**Appendix Table E2. Studies reporting correlation results between alternative platelet reactivity assays**

| **Author****Year****Country****PMID** | **Assays evaluated****(agonist)****[brand name, manufacturer]** | **Sample** **size** | **Results** |
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| Cuisset2009France19761935 | LTA (ADP 10 μmol/L) [PAP4, Biodata Corporation, Wellcome, Paris, France]VASP phosphorylation assay(PGE1 ± ADP 10 μmol/L)[Platelet VASP, Diagnostica Stago [Biocytex], Asnieres, France]; using flow cytometry [Beckman Coultronics, Margency, France] | 104 patients measured with both assays | Correlation of maximal intensity of aggregation (PAP4) with VASP PRI (flow cytometry) = 0.55; P < 0.01 |
| Michelson2009USA19435740 | VASP phosphorylation assay(PGE1 ± ADP, concentration not reported)[BioCytex, Marseilles, France]; using flow cytometry [FACSCalibur, Becton Dickinson, San Jose, California]LTA(ADP 5 μmol/L and 20 μmol/L) [not reported] | 125 using the VASP assay; of these 31 were also evaluated with LTA (both ADP concentrations). Measurements at baseline, 1-2 h post PCI, and 30 days (clopidogrel and prasugrel treated subjects) were analyzed together and observations were treated as independent. | Spearman rho between VASP assay and MPA (ADP 20 μmol/L)= 0.724; P<0.001Spearman rho between VASP assay and MPA (ADP 5 μmol/L)= 0.655; P<0.001 |
| Antonino2009USA19463513 | LTA(ADP 5 μmol/L and 20 μmol/L) [Chronolog Lumi-Aggregometer 490-4D, CHRONO-LOG Corporation, Havertown, Pennsylvania]Surface expression of P-selectin(ADP, 5μmol/L)Using flow cytometry [Immunocytometry Systems, Becton Dickinson and Company, Franklin Lakes, New Jersey]Surface expression of activated IIb/IIIa receptors(ADP, concentration NR)Using flow cytometry [Immunocytometry Systems, Becton Dickinson and Company, Franklin Lakes, New Jersey] | 110 patients measured for aggregation with both ADP concentrations and for platelet marker expression in response to ADP using flow cytometry | Spearman rho between platelet aggregation using 5 and 20 μmol/L ADP= 0.866; P<0.001Spearman rho between platelet aggregation using 20 μmol/L ADP and ADP-induced P-selectin expression = 0.296; P=0.04Spearman rho between platelet aggregation using 20 μmol/L ADP and ADP-induced activated IIb/IIIa receptor expression = 0.428; P<0.001 |
| Paniccia2009Italy19461090 | Impedance aggregometry(ADP, 10 μmol/L)[Multiplate analyzer, Dynabyte, Munich, Germany]LTA(ADP, 10 μmol/L)[APACT-4004 aggregometer, LABiTec, Ahrensburg, Germany]High shear platelet function(collagen/ADP)[PFA-100, Dade-Behring, Marburg, Germany] | Multiplate analyzer and LTA (ADP as agonist): 297Multiplate analyzer and PFA-100 (ADP as agonist): 111PFA-100 and LTA (ADP as agonist): 111 | Spearman rho between the Multiplate analyzer and LTA (ADP as agonist) = 0.73); P<0.001Spearman rho between the Multiplate analyzer and PFA-100 (ADP as agonist) = -0.40; P<0.001Spearman rho between the PFA-100 and LTA (ADP as agonist) = -0.51; P<0.001 |
| Frere2008France18394438 | LTA (ADP 10 μmol/L) [PAP4, Biodata Corporation, Wellcome, Paris, France]VASP phosphorylation assay(PGE1 ± ADP, 10μg/L)[Biocytex, Asnieres, France]; using flow cytometry [EPICS XL-MCL, Beckman Coultronics, Margency, France]Surface expression of P-selectin(ADP 10μM/L)Using flow cytometry [EPICS XL-MCL, Beckman Coultronics, Margency, France] | 603 patients for PAP4; 455 measurements for PRI-VASP, and 600 for ADP-stimulated P-selectin expression  | Pearson correlation between LTA (PAP4) and VASP assay (PRI) = 0.62; P<0.001Pearson correlation between VASP assay (PRI) and ADP-induced P-selectin expression = 0.52; P<0.001Pearson correlation between LTA (PAP4) and ADP-induced P-selectin expression = 0.36; P<0.001 |
| Marcucci2007Italy17938810 | LTA(ADP, 2 and 10 μM)[APACT 4 aggregometer, Helena Laboratories Italia s.p.a., Milan, Italy] | 367 subjects measured with two agonist concentrations  | Correlation between maximal and late aggregation with ADP 2 μM = 0.96; P<0.001Correlation between maximal and late aggregation with ADP 10 μM = 0.95; P<0.001  |
| Frere2007France17938809 | LTA (ADP 10 μM) [PAP4 Aggregometer, Biodata Corporation, Wellcome, Paris, France]VASP phosphorylation assay(PGE1 ± ADP, concentration not reported)[Platelet VASP, Diagnostica Stago (BioCytex), Asnieres, France]; using flow cytometry [EPICS XL-MCL, Beckman Coultronics, Margency, France] | 195 patients measured with both assays | Pearson correlation between LTA and VASP phosphorylation assay = 0.61; P<0.001 |
| Cuisset2007France17337040 | LTA (ADP 10 μmol/L) [PAP4 Aggregometer, Biodata Corporation, Wellcome, Paris, France]VASP phosphorylation assay(PGE1 ± ADP, concentration not reported)[Platelet VASP, Diagnostica Stago (BioCytex), Asnieres, France]; using flow cytometry [EPICS XL-MCL, Beckman Coultronics, Margency, France]Surface expression of P-selectin(ADP 10 μmol/mL final concentration)Using flow cytometry [EPICS XL-MCL, Beckman Coultronics, Margency, France] | 597 patients measured with LTA and flow cytometry for P-selectin expression; 454 of those patients were also measured the VASP phosphorylation assay  | Correlation between LTA and VASP phosphorylation assay = 0.64; P<0.001Correlation between P-selectin expression and LTA = 0.50; P<0.001Correlation between P-selectin expression and VASP phosphorylation assay = 0.58; P<0.001 |
| Paniccia2007Italy17723123 | LTA(ADP, 2 μmol/L and 10 μmol/L)[APACT-4 aggregometer, LABiTec, Ahrensburg, Germany]High shear platelet function(collagen/ADP)[PFA-100, Dade-Behring, Marburg, Germany]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA]VASP phosphorylation assay(PGE1 ± ADP; for ADP, the final concentration was 10 μmol/L)[Platelet VASP, Diagnostica Stago (BioCytex), Marseille, France]; using flow cytometry [EPICS XL-MCL, Beckman Coultronics, Margency, France] | 1267 patients measured with LTA (ADP 2 μmol/L and 10 μmol/L) and VerifyNow (P2Y12 assay); 626 patients measured with PFA-100 (collagen/ADP cartridge); 115 patients measured with VASP phosphorylation assay | Spearman correlation between LTA (ADP 2 μmol/L) and PFA-100 collagen/ADP cartridge) = -0.07; P = NSSpearman correlation between LTA (ADP 10 μmol/L) and PFA-100 collagen/ADP cartridge) = -0.11; P < 0.01Spearman correlation between LTA (ADP 2 μmol/L) and VerifyNow (P2Y12 assay) = 0.62; P < 0.0001Spearman correlation between LTA (ADP 10 μmol/L) and VerifyNow (P2Y12 assay) = 0.64; P < 0.0001Spearman correlation between VerifyNow (P2Y12 assay) and PFA-100 (collagen/ADP cartridge) = -0.09; P < 0.05Spearman correlation between LTA (ADP 2 μmol/L) and VASP phosphorylation assay = 0.47; P < 0.001Spearman correlation between LTA (ADP 10 μmol/L) and VASP phosphorylation assay = 0.50; P < 0.0001Spearman correlation between VerifyNow (P2Y12 assay; PRU units) and VASP phosphorylation assay = 0.52; P < 0.001 |
| Bliden2007USA17291930 | LTA (ADP 10 μmol/L) [PAP4 Aggregometer, Biodata Corporation, Wellcome, Paris, France]TEG(ADP 2μmol)[Thromboelastograph Hemostasis Analyzer with Platelet Mapping, Haemoscope Corp., Niles, Illinois] | 100 patients measured with both tests | Pearson correlation between LTA and TEG = 0.82; P<0.0001 |
