CARDIOVASCULAR DIAGNOSTICS INC

VI. Summary of Safety and Effectiveness Information

510(K) summary

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Trade name: Thrombolytic Assessment System Prothrombin Time Test Card (TAS PT ONE Test Card)

Common Name: TAS PT ONE Test Card

Classification Name: systems for in vitro coagulation studies, automated or semiautomated instruments and associated reagents and controls used to perform a series of coagulation studies and coagulation factor assays (Class II. 21 C.F.R. 864.5425)

Predicate Device: The proposed TAS PT ONE test card made with thromboplastin from human placenta is substantially equivalent to the marketed TAS PT test card made with rabbit brain thromboplastin (K882456).

Description of the Device: The TAS Prothrombin Time, ISI 1 (PT ONE) test card provides a one stage method which measures the clotting time of a sample after combining it with activator. This test consists of a single card that contains calcium chloride to initiate clotting in citrated blood samples, tissue thromboplastin as an activator, buffer, and stabilizers. Samples are tested by drawing venous or arterial blood into a sodium citrate tube and briefly mixing by gentle inversion. This allows the operator to control the start of the clotting reaction which requires recalcification. Because the sample is citrated, additional tests such as an aPTT can be performed with the same sample. The test card has a magnetic stripe on the back which encodes lot specific information such as number, expiration date, and calibration factors specific to that lot. A room temperature test card is removed from the pouch and the card is passed through the instrument's stripe reader to program the instrument to run a PT ONE. The instrument then requests patient and sample information and instructs the operator to insert a PT ONE test card. The card is quickly warmed and the operator is prompted to add a drop of sample to the card well. The sample is drawn into the card and rehydrates the PT ONE reagent which recalcifies the sample and begins the clotting reaction. As the reaction proceeds and clotting begins, the movement of the particles decreases, and the instrument signals the clotting time. Low levels of extrinsic clotting factors will cause prolongation of clotting time.

Intended Use: The new TAS PT ONE test card, is intended to be used with the TAS Analyzer to determine the prothrombin time in citrated whole blood or plasma.

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Comparison of old and new TAS PT test cards

Characteristic	Cleared PT	proposed PT ONE
Intended use	determination of prothrombin time	same
Card format	flat shallow reaction chamber mounted on a thin plastic card	same
Sample type	citrated whole blood or plasma	same
Reagent	thromboplastin, plus PIOP [a]	same
Source	rabbit brain	human placenta
Reaction	formation of a fibrin clot	same
Analyzer	TAS	same
Signal monitored	photo-optical detection of PIOP movement in a magnetic field	same
Signal interpretation	monitoring of clot formation by decrease in PIOP movement	same
Results	clotting time	same
Interpretation of results	increase in clotting time indicates low levels or inhibition of clotting factors	same
ISI	approx 1.6	approx 1.0
Quality control	self tests performed by analyzer at power up and throughout operation, plus periodic functional testing of each test card with quality control plasmas	same

[a] paramagnetic iron oxide particles

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Nonclinical Performance Data: Preclinical testing was done at CDI using TAS PT ONE test cards and the TAS analyzer to determine the performance characteristics of the system. In-house studies showed that the PT ONE test cards responded similarly to different clotting factors, coagulation inhibitors, and interference factors as the existing PT test cards. However, the new TAS PT ONE test cards were more sensitive to changes in factor activity and therefore exhibited longer clotting times in response to decreasing factor levels.

The proposed TAS PT ONE test cards are stable for two weeks at room temperature, and for at least 39 weeks at refrigerator temperatures. These studies are ongoing.

Within day precision of TAS PT test cards with various sample types

	Cleared PT		Proposed PT ONE	
Sample type	Mean	CV (%)	Mean	CV (%)
citrated whole blood	11.5	5.6	9.8	2.4
citrated plasma	11.9	3.7	10.6	1.7
level I control plasma	11.5	3.3	12.9	1.7
level II control plasma	19.5	4.3	29.4	3.6
level III control plasma	29.9	4.8	56.5	6.8

During 20 days of testing of the proposed TAS PT ONE test cards, coefficients of variation ranged from 1.8 to 4.5, and means from 11.9 to 12.8 seconds. There was no significant difference in precision of results produced with the PT ONE by multiple operators, nor between lots of test cards.

Sensitivity of PT ONE results to coagulation factor deficiencies

	Factor Level (%) Sensitivity	
Factor	Cleared PT	Proposed PT ONE
II	20	20
V	35	35
VII	45	50
X	45	45

Fibrinogen levels from >15 mg/dL to 1200 mg/dl have no significant effect on PT ONE test card results; total variation in clotting time over this range was two seconds . Acidified citrate cannot be used to obtain samples for this test. Hematocrit (0-55%) has no effect on results obtained. Heparin levels above 0.75 U/ml have a slight effect. Lipid, to at least 14 mg/ml, had no effect. There was no effect of sample temperature. These characteristics are similar for the existing and proposed TAS PT test cards.

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Underfill of blood collection tubes had a greater effect on PT ONE results than did overfilling, but only tubes that were greatly underfilled produced samples that gave results outside the normal range for both test card types. Overfilling did not have a substantial effect on PT ONE results.

Clinical Performance Data: Clinical testing was done at one large hospital to establish substantial equivalence of the TAS PT ONE test cards to the TAS PT test card (the predicate device). Three hundred thirty eight blood and plasma samples drawn from 101 people (normal donors or patients undergoing warfarin therapy) were tested by the existing and proposed PT test cards on the TAS Analyzer. The correlation of test results from the PT ONE test cards and those from PT test cards had correlations of greater than 0.92 for each of several card lots tested.

The PT ONE test card was determined by CDI and by two independent testing labs to have an average ISI for blood and plasma of 1.0.

Conclusions: Sufficient information is included in this application to demonstrate that the TAS PT ONE test card, together with the TAS Analyzer, is as safe and effective as a legally marketed device (PT test cards) and that it does not raise different questions of safety and efficacy.

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