Beckman | 0.998 | 0.008 | 0.999 |
| Ortho | 1.110 | -0.283 | 0.930 |  | Ortho | 0.939 | 0.165 | 0.994 |
| Roche | 1.026 | 0.015 | 0.964 |  | Roche | 1.004 | -0.012 | 0.998 |
| Siemens | 1.031 | -0.056 | 0.955 |  | Siemens | 1.006 | 0.005 | 0.999 |
| Thermo Scientific | 1.015 | -0.039 | 0.973 |  | Thermo Scientific | 0.994 | -0.004 | 0.993 |
| Trigl. | **Slope** | **Intercept** | ***r*** |  | **Uric acid** | **Slope** | **Intercept** | ***r*** |
| Abbott | 0.994 | -0.023 | 0.999 |  | Abbott | 1.076 | -27.7 | 0.999 |
| Beckman | 1.061 | -0.040 | 0.999 |  | Beckman | 1.017 | -9.4 | 0.999 |
| Ortho | 1.009 | -0.043 | 0.997 |  | Ortho | 0.967 | 2.407 | 0.999 |
| Roche | 0.981 | -0.028 | 0.999 |  | Roche | 0.993 | -8.7 | 0.999 |
| Siemens | 1.018 | -0.043 | 0.999 |  | Siemens | 1.019 | -3.4 | 0.999 |
| Thermo Scientific | 1.037 | -0.060 | 0.999 |  | Thermo Scientific | 1.092 | -8.9 | 0.999 |

