STUDY OF PLATELET ACTIVITY IN ROUTINE AND ACUTE CORONARY ANGIOGRAPHY

*David L. McGlasson, MS, CLS/NCA; Gilberto Patino, MD; Anan D. Shah, MD, Wilford Hall Medical Center, Lackland AFB, TX.
Bernard J. Rubal, Ph.D, Brooke Army Medical Center, Ft. Sam Houston, TX

ABSTRACT

The purpose of this study was to compare the different methods of platelet functional assay results among patients presenting for routine and acute coronary angiography. Our subject population was comprised of 102 subjects (59 males and 43 females) with an average age of 64±12 years. Each subject had the following platelet functional assays performed: Siemens PFA-100 (ADP/COLL and EPI/COLL) cartridges, Accumetrics system with the aspirin and P2Y12 cartridges, Chrono-Log 570Vs whole blood platelet aggregation analyzer using ADP (10.0, 5.0 µM), collagen (1.0 µG) and arachidonic acid (0.5mM) as agonists. Of the 102 subjects 95 were receiving some ASA therapy (81 or 325 mg) of which 62 were on both ASA and clopidogrel. Three patients were on clopidogrel only. In this patient population, no significant correlation was found between PFA-100 and platelet aggregation and poor correlation noted with Accumetrics aspirin (r = -.291, p <0.003) and P2Y12 (r= -.250, p <0.014). Correlations within platelet aggregation tests ranged from r = 0.33 to 0.757 (p ≤ 0.001) and between platelet aggregation (ADP 10 M) and Accumetrics measures (aspirin and P2Y12) were r = .338 and .352 (p <0.001), respectively. Only fair agreement was observed between PFA-100 EPI/COLL and Accumetrics aspirin (kappa = 0.274, p=0.006). These data suggest that there is generally poor agreement between methods for assessing platelet function in this study population. Given recent clinical data suggesting an increasing role for platelet function testing in patients with ischemic coronary heart disease, these findings suggest that alternative methods for rapid assessment of efficacy of anti-platelet therapy will be required.

INTRODUCTION

• Studies that have compared platelet functional assays have showed a vast variety of discord when comparing the laboratory results in a variety of studies.

• The purpose of this study was to compare the different methods of platelet functional assay results among patients presenting for routine and acute coronary angiography.
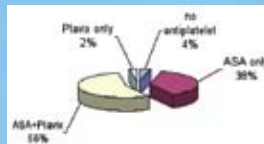
MATERIALS AND METHODS

• Subject population was comprised of 102 subjects (59 males and 43 females) with an average age of 64±12 years.

• Of the 102 subjects, 95 were receiving some ASA therapy (81 or 325 mg) of which 62 were on both ASA and clopidogrel.

• Three subjects were on clopidogrel only.

• Each of subjects had baseline studies drawn before having the angiography performed

• Each subject had the following platelet functional assays performed:
  - Siemens PFA-100 (ADP/COLL and EPI/COLL) cartridges
  - Accumetrics system: Aspirin and P2Y12 Cartridges
  - Chrono-Log 570VS whole blood platelet aggregometry using ADP (10 and 5.0 µM), Collagen (1.0 µg) and Arachidonic acid (0.5 mM) as agonists.
  - All subjects had a CBC and Platelet count to ensure that hematocrit levels were >30% and the platelet counts were >100,000/cu mm.

MATERIALS AND METHODS: Statistics Used

• Spearman's rho is a form of rank order calculation. The median rho between all pairs of items in a scale is a classic measure of reliability, in the sense of internal consistency.
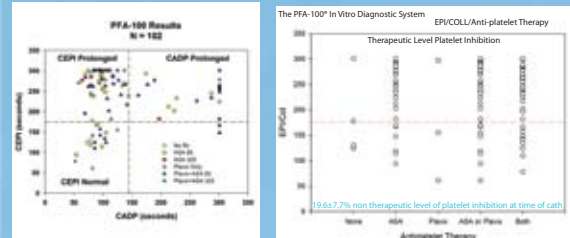
• Cohen's kappa: Kappa = (observed concordance - concordance by chance)/(1-concordance by chance), where "by chance" is calculated as in chi-square (multiple row marginal times column marginal and divide by n).