| Cuisset2007France17264949 | LTA (ADP 10 μM) [PAP4 Aggregometer, Biodata Corporation, Wellcome, Paris, France]VASP phosphorylation assay(PGE1 ± ADP, concentration not reported)[Platelet VASP, Diagnostica Stago (BioCytex), Asnieres, France]; using flow cytometry [EPICS XL-MCL, Beckman Coultronics, Margency, France]Surface expression of P-selectin(ADP 10 μM final concentration)Using flow cytometry [EPICS XL-MCL, Beckman Coultronics, Margency, France] | LTA results were available for 601 patients; VASP phosphorylation assay results were available for 454 patients; P-selectin expression results were available from 599 patients | Correlation between LTA and VASP phosphorylation = 0.64; P<0.001Correlation between ADP-induced P-selectin expression and LTA = 0.50; P<0.001Correlation between ADP-induced P-selectin expression and VASP phosphorylation = 0.58; P<0.001 |
| Van Werkum2006Netherlands16938130 | LTA(ADP, 20 μmol/L)[NR]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | 211 patients | Linear regression of LTA “peak aggregation” versus VerifyNow PRU:Y = 0.1289\*X + 37.551R = 0.73; P<0.01Linear regression of LTA “late aggregation” versus VerifyNow PRU:Y = 0.2386\*X – 8.5151 R = 0.75; P<0.01 |
| Gurbel2005USA16286166 | LTA(ADP 5 μmol/L and 20 μmol/L) [Chronolog Aggregometer model 490, Havertown, Pennsylvania]Surface expression of activated IIb/IIIa receptors(ADP, 5 μmol/L)Using flow cytometry [FACScan flow cytometer, Becton Dickinson]VASP phosphorylation assay(PGE1 ± ADP, concentration not reported)[Platelet VASP-FCM kit, Biocytex Inc., Marseille, France]; using flow cytometry [additional details NR] | 120 patients | Pearson correlation between LTA assays (ADP 5 μmol/L and 20 μmol/L) = 0.93; P = NRPearson correlation between VASP phosphorylation assay and LTA (ADP 20 μmol/L) = 0.57; P=0.019Pearson correlation between ADP-stimulated IIb/IIIa receptor expression and LTA (ADP 20 μmol/L) = 0.29; P=0.23 |
| Mobley2004USA14969622 | Optical platelet aggregometry(ADP, 1 μM)[Dual Channel Aggregometer; Chrono-Log Corp., Havertown, PA]TEG(ADP, 1 μM) [Thromboelastograph assay, Hemoscope, additional details NR]PlateletWorks(ADP, 1 μM)[PlateletWorks assay, Ichor, additional details NR] | 50 patients measured with all 3 assays | Correlation between optical platelet aggregometry and TEG; P<0.0003Correlation between optical platelet aggregometry and PlateletWorks; P=0.05  |
| Muller2003Germany12719773 | Optical aggregometry(ADP 5 and 20 μmol/L)[additional details NR] | 105 patients | Correlation between optical aggregometry using 5 and 20 μmol/L ADP = 0.820; P<0.001 |
| Bliden2011International(USA and UK)21742103 | LTA(ADP 20 μM) [Chronolog Aggregometer model 490-4D, Havertown, PA]Platelet agglutination assay(ADP cartridges)[NR]VASP phosphorylation assay(PGE1 ± ADP, concentration NR)[Platelet VASP-FCM kit, Biocytex Inc., Marseille, France]; using flow cytometry [additional details NR] | 103 patients on clopidogrel and 106 on ticagrelor; platelet function was evaluable in 201 patients measured with the 3 assays | Pearson correlation between LTA and VerifyNow, for patients on clopidogrel = 0.6644; P<0.001Pearson correlation between LTA and VASP phosphorylation, for patients on clopidogrel = 0.4304; P<0.001Pearson correlation between LTA and VerifyNow, for patients on ticagrelor = 0.7753; P<0.001Pearson correlation between LTA and VASP phosphorylation, for patients on ticagrelor = 0.6356; P<0.001 |
| Godino2009Italy19419580 | ADP-stimulated IIb/IIIa receptor AND P-selectin expression (considered jointly as the reference standard)(ADP, 20 μM)Using flow cytometry[FC500; Beckman Coulter, S.p.A., Cassina De’ Pecchi, Milan, Italy]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | 52 patients measured both for ADP-stimulated IIb/IIIa receptor and P-selectin expression and using the VerifyNow assay | Spearman correlation between ADP-stimulated P-selectin expression and VerifyNow (% inhibition) = -0.67 (95% CI -0.82, -0.41); P<0.0001Spearman correlation between ADP-stimulated IIb/IIIa receptor expression and VerifyNow (% inhibition) = -0.49 (95% CI -0.67, -0.24); P<0.002 |
| Collet2008France18765393 | LTA(ADP 5, 10, 20 and 50 μmol/L) [Chronolog Aggregometer model 490-4D, Chrono-Log Corp., Kordia, Netherlands]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | 166 patients measured at different timepoints (some patients did not have measurements available at all time points) | Spearman correlation between LTA and VerifyNow at 4 h post clopidogrel = 0.73; P<0.0001Spearman correlation between LTA and VerifyNow at 24 h post clopidogrel = 0.83; P<0.0001 |
| Lau2002USA17890800 | LTA(ADP 5, 10, 20 and 50 μmol/L) [Chronolog platelet aggregometer model 490-4D, Chronolog Corporation, Haverton, PA]Plateletworks(ADP, 1 μM)[PlateletWorks assay, ICHOR hematology analyzer, Array Medical, Somerville, NJ] | 225 measurements using ADP as the agonist [the measurements used in these analyses were performed across different patients populations; it was not clear if all patients received clopidogrel; a minority of measurements (<20%) were performed on populations that did not meet our eligibility criteria] | Pearson correlation between Plateletworks and LTA (ADP) = 0.82; P<0.01 (225 samples)Spearman correlation between Plateletworks and LTA (ADP) = 0.80; P<0.01 (225 samples) |
| Campo2010International (Italy and Spain)20951320 | Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | 840 patients represented the “final patient population”; 468 were screened for clopidogrel response | Correlation between % platelet inhibition and PRU measurements from the VerifyNow assay = -0.86 [note: the correlation in the paper is reported as -86, which is an impossible value; based on Figure 2 of the paper -0.86 appears to be the correct value] |
| Gurbel2010USA19817997 | LTA(ADP 5 μmol/L, 10 μmol/L and 20 μmol/L) [Chronolog Aggregometer model 490-4D, Havertown, PA]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA]TEG(ADP, concentration not reported) [Thromboelastograph assay, Haemoscope Corporation, Niles, IL]VASP phosphorylation assay(PGE1 ± ADP, concentration not reported)[Platelet VASP-FCM kit, Diagnostic Stago (Biocytex), Asnieres, France]; using flow cytometry [additional details NR] | 20 patients on clopidogrel therapy who received a single dose of elinogrel (and were then continued on clopidogrel therapy) underwent multiple measurements over time (6 time points), with multiple assays. In correlation analyses repeat measurements were considered as independent observations. | Correlation between LTA (ADP 5 μM, maximum platelet aggregation) with LTA (ADP 5 μM, final platelet aggregation) = 0.863; P<0.0001Correlation between LTA (ADP 5 μM, maximum platelet aggregation) with LTA (ADP 10 μM, maximum platelet aggregation) = 0.736; P<0.0001Correlation between LTA (ADP 5 μM, maximum platelet aggregation) with LTA (ADP 20 μM, maximum platelet aggregation) = 0.892; P<0.0001Correlation between LTA (ADP 5 μM, maximum platelet aggregation) with VerifyNow = 0.720; P<0.0001Correlation between LTA (ADP 5 μM, maximum platelet aggregation) with VASP assay = 0.601; P<0.0001Correlation between LTA (ADP 5 μM, maximum platelet aggregation) with TEG assay = 0.470; P<0.0001  |
| Gori2008Italy19132241 | LTA(ADP, 10 μmol/L)[APACT-4, Helena Laboratories, Italy]High shear platelet function(collagen/ADP)[PFA-100, Dade-Behring, Marburg, Germany] | 746 patients were assessed with LTA using ADP as the agonist; 398 were assessed with PFA-100 using collagen/ADP as the agonist | Correlation between PFA-100 (collagen/ADP) and LTA (ADP) = -0.28; P<0.001 [results on 398 patients with measurements available on both assays] |