## Supplemental Data Table 9. Assay AMTM/REF estimates (REF estimates: cholesterol, creatinine, and uric acid, only). The fixed limits are tabulated because they are analyte-specific by accounting for the uncertainty of the AMTM/REF target and inflation of Sy/x due to combined imprecision effects. The underlined figures indicate that the limits were exceeded.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Median Sy/x (%) | CHOL | CREA | GLU | HDL | LDL | PHOS | TRIGL | UA |  |  |  |  |  |  |  |  |
| Limits | 2 | 2 | 2 | 3 | 3 | 2 | 2.5 | 2 |  |  |  |  |  |  |  |  |
| Abbott | 1.2 | 0.9 | 0.8 | 2.5 | 1.5 | 0.8 | NA | 1.2 |  |  |  |  |  |  |  |  |
| Beckman | 1.1 | 1.5 | 0.8 | 2.0 | NA | 0.9 | NA | 1.2 |  |  |  |  |  |  |  |  |
| Ortho | 2.2 | 2.8 | 1.1 | 2.8 | NA | 1.5 | NA | 1.4 |  |  |  |  |  |  |  |  |
| Roche | 1.4 | 2.0 | 0.8 | 2.4 | 3.1 | 1.3 | NA | 1.3 |  |  |  |  |  |  |  |  |
| Siemens | 1.2 | 1.6 | 0.7 | 2.6 | 2.8 | 1.2 | NA | 1.2 |  |  |  |  |  |  |  |  |
| Thermo Scientific | 1.5 | 1.5 | 1.2 | 2.9 | 4.3 | NA | NA | 1.3 |  |  |  |  |  |  |  |  |
| Median | 1.3 | 1.5 | 0.8 | 2.6 | 2.9 | 1.2 | 2.0 | 1.2 |  |  |  |  |  |  |  |  |
| Bias Mid (%) | **CHOL** | CI\* | **CREA** | CI | **GLU** | CI | **HDL** | CI | **LDL** | CI | **PHOS** | CI | **TRIGL** | CI | **UA** | CI |
| Limits | 4 |  | 4 |  | 4.5 |  | 4.5 |  | 4.5 |  | 4.5 |  | 4.5 |  | 4 |  |
| Abbott | 2.5 | 0.5 | 3.7 | 2.1 | -0.2 | 1.1 | -1.0 | 2.3 | 1.5 | 1.6 | 0.0 | 0.9 | 0.1 | 1.5 | -1.2 | 1.2 |
| Beckman | 3.8 | 1.3 | 0.5 | 1.3 | 1.9 | 1.1 | -3.2 | 1.1 | NA | NA | 0.5 | 0.7 | 5.4 | 1.9 | -1.3 | 0.7 |
| Ortho | 0.0 | 1.5 | 1.2 | 1.5 | -2.8 | 0.8 | -1.1 | 1.1 | NA | NA | 8.9 | 1.4 | -0.3 | 1.1 | -2.6 | 0.5 |
| Roche | 2.5 | 1.0 | 2.7 | 1.8 | -0.6 | 1.1 | 3.9 | 1.4 | 2.0 | 1.1 | -0.7 | 1.5 | -1.6 | 0.9 | -3.4 | 1.3 |
| Siemens | 0.0 | 0.8 | -4.2 | 1.2 | 1.0 | 1.0 | 2.2 | 1.5 | -0.3 | 1.8 | 1.1 | 0.9 | 0.7 | 1.5 | 0.8 | 1.7 |
| Thermo Scientific | 2.6 | 1.4 | -0.3 | 1.6 | 0.7 | 1.5 | -0.7 | 1.5 | -0.1 | 3.4 | NA | NA | 1.0 | 1.6 | 6.4 | 1.2 |
| Bias Low (%) | **CHOL** | CI | **CREA** | CI | **GLU** | CI | **HDL** | CI | **LDL** | CI | **PHOS** | CI | **TRIGL** | CI | **UA** | CI |
| Limits | 4 |  | 4 |  | 4.5 |  | 4.5 |  | 4.5 |  | 4.5 |  | 4.5 |  | 4 |  |
| Abbott | 3.0 | 0.6 | 5.1 | 3.3 | -0.4 | 1.3 | 5.5 | 3.5 | 2.7 | 1.3 | 0.1 | 1.4 | 2.5 | 3.9 | -4.9 | 1.2 |
| Beckman | 2.7 | 1.3 | -0.6 | 1.8 | 2.1 | 1.1 | 0.3 | 1.5 | NA | NA | 0.8 | 1.1 | 5.8 | 3.3 | -2.6 | 0.8 |
| Ortho | -0.6 | 1.3 | 1.6 | 2.9 | -3.0 | 1.0 | 0.0 | 2.2 | NA | NA | 14.6 | 1.9 | -0.9 | 1.5 | -2.2 | 1.1 |
| Roche | 3.5 | 1.4 | 2.6 | 1.9 | -0.7 | 1.3 | -0.3 | 1.5 | 5.2 | 1.6 | -1.1 | 1.8 | 0.0 | 2.2 | -4.6 | 1.5 |
| Siemens | 0.7 | 0.9 | -5.5 | 1.4 | 1.2 | 1.1 | 2.8 | 2.2 | 0.0 | 1.9 | 1.3 | 1.4 | 0.3 | 3.2 | 0.4 | 2.2 |
| Thermo Scientific | 2.2 | 1.6 | -1.5 | 2.0 | 0.8 | 1.6 | -8.3 | 1.6 | 2.1 | 2.2 | NA | NA | -1.9 | 3.1 | 5.2 | 1.4 |
| Bias High (%) | **CHOL** | CI | **CREA** | CI | **GLU** | CI | **HDL** | CI | **LDL** | CI | **PHOS** | CI | **TRIGL** | CI | **UA** | CI |
| Limits | 4 |  | 4 |  | 4.5 |  | 4.5 |  | 4.5 |  | 4.5 |  | 4.5 |  | 4 |  |
| Abbott | 2.3 | 0.6 | 2.8 | 1.4 | 0.2 | 1.1 | -5.4 | 1.6 | 0.9 | 1.8 | 0.0 | 0.8 | -1.0 | 0.8 | 1.9 | 1.2 |
| Beckman | 4.4 | 1.3 | 1.1 | 1.0 | 1.6 | 1.3 | -5.6 | 1.1 | NA | NA | 0.4 | 0.7 | 5.3 | 1.5 | -0.3 | 0.7 |
| Ortho | 0.4 | 1.7 | 0.9 | 0.8 | -2.4 | 1.1 | -1.9 | 1.2 | NA | NA | 6.7 | 1.3 | 0.0 | 1.1 | -2.8 | 0.4 |
| Roche | 1.9 | 1.0 | 2.7 | 2.2 | -0.6 | 0.9 | 6.7 | 1.4 | 0.4 | 1.0 | -0.5 | 1.4 | -2.3 | 0.4 | -2.4 | 1.3 |
| Siemens | -0.4 | 0.9 | -3.4 | 1.3 | 0.5 | 1.0 | 1.7 | 1.1 | -0.4 | 1.8 | 1.1 | 0.8 | 1.0 | 1.2 | 1.2 | 1.3 |
| Thermo Scientific | 2.8 | 1.4 | 0.5 | 1.5 | 0.6 | 1.5 | 4.4 | 1.5 | -1.3 | 4.1 | NA | NA | 2.3 | 2.2 | 7.3 | 1.1 |
| TE (%) | **CHOL** | **CREA** | **GLU** | **HDL** | **LDL** | **PHOS** | **TRIGL** | **UA** |  |  |  |  |  |  |  |  |
| Limits | 7.5 | 7.5 | 8 | 9.5 | 9.5 | 8 | 8.5 | 7.5 |  |  |  |  |  |  |  |  |
| Abbott | 4.5 | 5.2 | 1.5 | 5.1 | 4.1 | 1.3 | 4.3 | 3.2 |  |  |  |  |  |  |  |  |
| Beckman | 5.6 | 2.9 | 3.3 | 6.4 | NA | 1.9 | 9.2 | 3.2 |  |  |  |  |  |  |  |  |
| Ortho | 3.6 | 5.8 | 4.5 | 5.8 | NA | 11.4 | 6.1 | 4.9 |  |  |  |  |  |  |  |  |
| Roche | 4.8 | 5.9 | 1.9 | 7.7 | 7.2 | 2.8 | 4.1 | 5.5 |  |  |  |  |  |  |  |  |
| Siemens | 1.9 | 6.8 | 2.2 | 6.5 | 4.8 | 3.1 | 3.3 | 2.8 |  |  |  |  |  |  |  |  |
| Thermo Scientific | 5.1 | 2.7 | 2.7 | 5.5 | 7.2 | NA | 3.7 | 8.4 |  |  |  |  |  |  |  |  |

\*CI: confidence interval; they were calculated from the biases of the peer laboratories

**Supplemental Data Figure 2**: Assay % difference for cholesterol, creatinine, glucose, HDL-cholesterol versus AMTM or REF target values, as applicable, for Abbott (red diamond), Beckman (blue square), Ortho (black triangle), Roche (yellow circle), Siemens (red square), and Thermo (blue diamond). These figures are identical to the corresponding figures in the main text, apart from the SI-units used in the x-axis. The red-broken bias limits are those listed in Supplemental Data Table 5; the blue-broken limits are optimal bias limits from biological variation (Supplemental Data Table 6) (24, 25).



**Supplemental Data Figure 3**: Assay % difference for LDL-cholesterol, phosphate, triglyceride, and uric acid versus AMTM or REF target values, as applicable, for Abbott (red diamond), Beckman (blue square), Ortho (black triangle), Roche (yellow circle), Siemens (red square), and Thermo (blue diamond). The red and blue broken limits and units in the x-axis are the same as described for Supplemental Data Figure 2.

