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A comparison of T2MR and P2Y12 platelet activity measurements: Assessment of cardiovascular outcomes in patients on anti-platelet therapy

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Abstract

Introduction: Regular monitoring of platelet function in patients on antiplatelet therapy with a history of ischemic heart disease remains a clinical dilemma. Commonly used platelet function assays such as the VerifyNow P2Y12 ADP test primarily rely on a highly-specific reagent formulation using ADP, PGE1 and fibrinogen coated beads. This approach can monitor the pharmacodynamics of P2Y12 platelet receptor inhibitors, but these measurements do not accurately predict the adverse clinical outcomes related to platelet dysfunction, mainly recurrent thrombosis. In our current single-center, prospective study, we used a novel technology to monitor platelet function using a portable T2 Magnetic Resonance (T2MR) device, T2Stat, utilizing small volume blood samples and a reagent cocktail that measures ADP induced platelet mediated clot contraction.

Materials and Methods: In our current investigation, we measured prospectively P2Y12 activity (using VerifyNow assay) and T2MR activity on a set of 30 samples of patients who underwent Plavix response testing. The T2MR reagent formulation was designed to activate platelets by ADP without PGE1 and simultaneously induce fibrin polymerization. Platelet activity was measured by T2MR via platelet-mediated clot contraction. We used this preliminary data first to build a correlation between these two methodologies. We then compared short-term clinical outcomes with the P2Y12 and T2MR data obtained on an additional 22 patient samples, focusing on the 12 patient samples in which the two diagnostic tests differed.

Results: Of 12 patients with discrepant results between two methods, 8 had available meaningful data on short-term clinical outcomes. In all of these 8 patients, we observed that the T2MR activity correlated best with the observed clinical outcomes.

Conclusion: These initial clinical results suggest that the T2MR ADP test has excellent potential to predict the hemostatic state of ADP-induced platelet activity in patients with history of ischemic heart disease. Additional studies will provide further evidence of the potential role of this new technology for the accurate prediction of clinical outcomes.

Biography

Lovely Chhabra finished his medical school from T.N Medical College, Mumbai, India in 2007. After serving as a junior lecturer in a Govt. Medical school and a medical officer at Apollo Medical Center for two years in India, he then moved to USA to join his residency training at Saint Vincent Hospital (SVH), University of Massachusetts Medical School (UMMS) in 2009 and received his MD degree in 2012. He is currently working as a Chief Medical Resident at SVH, UMMS. During his years of the residency training, he worked on several research projects, especially focusing in the field of Cardiovascular Medicine. Chhabra has authored and co-authored two book chapters and over 20 peer-reviewed journal publications in several international peer-reviewed scientific journals. He has presented his scholarly work at over 20 state, national and international medical society meetings. He has also served on the reviewer boards of several international peer-reviewed medical journals including American Journal of Cardiology, Indian Heart Journal, Hemodialysis International and Indian Pacing and Electrophysiology. His research interests include electrocardiography, pericardial diseases, interatrial conduction blocks, electrocardiographic changes associated with pulmonary disorders and antiplatelet therapy. He is starting his cardiovascular diseases fellowship training at the University of Connecticut (Hartford Hospital) in July, 2013 and is planning to actively continue on research activities during his future career.

Rabin Niroula: Niroula graduated from Sher-e-Bangla medical college, Bangladesh in 2005 and then joined residency at Saint Vincent Hospital (SVH), University of Massachusetts Medical School (UMMS) in 2009. He received his MD degree in 2012 and is currently working as a Chief Medical Resident at SVH, UMMS. His research interest is in antiplatelet therapy. He will be joining his Hematology-Oncology fellowship training at Roger Williams Medical Center, Boston University, in July, 2013 and will continue his research activities in the field of Hematology-Oncology.