| Paniccia2011Italy21192314 | LTA(ADP, 2 μmol/L, 5 μmol/L, 10 μmol/L, and 20 μmol/L)[APACT-4004 aggregometer, LABiTec, Ahrensburg, Germany]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | 5 samples from each of 10 patients of the assessment of reliability; samples from 466 patients for the assessment of agreement [data from 46 healthy individuals (~9% of the total population) were also included in the assessment of agreement] | Spearman correlation between LTA using ADP 2 μmol and 5 μmol = 0.89; P < 0.0001Spearman correlation between LTA using ADP 2 μmol and 10 μmol = 0.90; P < 0.0001Spearman correlation between LTA using ADP 2 μmol and 20 μmol = 0.90; P < 0.0001Spearman correlation between LTA using ADP 5 μmol and 10 μmol = 0.88; P < 0.0001Spearman correlation between LTA using ADP 5 μmol and 20 μmol = 0.88; P < 0.0001Spearman correlation between LTA using ADP 10 μmol and 20 μmol = 0.98; P < 0.0001 |
| Wenaweser2010Switzerland20664903 | LTA(ADP, 5 μmol and 20 μmol)[APACT, Endotell AG, Allschwil, Switzerland]Impedance aggregometry (multiple electrode)(ADP, 2 μM)[Multiplate analyzer, Dynabyte, Munich, Germany] | 77 patients measured with both assays and different concentrations of agonists at 2 timepoints (both under clopidogrel therapy) | Pearson correlation between LTA using ADP 5μmol and 20 μmol = 0.892 at the first timepointPearson correlation between LTA using ADP 5μmol and 20 μmol = 0.933 at the second timepointPearson correlation between LTA (ADP 20 μmol) and Multiplate analyzer (AUC) = 0.563 at the first timepointPearson correlation between LTA (ADP 20 μmol) and Multiplate analyzer (AUC) = 0.0.456 at the second timepoint |
| Paniccia2010Italy20458439 | LTA(ADP, 10 μM)[APACT-4004 aggregometer, LABiTec, Ahrensburg, Germany]Impedance aggregometry(ADP, 10 μM final concentration)[Multiplate analyzer, Dynabyte, Munich, Germany]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | Samples from 801 patients measured by 3 assays | Spearman correlation between Multiplate analyzer and LTA = 0.71, P < 0.0001Spearman correlation between Multiplate analyzer and VerifyNow = 0.62; P< 0.0001Spearman correlation between VerifyNow and LTA = 0.70; P < 0.0001 |
| Ko2011Korea21315223 | Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, additional details not reported]Impedance aggregometry(ADP, concentration not reported)[Multiplate analyzer, Dynabyte, additional details not reported] | Samples from 222 patients measured with both assays | Spearman correlation between VerifyNow PRU and Multiplate analyzer units = 0.390 (P < 0.001) |
| Gremmel2010Austria20729752 | LTA(ADP 10 μM) [LABiTec, Ahrensburg, Germany]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA]VASP phosphorylation assay(PGE1 ± ADP, concentration not reported)[Platelet VASP, Diagnostic Stago (Biocytex), Marseille, France]; using flow cytometry [FACSCalibur system, Becton Dickinson Biosciences, Vienna, Austria]Impedance aggregometry (multiple electrode)(ADP, 6.4 μM)[Multiplate analyzer, Dynabyte, Munich, Germany]Impact-R(ADP 1.36 M)[DiaMed, Cressier, Switzerland] | Samples from 230 patients measured with 5 assays | Spearman correlation between LTA and VerifyNow = 0.67Spearman correlation between LTA and VASP assay = 0.38Spearman correlation between LTA and Multiplate analyzer = 0.45Spearman correlation between LTA and Impact-R = -0.34Spearman correlation between VerifyNow and VASP assay = 0.38Spearman correlation between VerifyNow and Multiplate analyzer = 0.33Spearman correlation between VerifyNow and Impact-R = -0.5Spearman correlation between VASP assay and Multiplate analyzer = 0.32Spearman correlation between VASP assay and Impact-R = -0.23Spearman correlation between Multiplate analyzer and Impact-R = -0.26[P-values NR] |
| Aradi2010Hungary20642320 | LTA(ADP 5 μM)[CARAT TX4 aggregometer, Carat Diagnostics, Budapest, Hungary]VASP phosphorylation assay(PGE1 ± ADP, concentration not reported)[Platelet VASP/P2Y12 kit, BioCytex, Marseille, France]; using flow cytometry [Beckman Coulter flow cytometer, no additional details reported] | 242 samples from 121 patients, all assessed with both assays | Spearman correlation between maximal and late aggregation LTA measurements = 0.91 (P<0.001)Spearman correlation between maximal aggregation by LTA and PRI VASP measurements = 0.47 (P<0.001)Spearman correlation between late aggregation by LTA and PRI VASP measurements = 0.45 (P<0.001)Spearman correlation between disaggregation by LTA and PRI VASP measurements = -0.44 (P<0.001)Spearman correlation between LTA AUC of the light transmission curve and PRI VASP measurements = 0.50 (P<0.001) |
| Woo2010Korea20890076 | LTA(ADP, 10 μM)[Chronolog impedance aggregometer Series 590, Probe and Co., Endingen Germany]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA]Impedance aggregometry(ADP, 20 μM)[Multiplate analyzer, Dynabyte Medical, Munich, Germany]VASP phosphorylation assay(PGE1 ± ADP, concentration not reported)[Platelet VASP/P2Y12 kit, BioCytex, Marseille, France]; using flow cytometry [no additional details reported] | 66 patients measured with 4 assays | Spearman correlation coefficient between LTA and VerifyNow PRU = -0.5640; P<0.0001Spearman correlation coefficient between LTA and VerifyNow %inhibition = -0.5765; P<0.0001Spearman correlation coefficient between LTA and Multiplate analyzer = -0.3449; P=0.0046Spearman correlation coefficient between LTA and VASP PRI assay = -0.3650; P=0.0026 |
| Madsen2010Canada20224050 | LTA(ADP, 5 μM)[Chrono-Log Lumi Aggregometer, model 810; Chrono-Log Corporation, no additional details provided]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, no additional details provided]TEG(ADP, 2 μmol/L) [TEG Hemostasis Analyzer, Haemonetics Corporation, no additional details provided] | 33 patients, 26 of whom completed all study visits. Patients contributed samples at multiple timepoints and measurements were considered independent. The total number of measurements for each comparison was not reported; as such data are incomplete for the assessment of agreement. Number of measurements available for each comparison was variable (given in the next column) | Authors reported that baseline values only reflected the effect of aspirin. Data were extracted for measurements on clopidogrel (1d to 12 mo). The number of measurements available for each comparison is reported in brackets.Spearman correlation coefficient between TEG ADP inhibition and TEG maximal amplitude = -0.92; P<0.001 [n=78]Spearman correlation coefficient between maximal aggregation by LTA and late aggregation by LTA = 0.88; P<0.001 [n=112]Spearman correlation coefficient between VerifyNow PRU and VerifyNow ADP inhibition = -0.83; P<0.001 [n=87] Spearman correlation coefficient between maximal aggregation by LTA and VerifyNow PRU = 0.66; P<0.001 [n=87]Spearman correlation coefficient between late aggregation by LTA and VerifyNow PRU = 0.64; P<0.001 [n=87] Spearman correlation coefficient between maximal aggregation by LTA and VerifyNow ADP inhibition = -0.53; P<0.001 [n=97]Spearman correlation coefficient between late aggregation by LTA and VerifyNow ADP inhibition = -0.51; P<0.001 [n=97] Spearman correlation coefficient between maximal aggregation by LTA and TEG ADP inhibition = -0.32; P=0.005 [n=79]Spearman correlation coefficient between late aggregation by LTA and TEG ADP inhibition = -0.30; P=0.01 [n=79] Spearman correlation coefficient between TEG ADP inhibition and VerifyNow PRU = -0.11; P=0.39 [n=68]Spearman correlation coefficient between TEG ADP inhibition and VerifyNow ADP inhibition = -0.01; P=0.95 [n=68]  |
