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The assessment of platelet function as related to various pathological and surgical conditions continues to be poorly used due to technical constraints involved in performing platelet function assessment. Of all the techniques presently available, none offer the ability to assess any parameter of platelet function under point-of-care or STAT conditions. With several different techniques available for assessing platelet function, the technology itself is open to question, since there are very few studies comparing the various technologies. Collecting blood into citrate to be able to prepare a platelet concentrate, which can then be evaluated by photo optical techniques, introduces a number of variables. These variables may or may not impact the ultimate assessment of platelet function. The above constraints lead to infrequent use of platelet function testing and considerable controversy. One result has been the use of "platelet function" as a reason for post-surgical bleeding. Since there are no good STAT tests available for platelet function, when all other available diagnostic aids have been tried and the bleeding continues, platelet dysfunction must be the cause. Thus, in cardiopulmonary bypass surgery, one of the primary reasons offered for excessive post surgical bleeding is "poor platelet function". This leads to heavy use of platelet concentrates as a shotgun approach to addressing the post surgical bleeding patient.

The Platelet Function Tests described in this application offer a method of addressing platelet function in a STAT condition. The data presented in this application demonstrate that an aspect of platelet function is being measured, that it correlates with presently available platelet diagnostic techniques, and the tests have been demonstrated to measure an activity dependent on the presence of platelets. The clinical data have shown that, although platelet function disorders may not be rampant in post surgical patients, the test would allow more selective use of platelet concentrates, i.e., unless there is a clear defect in the assessed platelet function, another cause should be addressed before swamping the patient with unneeded platelet concentrates.

The tests presented in this application use an instrument platform and assay cartridges that have been used in cardiopulmonary bypass surgery since 1989. The instrument and assay cartridges have proven to be sturdy, reliable, and effective. The instrument and cartridges are designed for the detection of clot formation. The present series of Platelet Function Tests also rely on the detection of clot formation, thus there is not an extension of the basic technology. The basic principles of the instrument and cartridges do not change. Present functional assay cartridge used on the Hepcon HMS (the Heparin Dose Response and the Activated Clotting Time), use some of the same principles that are used in the Platelet Function Tests. In the above two assay cartridges, the control of platelet activation is used to insure the highest level of performance with the two cartridges. In the Platelet Function Tests, this control is taken a step further, so that the contribution of platelets to the functional test (the activated

clotting time) can be assessed.

In terms of safety, the present Platelet Function Test assay cartridges are similar to the Hepcon Heparin Dose Response assay cartridges. The same degree of technical skill is required. To some extent this same concern exists with the performance of an activated clotting time. If the sample is mishandled and prematurely activated, the results will be misleading. If an inadequate volume of sample is taken, again the tests will be misleading. All the cartridges have some built in error analysis. Since even the activated clotting time is a duplicate channel assay, results must fall within certain limits, or the test is invalidated. The same holds true for the Platelet Function Tests. The existence of a titration curve illustrates that the test has been properly performed. If the curve is nonexistent, or erratic, this is a warning that an error condition exists.

Quality control of the Platelet Function Tests is more difficult than standard plasma clotting tests in which a variety of control plasmas are available for verifying test performance. The reason for this difficulty is the ability to manufacture a blood control sample in which the platelets behave as if they were in a fresh whole blood sample. Even though the quality control of the test is not as straight forward as plasma coagulation tests, the quality control methods available for the Platelet Function Tests is more straight forward than for most other platelet function tests. The trending of test data is relatively straightforward. Drawing a normal donor is also straight forward and has added ability to also provide an "abnormal" control by preactivating the platelets in a portion of the sample. This allows the end user to verify that the test does work.

The Platelet Function Tests as presented in this application have been shown to be both effective and maintain the same level of safety as other cartridges which are presently used on the Hepcon HMS. This suggests that with proper instruction, these assay cartridges can be used effectively in STAT clinical situations to provide a measurement of platelet function.

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