• Cronbach's alpha (a.k.a., "the reliability coefficient"), the most common estimate of internal consistency of items in a scale.
Descriptive statistics

The PFA-100® In Vitro Diagnostic System

Modified from PA. Keresztes, J Tazbir, Journal of Cardiovascular Nursing Vol. 20, No. 6, pp 405- 407 2005
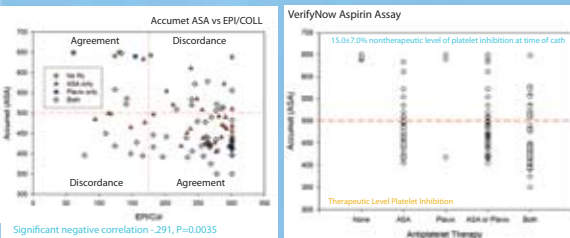
RESULTS: Accumetrics ASA and P2Y12 RANGES

• Accumetrics: (Aspirin) ASA Ranges: >550 aspirin resistance units (ARU) [Non-responder]; <550 ARU (Responder)

• N=100 SUBJECTS:
  >550 ARU 15/100 (15.0%) Non-responders
  <550ARU 85/100 (85.0%) Responders

• Plavix (P2Y12): >20% Responder: <20% Non-responder
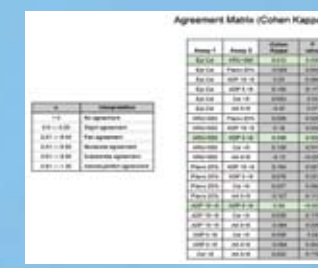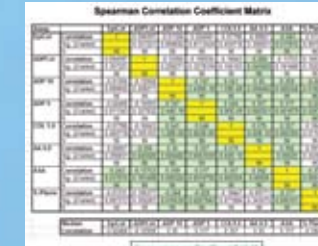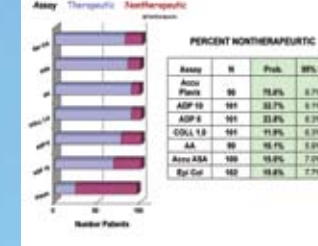
• N=96 SUBJECTS: 79/96 (75.0%): Non-responders
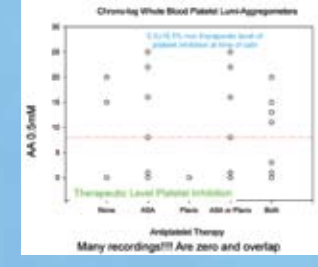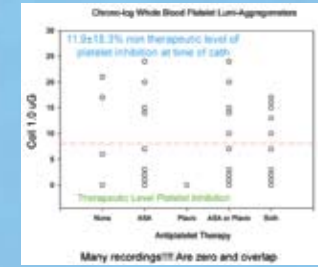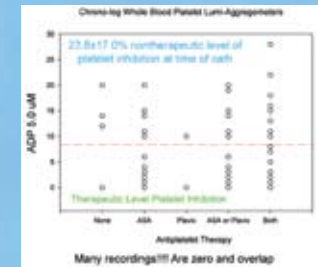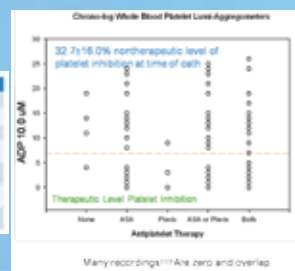 17/96 (25.0%): Responders

Chrono-log Whole Blood Platelet Aggregometry

• All platelet aggregations used >8.0 ohms as non-therapeutic responses.

• Platelet aggregation subjects N=100

RESULTS

• In this study, 96% of patients received some form of anti-platelet therapy:

• 28 (27.5%) ASA 81 mg, 5(4.9%), ASA 325 mg, 3 (2.9%), clopidogrel, 51 (50%) clopidogrel+ASA 81 mg and 11 (10.8%) clopidogrel + ASA 325 mg.

• EPI/COLL closure times prolonged in 57.8% of patients (ADP/COLL <145 sec) and 23 (22.5%) patients (ADP/COLL >145 sec.)

• Twenty patients (19.6±9.4%) had sub-therapeutic anti-platelet therapy defined by EPI/COLL closure times and 15±7% by Accumetrics assay (>550 ARU).

• Only fair agreement was noted between EPI/COLL and Accumetrics ASA (Cohen Kappa=0.21, P=0.026).

• Of the 63 patients receiving clopidogrel, only 17.5%±9.4% achieved therapeutic goals (P2Y12>20.0% inhibition) at the time of catheterization.

• During a 20.4±3.8 month follow-up 35.3% of patients were admitted for recurrent angina, congestive heart failure or revascularization, 8.8% of subjects had myocardial infarction, stroke or death, and 2 patients required transfusion for major GI bleeds.

DISCUSSION

• Our study in a high risk population demonstrates both the varied patient response to standard anti-platelet regimens and poor agreement among methodologies for assessing platelet function.

• Conclusion: all assays discriminated between platelet response and non-response to anti-platelet therapies.

• It should be emphasized that current methods of assessing platelet function are discordant because they probably assess different aspects of the platelet response to different agonists.

• It may be necessary to employ multiple assays to detect individual platelet responses.

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