| Siller-Matula2010Austria19943879 | VASP phosphorylation assay(PGE1 ± ADP, concentration not reported)[Platelet VASP/P2Y12 kit, BioCytex, Marseille, France]; using flow cytometry [FACSCalibur System, BD Biosciences, Vienna, Austria]Impedance aggregometry(ADP, concentration not reported)[Multiplate analyzer, Dynabyte Medical, Munich, Germany] | 402 samples measured with both assays | Correlation between Multiplate analyzer and VASP assay = 0.34; P<0.001 |
| Bidet2010France20148735 | LTA (ADP 10 μM) [PAP4 aggregometer, Bio/Data Corp., Welcome Laboratories, Paris, France]VASP phosphorylation assay(PGE1 ± ADP, concentration not reported)[Platelet VASP-FCM kit, Diagnostic Stago, Asnieres, France]; using flow cytometry [FC500, Beckman Coulter, Villepinte, France]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | Samples from 100 patients measured with 3 methods | Pearson correlation between results expressed as PRU and %inhibition using the VerifyNow assay = 0.63; P<0.001Pearson correlation between maximum platelet aggregation by LTA and VASP assay = 0.53Pearson correlation between maximum platelet aggregation by LTA and VerifyNow (% inhibition) = -0.63Pearson correlation between VASP assay and VerifyNow (% inhibition) = -0.77Pearson correlation between residual platelet aggregation by LTA and VASP assay = 0.59Pearson correlation between degree of disaggregation by LTA and VASP assay = -0.63Pearson correlation between residual platelet aggregation by LTA and VerifyNow (% inhibition) = -0.75Pearson correlation between degree of disaggregation by LTA and VerifyNow (% inhibition) = 0.77Patients studied during the chronic period (after one month of treatment):Pearson correlation between maximum platelet aggregation by LTA and VASP assay = 0.72Pearson correlation between maximum platelet aggregation by LTA and VerifyNow (% inhibition) = -0.77Pearson correlation between VASP assay and VerifyNow (% inhibition) = -0.83 |
| Cuisset2010France20142119 | LTA (ADP 10 μmol/L) [PAP4, Biodata Corporation, Wellcome, Paris, France]VASP phosphorylation assay(PGE1 ± ADP, concentration not reported)[Platelet VASP-FCM kit, Diagnostic Stago (BioCytex), Asnieres, France]; using flow cytometry [no additional details reported]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | 70 patients with NSTE ACS measured with all assays | Pearson correlation coefficient between platelet aggregation by LTA and PRI VASP = 0.55; P<0.0001Pearson correlation coefficient between platelet aggregation by LTA and VerifyNow PRU = 0.64; P<0.0001Pearson correlation coefficient between PRI VASP and VerifyNow PRU = 0.59; P< 0.0001 |
| Smit2009Netherlands19200163 | Fe-induced platelet aggregation [samples were added to tubes containing 100 mg of steel wool (Haemoscan, Groningen, Netherlands)] and a platelet counter was use to assess platelet aggregation (against a control tube no containing iron). Plateletworks(ADP, 20 μM/L)[PlateletWorks, Helena Laboratories, Beaumont, TX] | 111 patients contributed samples for 3 assays; measurements with the Fe-based assay were performed in duplicate to assess reliability | Duplicate measurements with the iron-based assay to assess reliability: correlation between measurements = 0.94; P<0.001. Correlation coefficient between the iron-based assay and Plateletworks = 0.834; P<0.001The authors stated that they calculated “a Spearman Rho correlation coefficient […] using the Pearson product-moment correlation”. It is unclear which statistical procedure was used.  |
| Gremmel2009Austria19190818 | LTA (ADP 10 μΜ) [ΑPACT 4S Plus aggregometer, LABiTec, Ahrensburg, Germany]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA]VASP phosphorylation assay(PGE1 ± ADP, concentration not reported)[Platelet VASP kit, Diagnostica Stago, BioCytex, Marseille, France]; using flow cytometry [FACSCalibur system, Becton Dickinson, BD Biosciences, Vienna, Austria]Impedance aggregometry(ADP, 6.4 μM)[Multiplate analyzer, Dynabyte Medical, Munich, Germany]Cone and plate analyzer(ADP 1.36 μM)[Impact-R test, DiaMed, Cressier, Switzerland] | 80 patients assessed with 5 assays | Spearman correlation coefficient between LTA and VerifyNow = 0.61; P<0.001Spearman correlation coefficient between LTA and VASP PRI = 0.52; P<0.001Spearman correlation coefficient between LTA and Multiplate analyzer = 0.35; P=0.001Spearman correlation coefficient between LTA and Impact-R = 0.33; P=0.002 |
| Cuisset2009France18499233 | LTA (ADP 10 μmol/L) [PAP4 Aggregometer, Biodata Corporation, Wellcome, Paris, France]VASP phosphorylation assay(PGE1 ± ADP, concentration not reported)[Platelet VASP, Diagnostica Stago (BioCytex), Asnieres, France]; using flow cytometry [EPICS XL-MCL, Beckman Coultronics, Margency, France] | Samples from 635 patients were measured with LTA and 442 with VASP phosphorylation assay (i.e. 442 pairs of measurements were available for the correlation analysis). | Spearman correlation between LTA and VASP assay = 0.61; P<0.001 |
| Thomson2008India19276493 | LTA (ADP 2.5 and 10 μmol/L) [Chronolog aggregometer,Model 810 Aggro/Link, additional information NR] | 69 patients measured with two ADP concentrations: 63 samples were measured at 2.5 μmol/L and 65 at 10 μmol/L. Measurements were performed at 3 timepoints; at all timepoints patients had been exposed to clopidogrel | Correlation between platelet aggregation measured with 2.5 and 10 μmol/L = 0.67 at baselineCorrelation between platelet aggregation measured with 2.5 and 10 μmol/L = 0.55 at 2 hCorrelation between platelet aggregation measured with 2.5 and 10 μmol/L = 0.74 at 24 h |
| Gurbel2008USA19012177 | LTA(ADP 5 μM and 20 μM) [Chronolog Lumi-Aggregometer, Model 490-4D, Havertown, PA] | Samples from 297 patients were measured with both agonist concentrations | Pearson correlation between measurements using the two agonist concentrations = 0.87; P<0.0001 |
| Schafer2008Germany18841284 | LTA (ADP 20 μΜ) [PAP-8, BioData, Horsham, PA]VASP phosphorylation assay(PGE1 ± ADP, 20 μM)[Platelet VASP Test kit, American Diagnostica, Pfungstadt, Germany]; using flow cytometry [FACSCalibur, Becton Dickinson, Heidelberg, Germany]Surface expression of P-selectin(ADP, 20 μM)Using flow cytometry [FACSCalibur, Becton Dickinson, Heidelberg, Germany] | Samples from 100 patients measured with 3 assays | Correlation\* between VASP PRI and LTA = 0.44; P<0.0001Correlation between P-selecting expression and PRI VASP = 0.31; P<0.0001Subgroup analysis by diabetes statusDiabetic patients (n=30): correlation between VASP PRI and LTA = 0.52; P<0.0001Non-diabetic patients (n=70): correlation between VASP PRI and LTA = 0.40; P<0.0001 |
| Shenkman2008Israel18155752 | LTA(ADP, 5.5 μM)[PACKS-4 aggregometer, Helena Laboratories, Beaumont, TX]Impact-R(ADP 1.38 μM)[DiaMed, Cressier, Switzerland] | Samples from 114 patients were measured at baseline and post-treatment; correlation analyses were used to compare % maximal aggregation with change in maximal aggregation from baseline | Bivariate regression of maximal aggregation vs. change in maximal aggregation: r2 = 0.867; P<0.0001. This value corresponds to a correlation of 0.931. |
| Von Beckerath2010Germany19823079 | LTA(ADP 5 μmol/L) [PAP 8 aggregometer, Molab, Berlin, Germany]Impedance aggregometry(ADP 6.4 μmol/L ± PGE1 9.4 μmol/L)[Multiplate analyzer, Dynabyte Medical, Munich, Germany]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA]VASP phosphorylation assay(PGE1 ± ADP, 20 μM)[Platelet VASP, Biocytex, Marseille, France]; using flow cytometry [no additional details provided] | Samples from 60 patients measured with 4 assays (2 different agonist types were used for the Multiplate analyzer) | Spearman correlation between LTA and Multiplate analyzer (ADP) = 0.47; P=NRSpearman correlation between LTA and Multiplate analyzer (ADP + PGE1) = 0.29; P=NRSpearman correlation between LTA and VerifyNow = 0.63; P<0.0001Spearman correlation between LTA and VASP assay = 0.49; P=0.0002Spearman correlation between Multiplate analyzer (ADP) and multiplate analyzer (ADP + PGE1) = 0.83; P<0.0001Spearman correlation between Multiplate analyzer (ADP) and VerifyNow = 0.47; P=0.0004Spearman correlation between Multiplate analyzer (ADP) and VASP assay = 0.35; P=0.0007Spearman correlation between Multiplate analyzer (ADP + PGE1) and VerifyNow = 0.81; P=NRSpearman correlation between Multiplate analyzer (ADP + PGE1) and VASP assay = 0.22; P=NRSpearman correlation between VerifyNow and VASP assay = 0.59; P<0.0001[Results were only extracted for measurements while patients were on clopidogrel] |
| Gurbel2009International (USA and UK)19923168 | LTA(ADP 5 μmol/L and 20 μmol/L) [Chronolog Optical Aggregometer model 490-4D, Chrono-log Corporation, Havertown, PA]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA]VASP phosphorylation assay(PGE1 ± ADP, concentration not reported)[Biocytex Inc, Marseille, France]; using flow cytometry [additional details NR]ADP-stimulated surface expression of activated IIb/IIIa receptors(ADP, 5 μmol/L final concentration)Using flow cytometry [FACScan flow cytometer, Becton Dickinson]ADP-stimulated P-selectin expression(ADP, 5 μmol/L final concentration)Using flow cytometry [FACScan flow cytometer, Becton Dickinson] | 50 patients on clopidogrel | Pearson correlation between inhibition of platelet aggregation with LTA ADP 20 μM (final extent) and LTA ADP 5 μM ADP (maximum) = 0.8805; P < 0.0001Pearson correlation between inhibition of platelet aggregation with LTA ADP 20 μM (final extent) and LTA ADP 5 μM ADP (final) = 0.9067; P < 0.0001Pearson correlation between inhibition of platelet aggregation with LTA ADP 20 μM (final extent) and LTA ADP 20 μM ADP (maximum) = 0.9396; P < 0.0001Pearson correlation between inhibition of platelet aggregation with LTA ADP 20 μM (final extent) and VASP PRI (%) = 0.3973; P < 0.0001Pearson correlation between inhibition of platelet aggregation with LTA ADP 20 μM (final extent) and Inhibition of stimulated P-selectin expression = 0.3586; P < 0.0001Pearson correlation between inhibition of platelet aggregation with LTA ADP 20 μM (final extent) and inhibition of stimulated IIb/IIIa receptor expression = 0.2934; P < 0.0001Pearson correlation between inhibition of platelet aggregation with LTA ADP 20 μM (final extent) and VerifyNow (% inhibition) = 0.7408; P < 0.0001Pearson correlation between inhibition of platelet aggregation with LTA ADP 20 μM (final extent) and VerifyNow (PRU units) = -0.5921; P < 0.0001 |
| Lordkipanidze2009Canada19419755 | LTA (ADP 5 and 20 μΜ) [ChronoLog aggregometer 540 model, Havertown, PA] | 120 patients contributed measurements | Spearman correlation coefficient between late and peak aggregation by LTA ADP 5 μM = 0.853; P<0.0001Spearman correlation coefficient between late and peak aggregation by LTA ADP 20 μM = 0.912; P<0.0001Spearman correlation coefficient between absolute inhibition using late vs. peak aggregation by LTA ADP 5 μM = 0.848; P<0.0001Spearman correlation coefficient between absolute inhibition using late vs. peak aggregation by LTA ADP 20 μM = 0.799; P<0.0001Spearman correlation coefficient between relative inhibition using late vs. peak aggregation by LTA ADP 5 μM = 0.824; P<0.0001Spearman correlation coefficient between relative inhibition using late vs. peak aggregation by LTA ADP 20 μM = 0.857; P<0.0001 |
| Voisin2011France21544318 | Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | 93 patients tested at two timepoints (24-48h and 5-7 w post-PCI) to assess the correlation between different measurements produced by the same assay | Spearman correlation between PRU and %inhibition at 24-48 h post-PCI = -0.93; P < 0.0001Spearman correlation between PRU and %inhibition at 5-7 w post-PCI = -0.86; P < 0.0001Linear regression results (PRU ~ %inhibition) were also reported by Hb quartile:Q1: PRU = 393 – 4.16\*(%inh); r2=0.88Q2: PRU = 352 – 3.56\*(%inh); r2=0.90Q3: PRU = 332 – 3.41\*(%inh); r2=0.85Q4: PRU = 314 – 3.28\*(%inh); r2=0.87 |
| Von Beckerath2006Germany16676093 | LTA (ADP 5 and 20 μΜ) [Chrono-log lumi-aggregometer; Probe & go Labordiagnostica; Endingen, Germany]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | Measurements were obtained in 30 patients, before and after clopidogrel administration (results were not analyzed separately) with all 3 assays; results from VerifyNow were correlated with LTA (using two different ADP concentrations) | “Correlations assessed by linear regression” between VerifyNow PRU units and LTA (ADP 5 μM) = 0.86; P < 0.0001“Correlations assessed by linear regression” between VerifyNow PRU units and LTA (ADP 20 μM) = 0.86; P < 0.0001“Correlations assessed by linear regression” between VerifyNow %inhibition units and LTA (ADP 5 μM) = -0.85“Correlations assessed by linear regression” between VerifyNow %inhibition units and LTA (ADP 5 μM) = -0.84 |
| Sambu2011UK21231856 | TEG(ADP channel, concentrations NR) [TEG Haemostasis system; Haemonetics Corp., MA, USA]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | Analyses were based on “296 timepoints”. In the methods section the patients included in this analyses are reported as follows: 30 on clopidogrel 600 mg × 5 timepoints = 150 measurements; 29 on clopidogrel 900 mg × 5 timepoints = 145 measurements; 20 on dual treatment (presumably at a single time point) = 20 measurements, for a total of 315 measurements. The discrepancy is not clarified in the paper. It is also unclear if a small number of healthy volunteers were included (at most they would represent 17% of the total sample size). | Pearson correlation between TEG ADP channel (AUC for the response curve at 15 minutes) and VerifyNow = 0.609; P<0.001 (R2=0.371 from linear regression) |
| Freynhofer2011Austria21614416 | VASP phosphorylation assay(PGE1 ± ADP, concentration not reported)[Biocytex Inc, Marseille, France]; using flow cytometry [additional details NR]Impedance aggregometry(ADP 6.5 μM ± PGE1 9.4 μM)[Multiplate analyzer, Dynabyte Medical, Munich, Germany] | 196 patients with valid measurements on both assays | Spearman correlation coefficient between Multiplate analyzer and PRI VASP = 0.587; P<0.001 |
| Ang2008USA18848137 | Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | 157 patients provided measurements to compare two metrics reported by the same assay | Pearson correlation coefficient between % inhibition and final PRU values = -0.879; P<0.001 |
| Varenhorst2009Sweden19249429 | LTA(ADP 20 μmol/L) [PAP-4 optical aggregometer, BioData, no additional information reported]VASP phosphorylation assay(PGE1 ± ADP, concentrations NR)[Platelet VASP kit, BioCytex, Marseille, France]; using flow cytometry [samples were analyzed on different flow-cytometers in 2 participating centers: Epics XL, Beckman Coulter, Fullurton, CA; and FACScan, Becton Dickinson, Franklin Lakes, NJ]. The authors reported that “synchronization between the flow cytometers was performed”.Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | 110 patients (1:1 randomized to clopidogrel or prasugrel) measured at 5 timepoints (not clear if all measurements were available for all patients and timepoints)  | Pearson correlation coefficient between PRI VASP and VerifyNow PRU = 0.86; P<0.0001 during the loading dose phasePearson correlation coefficient between PRI VASP and VerifyNow PRU = 0.81; P<0.0001 during the maintenance dose phasePearson correlation coefficient between late reactivity (6 min) by LTA and VerifyNow PRU = 0.88; P<0.0001 during the loading dose phasePearson correlation coefficient between late reactivity (6 min) by LTA and VerifyNow PRU = 0.79; P<0.0001 during the maintenance dose phasePearson correlation coefficient between maximal reactivity by LTA and VerifyNow PRU = 0.76; P<0.0001 during the loading dose phaseLinear regression of PRI VASP over VerifyNow PRU: (PRI VASP) = 8.418 + 0.284\*(VerifyNow PRU), during the loading dose phaseLinear regression of PRI VASP over VerifyNow PRU: (PRI VASP) = 16.335 + 0.192\*(VerifyNow PRU), during the maintenance dose phaseLinear regression of late reactivity (6 min) by LTA over VerifyNow PRU: (LTA reactivity) = 3.096 + 0.233\*(VerifyNow PRU), during the loading dose phaseLinear regression of late reactivity (6 min) by LTA over VerifyNow PRU: (LTA reactivity) = 9.839 + 0.177\*(VerifyNow PRU), during the maintenance dose phase |
| Lordkipanidze2008Canada18826988 | LTA(ADP 5 and 20 μM) [ChronoLog 540 model, Havertown, PA]Impedance aggregometry(ADP 5 and 20 μM) [ChronoLog 560 model, Havertown, PA]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA]High shear platelet function(collagen/ADP cartridges)[PFA-100, Dade Behring, Deerfield, IL] | 116 patients contributed samples to the analyses; only 72 patients had measurements with VerifyNow | Partial correlations (accounting for randomization group)Correlation between LTA ADP 5 μM and LTA ADP 20 μM = 0.902 (95% CI, 0.862, 0.931); P<0.05Correlation between LTA ADP 5 μM and impedance aggregometry ADP 5 μM = 0.255 (95% CI, 0.077, 0.417); P<0.05Correlation between LTA ADP 5 μM and impedance aggregometry ADP 20 μM = 0.307 (95% CI, 0.133, 0.463); P<0.05Correlation between LTA ADP 5 μM and PFA-100 = -0.270 (95% CI, -0.438, -0.102); P<0.05Correlation between LTA ADP 5 μM and VerifyNow = 0.370 (95% CI, 0.152, 0.554); P<0.05Correlation between LTA ADP 20 μM and impedance aggregometry ADP 5 μM = 0.291 (95% CI, 0.112, 0.449); P<0.05Correlation between LTA ADP 20 μM and impedance aggregometry ADP 20 μM = 0.382 (95% CI, 0.215, 0.527); P<0.05Correlation between LTA ADP 20 μM and PFA-100 = -0.274 (95% CI, -0.434, -0.097); P<0.05Correlation between LTA ADP 20 μM and VerifyNow = 0.496 (95% CI, 0.299, 0.652); P<0.05Correlation between impedance aggregometry ADP 5μM and impedance aggregometry ADP 20 μM = 0.881 (95% CI, 0.833, 0.916); P<0.05Correlation between impedance aggregometry ADP 5μM and PFA-100 = -0.139 (95% CI, -0.313, 0.044); P=NSCorrelation between impedance aggregometry ADP 5μM and VerifyNow = 0.187 (95% CI, -0.046, 0.401); P=NSCorrelation between impedance aggregometry ADP 20 μM and PFA-100 = -0.150 (95% CI,- 0.322, 0.033); P=NSCorrelation between impedance aggregometry ADP 20 μM and VerifyNow = 0.293 (95% CI, 0.066, 0.491); P<0.05Correlation between PFA-100 and VerifyNow = -0.334 (95% CI, -0.525, -0.111); P<0.05 |
| Jeong2008S. Korea18617479 | LTA(ADP 5 μM) [ChronoLog 540 model, Havertown, PA]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | 300 patients measured with both assays | Correlation between LTA PRU and VerifyNow = 0.641; P<0.001Correlation between LTA % inhibition and VerifyNow = 0.679; P<0.001 |
| Kim2010S. Korea20449634 | LTA(ADP 5 and 20 μM) [AggRam aggregometer, Helena Laboratories Corp., Beaumont, TX]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | 1058 patients contributed measurements | Pearson correlation between maximal reactivity by LTA ADP 5 μmol/L and VerifyNow PRU = 0.653 P<0.001Pearson correlation between late reactivity by LTA ADP 5 μmol/L and VerifyNow PRU = 0.669 P<0.001Pearson correlation between maximal reactivity by LTA ADP 20 μmol/L and VerifyNow PRU = 0.683 P<0.001Pearson correlation between late reactivity by LTA ADP 20 μmol/L and VerifyNow PRU = 0.718 P<0.001 |
| Malinin2006USA16845449 | Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | 131 patients with CAD contributed two measurements with VerifyNow (before and after clopidogrel) to compare the before-after contrast (using the measured values) versus an “estimated” contrast using the post-clopidogrel measurement and the TRAP channel of the same device | Pearson correlation between estimated and observed contrast = 0.971Base on linear regression of the %inhibition using the TRAP channel versus inhibition using the observed baseline value: (estimated %inhibition) = 0.9989\*(observed % inhibition) – 0.0129 |
| Hochholzer2007Germany16603231 | LTA(ADP 20 μmol/L) [PAP4, Molab, Hilden, Germany]Impedance aggregometry(ADP 20 μmol/L)  [Chronolog Series 590; Probe and Co, Endingen, Germany]ADP-stimulated P-selectin and activated IIb/IIIa expression(ADP 20 μmol/L final concentration)Using flow cytometry [FACSCalibur flow cytometer, Becton Dickinson, Germany]Platelet agglutination assay(ADP cartridges)[ULTEGRA rapid platelet function assay, Accumetrics, San Diego, CA] | 27 patients presumably at two timepoints; on-clopidogrel samples were obtained before PCI (after loading) and 24 h post-PCI; measurements in analyses of correlations appear to have been treated as independent observations | Spearman correlation coefficient between LTA and P-selectin expression = 0.515; P<0.001Spearman correlation coefficient between LTA and activated IIb/IIIa expression = 0.568; P<0.001Spearman correlation coefficient between LTA and impedance aggregometry = 0.257; P=0.196Spearman correlation coefficient between LTA and ULTEGRA assay = 0.135; P=0.504Spearman correlation coefficient between P-selectin expression and activated IIb/IIIa expression = 0.815; P<0.001Spearman correlation coefficient between P-selectin expression and impedance aggregometry = 0.292; P=0.139Spearman correlation coefficient between P-selectin expression and ULTEGRA assay = 0.453; P=0.059Spearman correlation coefficient between activated IIb/IIIa expression and impedance aggregometry = 0.471; P=0.013Spearman correlation coefficient between activated IIb/IIIa expression and ULTEGRA assay = 0.523; P=0.026 |
| Lordkipanidze2009Canada19250657 | LTA(ADP 5 and 20 μM) [ChronoLog Aggregometer, 540 model, Havertown, PA]“Platelet count drop method” using impedance platelet counting before and after exposure to the agonist(ADP 5 and 20 μM) Using a Coulter ACT Series Analyzer, Beckman Coulter Inc., Fullerton, CA] | 91 patients receiving aspirin + clopidogrel | Spearman correlation coefficient between LTA (ADP 5 μM) and platelet count drop method (ADP 5 μM) = 0.374; P<0.001Spearman correlation coefficient between LTA (ADP 20 μM) and platelet count drop method (ADP 20 μM) = 0.402; P<0.001 |
| Pettersen2011Norway21426546 | VASP phosphorylation assay(PGE1 ± ADP, concentration not reported)[PLT VASP/P2Y12 assay, Biocytex, France]; using flow cytometry [FACS Calibur System, Becton Dickinson, Plymouth, UK]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | 219 patients were on aspirin + clopidogrel; 155 were analyzed successfully with the VASP assay and 212 with the VerifyNow assay | Spearman correlation coefficient between PRI VASP and VerifyNow PRU = 0.682; P<0.001 |
| Sibbing2008Germany18217143 | LTA(ADP 5 or 20 μM) [PAPA 8 aggregometer, Bio/Data, no additional information reported]Impedance aggregometry(ADP, 6.4 μM)[Multiplate analyzer, Dynabyte, Munich, Germany] | 149 patients were included in the study and contributed on-clopidogrel measurements to the analysis; baseline (pre-clopidogrel) measurements were available from 60 patients (data not reported separately); pre- and post-clopidogrel measurements were treated as independent observations | Correlation between LTA (ADP 5 μM) and Multiplate analyzer = 0.71; P<0.0001Correlation between LTA (ADP 20 μM) and Multiplate analyzer = 0.71; P<0.0001 |
| Lakkis2002USA12124955 | Platelet agglutination assay(4 μM iso-TRAP)[ULTEGRA rapid platelet function assay, Accumetrics, San Diego, CA]blood for this device was treated with 2 different anticoagulants: D-phenylalanul-L-propyl-L-arginine chloromethyl ketone (PPACK) or citratePlateletWorks(ADP, 20 μM)[PlateletWorks assay, additional details NR]LTA(ADP 20 μM) [PACKS-4, Helena Laboratories, Beaumont, TX] | 25 patients on aspirin + clopidogrel participating in a comparative study of tirofiban dosing; measurements were obtained before tirofiban and at 5, 15, 30, 45, 60, and 120 minutes following administration, for a total of 175 measurements, which were treated as independent observations | Pearson correlation between Ultegra RPFA-PPACK and RPFA-citrate = 0.79Pearson correlation between Ultegra RPFA-PPACK and PlateletWorks = 0.72Pearson correlation between Ultegra RPFA-PPACK and LTA = 0.76 |
| Kreutz2012USA 22385219 | LTA(ADP 20 μM; for some measurements samples were pre-treated with PGE1 22 nM and 88 nM, before ADP) [Optical Lumi-Aggregometer, Model 700, Chrono-Log Corporation, Havertown, PA]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | 94 patients on aspirin + clopidogrel provided samples that were measured with all assays | Pearson correlation between VerifyNow P2Y12and LTA (ADP) = 0.72; P<0.001Spearman correlation between VerifyNow and LTA (ADP + PGE1 22 nM) = 0.62; P<0.001Spearman correlation between VerifyNow and LTA (ADP + PGE1 88 nM) = 0.59; P<0.001Spearman correlation between LTA (ADP) and LTA (ADP + PGE1 88 nM) = 0.74; P<0.001 |
| Gaborit2009France20015321 | aggregometry(ADP 10 μmol/L) [additional details NR]VASP phosphorylation assay[additional details NR] | 124 diabetic patients treated with clopidogrel for ≥1 mo, without aspirin measured with both assays | Correlation between maximal ADP aggregation and PRI VASP = 0.517; P<0.001 |
| Toma2012USA22277895 | LTA (ADP 5 μM) [PAP4, Bio/Data Corp., Horsham, PA]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | 255 patients undergoing PCI with clopidogrel loading provided samples measured with both assays (50 patients who were clopidogrel naïve at study enrollment were also measured before the loading dose) | Spearman correlation between LTA and VerifyNow = 0.64; P<0.001 |
| Gremmel2011Austria21621250 | LTA(ADP 10 μM) [additional information NR]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA]VASP phosphorylation assay(PGE1 ± ADP, concentration not reported)[Platelet VASP, Diagnostic Stago, Biocytex, Marseille, France]; using flow cytometry [FACSCalibur system, BD Biosciences, Vienna, Austria]Impedance aggregometry (multiple electrode)(ADP, 6.4 μM)[Multiplate analyzer, Dynabyte, Munich, Germany]Impact-R(ADP 1.36 M)[Matis Medical Inc., Beersel, Belgium; and DiaMed, Cressier, Switzerland] | 288 patients receiving aspirin + clopidogrel post PCI with stent placement provided samples measured with all assays | Spearman correlation between LTA and VerifyNow P2Y12 = 0.65Spearman correlation between LTA and VASP = 0.37Spearman correlation between LTA and Multiplate = 0.45Spearman correlation between LTA and Impact-R = -0.32Spearman correlation between VerifyNow P2Y12 and VASP = 0.44Spearman correlation between VerifyNow P2Y12 and Multiplate = 0.32Spearman correlation between VerifyNow P2Y12 and Impact-R = -0.52Spearman correlation between VASP and Multiplate = 0.33Spearman correlation between VASP and Impact-R = -0.26Spearman correlation between Multiplate and Impact-R= -0.20All results were statistically significant (p-values NR) |
| Saad2012Egypt22146578 | LTA(ADP 5 μM) [Chrono-Log 450 Model, Chrono-Log, Havertown, PA]Surface expression of activated IIb/IIIa receptors(ADP 5μM)Using flow cytometry [EPICS-XL PROFILE II Coulter, Beckman Coulter] | 90 patients undergoing PCI with clopidogrel loading provided samples measured with both assays | Spearman correlation between LTA and IIb/IIIa receptor expression = 0.927; P<0.001 (in the overall population) |
| Stellbaum2012Germany 22503564 | Impedance aggregometry (multiple electrode)(ADP and ADP + prostaglandin; agonist concentrations NR)[Multiplate analyzer, Dynabyte, Munich, Germany] | 100 patients receiving clopidogrel loading before cardiac catheterization  | Correlation between aggregation with ADP and ADP + prostaglandin = 0.764 (95% CI 0.656, 0.841); P<0.001 |
| Bliden2011USA + UK21742103ONSET/OFFSET and RESPOND studies | LTA(ADP 20 μM) [Chronolog Model 490-4D, Chronolog, Havertown, PA]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA]VASP phosphorylation assay(PGE1 ± ADP, concentration not reported)[Platelet VASP-FCM kit, Biocytex Inc., Marseille, France]; using flow cytometry [additional information NR] | 103 patients receiving clopidogrel provided samples measured by all assays; patients were participants in the ONSET/OFFSET and RESPOND trials | Correlation between maximum platelet aggregation by LTA and VerifyNow P2Y12 PRU = 0.6644; P<0.001Correlation between maximum platelet aggregation by LTA and PRI VASP = 0.4304; P<0.001 |
| Ono2011Japan21862109 | LTA(ADP 20 μmol/L) [MCM HEMA TRACER 313 M, MC Medical, Inc., Tokyo, Japan]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | 202 patients with coronary artery disease undergoing elective PCI contributed samples measured with both assays | Pearson correlation between LTA maximal reactivity and VerifyNow PRU = 0.705; P<0.001Pearson correlation between LTA area under the curve and VerifyNow PRU = 0.793; P<0.001Pearson correlation between LTA maximal reactivity and VerifyNow %inhibition = -0.728; P<0.001Pearson correlation between LTA area under the curve and VerifyNow %inhibition = -0.805; P<0.001 |
| Gaglia2011USA21919956 | LTA(ADP 5 or 20 μM) [ChronoLog, Havertown, PA]VASP phosphorylation assay(PGE1 ± ADP, concentration not reported)[PLT VASP/P2Y12 assay, BioCytex, Marseille, France]; using flow cytometry [FACSCalibur flow cytometer, BD Biosciences, San Jose, CA]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | 200 patients contributed samples to be measured with 3 assays | Spearman correlation between VASP and VerifyNow P2Y12 = 0.71 (0.63, 0.77); P<0.0001Spearman correlation between VASP and LTA ADP 5 μM = 0.60 (0.50, 0.69); P<0.0001Spearman correlation between VASP and LTA ADP 20 μM = 0.69 (0.60, 0.76); P<0.0001Spearman correlation between VerifyNow P2Y12and LTA ADP 5 μM = 0.67 (0.57, 0.74); P<0.0001Spearman correlation between VerifyNow P2Y12and LTA ADP 20 μM = 0.77 (0.70, 0.83); P<0.0001Spearman correlation between LTA ADP 5 μM and LTA ADP 20 μM = 0.86 (0.81, 0.89); P<0.0001 |
| Park2012Korea21942752 | LTA(ADP 5 and 20 μM and ADP 5 μM + 5 nM PGE1)[AggRAM aggregometer, Helena Laboratories Corp., Beaumont, TX]Impedance aggregometry(ADPtest 6.4 μΜ ADP and high-sensitivity ADPtest (ADPtest HS) 6.4 μΜ ADP + 9.4 nM PGE1)[Multiplate analyzer, Dynabyte, Munich, Germany] | 246 patients | Pearson correlation between LTA maximal platelet aggregation (ADP 5μM) and LTA final platelet aggregation (ADP 5 μM) = 0.956; P<0.01Pearson correlation between LTA maximal platelet aggregation (ADP 5μM) and LTA maximal platelet aggregation (ADP 5 μM + PGE1) = 0.964; P<0.01Pearson correlation between LTA maximal platelet aggregation (ADP 5 μM) and LTA final platelet aggregation (ADP 5μM + PGE1) = 0.923; P<0.01Pearson correlation between LTA maximal platelet aggregation (ADP 5μM) and LTA maximal platelet aggregation (ADP 20 μM) = 0.945; P<0.01Pearson correlation between LTA maximal platelet aggregation (ADP 5μM) and LTA final platelet aggregation (ADP 20 μM) = 0.920; P<0.01Pearson correlation between LTA maximal platelet aggregation (ADP 5μM) and ADPtest = 0.678; P<0.01Pearson correlation between LTA maximal platelet aggregation (ADP 5μM) and ADPtest HS = 0.632; P<0.01Pearson correlation between LTA final platelet aggregation (ADP 5 μM) and LTA maximal platelet aggregation (ADP 5 μM + PGE1) = 0.946; P<0.01Pearson correlation between LTA final platelet aggregation (ADP 5 μM) and LTA final platelet aggregation (ADP 5 μM + PGE1) = 0.968; P<0.01Pearson correlation between LTA maximal platelet aggregation (ADP 5 μM) and LTA maximal platelet aggregation (ADP 20 μM) = 0.894; P<0.01Pearson correlation between LTA final platelet aggregation (ADP 5 μM) and LTA maximal platelet aggregation (ADP 20 μM) = 0.939; P<0.01Pearson correlation between LTA final platelet aggregation (ADP 5 μM) and ADPtest = 0.710; P<0.01Pearson correlation between LTA final platelet aggregation (ADP 5 μM) and ADPtest HS = 0.691; P<0.01Pearson correlation between LTA maximal platelet aggregation (ADP 5 μM + PGE1) and LTA final platelet aggregation (ADP 5 μM + PGE1) = 0.961; P<0.01Pearson correlation between LTA maximal platelet aggregation (ADP 5 μM + PGE1) and LTA maximal platelet aggregation (ADP 20 μM) = 0.923; P<0.01Pearson correlation between LTA maximal platelet aggregation (ADP 5μM + PGE1) and LTA final platelet aggregation (ADP 20 μM) = 0.921; P<0.01Pearson correlation between LTA maximal platelet aggregation (ADP 5μM + PGE1) and ADPtest = 0.697; P<0.01Pearson correlation between LTA maximal platelet aggregation (ADP 5 μM + PGE1) and ADPtest HS = 0.662; P<0.01Pearson correlation between LTA final platelet aggregation (ADP 5 μM + PGE1) and LTA maximal platelet aggregation (ADP 20 μM) = 0.865; P<0.01Pearson correlation between LTA final platelet aggregation (ADP 5 μM + PGE1) and LTA final platelet aggregation (ADP 20 μM) = 0.913; P<0.01Pearson correlation between LTA final platelet aggregation (ADP 5 μM + PGE1) and ADPtest = 0.688; P<0.01Pearson correlation between LTA final platelet aggregation (ADP 5 μM + PGE1) and ADPtest HS = 0.693; P<0.01Pearson correlation between LTA maximal platelet aggregation (ADP 20 μM) and LTA final platelet aggregation (ADP 20 μM) = 0.958; P<0.01Pearson correlation between LTA maximal platelet aggregation (ADP 20 μM) and ADPtest = 0.663; P<0.01Pearson correlation between LTA maximal platelet aggregation (ADP 20 μM) and ADPtest HS = 0.596; P<0.01Pearson correlation between LTA final platelet aggregation (ADP 20 μM) and ADPtest = 0.698; P<0.01Pearson correlation between LTA final platelet aggregation (ADP 20 μM) and ADPtest HS = 0.630; P<0.01Pearson correlation between ADPtest and ADPtest HS = 0.776; P<0.01 |
| Zhang2012Korea22774770 | LTA(ADP 10 μM)[additional information NR]Impedance aggregometry(ADP, 6.4 μM, sample anticoagulated with hirudin or citrate)[Multiplate analyzer, Dynabyte Medical, Munich, Germany]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | 119 patients; measurement of samples with three assays to assess analytic performance at 2 timepoints (at PCI and post-PCI); assessments performed with samples treated with different anti-coagulants (pre-analytically) | Pearson correlation between Multiplate analyses (at PCI) using samples anticoagulated with citrate and samples anticoagulated with hirudin = 0.60; P<0.001Pearson correlation between Multiplate analyses (post-PCI) using samples anticoagulated with citrate and samples anticoagulated with hirudin = 0.65; P<0.001Pearson correlation between LTA and Multiplate using samples antcoagulated with citrate at PCI = 0.4Pearson correlation between LTA and Multiplate using samples antcoagulated with hirudin at PCI = 0.38Pearson correlation between LTA and Multiplate using samples antcoagulated with citrate post-PCI = 0.42Pearson correlation between LTA and Multiplate using samples antcoagulated with hirudin post- PCI = 0.51Pearson correlation between VerifyNow and Multiplate using samples antcoagulated with citrate at PCI = 0.47Pearson correlation between VerifyNow and Multiplate using samples antcoagulated with hirudin at PCI = 0.37Pearson correlation between VerifyNow and Multiplate using samples antcoagulated with citrate post-PCI = 0.5Pearson correlation between VerifyNow and Multiplate using samples antcoagulated with hirudin post-PCI = 0.42 |
| Tsantes2012Greece22646492 | LTA(ADP 10 μM)[Biodata-PAP-4 aggregometer, Bio/Data Corporation, Horsham, PA]High shear platelet function(PFA-100 ADP/PGE1 cartridges)[INNOVANCE PFA P2Y, Siemens Healthcare DiagnosticsProducts GmbH, Marburg, Germany]Impedance aggregometry(ADP 6.5 μM)[Multiplate analyzer, Dynabyte Medical, Munich, Germany]VASP phosphorylation assay(PGE1 ± ADP, concentration not reported)[PLT VASP/P2Y12 assay, Biocytex, Marseille, France]; using flow cytometry [Partec CyFlow ML, Partec GmbH, Munster, Germany] | 90 patients contributed samples measured with 4 different methods | Spearman correlation between INNOVANCE PFA-100 P2Y and LTA peak aggregation = -0.51; P<0.001Spearman correlation between INNOVANCE PFA-100 P2Y and LTA late aggregation (6 min) = -0.55; P<0.001Spearman correlation between INNOVANCE PFA-100 P2Y and LTA disaggregation = 0.39; P<0.001Spearman correlation between INNOVANCE PFA-100 P2Y and Multiplate analyzer AUC = -0.47; P<0.001Spearman correlation between INNOVANCE PFA-100 P2Y and VASP PRI = -0.41; P = 0.003 |
| Liang2012Canada22797934 | LTA(ADP 5 μmol/L)[Chrono-log aggregometer, Model 560-Ca]Impedance aggregometry(ADP 6.5 μM)[Multiplate analyzer, Dynabyte Medical, Munich, Germany]VASP phosphorylation assay(PGE1 ± ADP, concentration not reported)[PLT VASP/P2Y12 assay, BioCytex, Marseille, France]; using flow cytometry [FACSCaliber Flow Cytometer, Becton-Dickinson, SanJose, CA] | 82 patients measured at measured at 6 h post-loading on d 1 and 1 h post-treatment on d 7 and 14 | *6 h post-loading on day 1*Pearson correlation between VASP-PRI and LTA = 0.6410Pearson correlation between VASP-PRI and Multiplate = 0.4672Pearson correlation between LTA and MEA = 0.4645*1 h post-treatment, d 7*Pearson correlation between VASP-PRI and LTA = 0.5527Pearson correlation between VASP-PRI and Multiplate = 0.4161Pearson correlation between LTA and MEA = 0.4995*1 h post-treatment, d 14*Pearson correlation between VASP-PRI and LTA = 0.4676Pearson correlation between VASP-PRI and Multiplate = 0.3913Pearson correlation between LTA and MEA = 0.4976 |
| Namazi2012Iran22232732 | LTA(ADP 5 and 20 μM)[PACKS-4, Helena BioSciences Europe, Sunderland, UK] | 112 patients with measurements obtained at 3 times points; repeat measurements were treated as independent observations | Pearson correlation between maximal aggregation with LTA 5 and 20 μM = 0.88; P <0.001 |
| Jang2012Korea22811359 | High shear platelet function(PFA-100 ADP/PGE1 cartridges)[INNOVANCE PFA P2Y, Siemens Healthcare DiagnosticsProducts GmbH, Marburg, Germany]Platelet agglutination assay(ADP cartridges)[VerifyNow P2Y12 assay, Accumetrics, San Diego, CA] | 255 patients | Spearman correlation between INNOVANCE PFA P2Y and VerifyNow %inhibition = 0.412; P<0.0001Spearman correlation between INNOVANCE PFA P2Y and VerifyNow PRU = - 0.402; P<0.0001 |

\*The study reported “r2” values as correlations and used fitted regression lines to summarize bivariate linear relationship
**Abbreviations:** NA = not applicable; NR = not reported; PMID = PubMed identification number; TEG = Thromboelastography.