

**510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
DEVICE AND INSTRUMENT TEMPLATE**

A. 510(k) Number:

K041502

B. Purpose for Submission:

To change the name of a previously cleared analyzer, and to seek clearance for a new assay on that analyzer

C. Analyte:

Platelet aggregation

D. Type of Test:

Aggregation

E. Applicant:

Haemoscope Corporation

F. Proprietary and Established Names:

Thrombelastograph® (TEG®) Hemostasis Analyzer

Thrombelastograph® Platelet Mapping Assay

G. Regulatory Information:

1. Regulation section:
21 CFR 864.5700
2. Classification:
Class II
3. Product Code:
JOZ
4. Panel:
81 Hematology

H. Intended Use:

1. Intended use(s):
The TEG® Platelet Mapping Assay is intended to assess platelet function in patients who have received platelet inhibiting drugs such as aspirin, clopidogrel, abciximab, tirofiban, or eptifibatide.

2. Indication(s) for use:

The TEG Hemostasis System is a non-invasive diagnostic instrument designed to monitor and analyze the coagulation state of a blood sample in order to assist in the assessment of patient clinical hemostasis conditions.

The TEG analyzer is indicated for use with adult patients where an evaluation of their blood coagulation properties is desired. Coagulation evaluations are commonly used to assess clinical conditions such as post-operative hemorrhage and d/or thrombosis during and following cardiovascular surgery, organ transplantation, trauma, and cardiology procedures.

3. Special condition for use statement(s):

4. Special instrument Requirements:

For use with the Thromboelastograph® (TEG®) Hemostasis Analyzer (formally called Thromboelastograph® (TEG®) Coagulation Analyzer)

I. Device Description:

The TEG® Hemostasis System consists of a two-column TEG instrument, a computer interface module, and software. In addition, Haemoscope offers consumables needed to run samples on the/ed system, including disposable sample cups and pin, biological controls, sample modifiers, and pipetting and maintenance supplies.

The TEG Platelet Mapping Assay consists of a set of platelet agonists- adenosine diphosphate (ADP) and arachidonic acid (AA). When used on a heparinized blood sample, ADP and AA together with Activator F, measure the inhibition of platelet function (TEG MA parameter)

J. Substantial Equivalence Information:

1. Predicate device name(s):

a. Chrono-log Corporation Optical Platelet Aggregation Systems (K771198, K830749, K940792)

b. Chrono-log Corporation Platelet Aggregation Reagents (K850593, K922800)

c. Haemoscope Corporation TEG 5000 Series Analyzer (K002177)

2. Predicate K number(s):

3. Comparison with predicate:

Similarities				
Item	Device	Predicate a	Predicate b	Predicate c
Intended Use	Assess platelet function in patients who have received platelet inhibiting drugs	Perform platelet aggregation tests is PRP	To confirm normal platelet function and to diagnose platelet dysfunctions	Provide quantitative and qualitative indication of the hemostasis state of whole blood, PRP, or PPP
User Interface	User –selectable	Same	Same	Same

Differences				
Item	Device	Predicate a	Predicate b	Predicate c
Matrix	Whole blood	PRP	Whole blood	Whole blood, PRP, or PPP
Platelet function measurement method	Uses the TEG MA parameter	Asses the increase in light transmittance of the PRP sample following addition of an agonist	Assess the increase in light transmittance of the PRP sample following addition of an agonist	

K. Standard/Guidance Document Referenced (if applicable):**L. Test Principle:**

A heparinized patient sample is split. One aliquot containing only Activator F is run to yield a TEG MA that is an expression of fibrin only, MA_{FIBRIN}. Another aliquot measures platelets activated without thrombin and with the addition of ADP or AA plus Activator F. The ADP aliquot generates the TEG MA_{ADP} value, while the AA aliquot yields the MA_{AA} value. A standard kaolin-activated aliquot is analyzed to measure total possible platelet activation and yields TEG MA_{THROMBIN}.

The presence of platelet-inhibiting drugs is reflected in a reduction in the TEG MA values, and platelet inhibition then is a derived percentage based on MA without activating agents, and is computed separately for ADP- and TxA2 receptor inhibition.

Therefore, %MA reduction =

$$100 - \left[\left\{ \frac{MA_P - MA_{FIBRIN}}{MA_{THROMBIN} - MA_{FIBRIN}} \right\} * 100 \right]$$

M. Performance Characteristics (if/when applicable):1. Analytical performance:*a. Precision/Reproducibility:*

Evaluated according to NCCLS EP 15-P. Eight replicates were run simultaneously, and the experiment was repeated four times. Within-run precision of the MA parameter was 9%, total precision was 10%.

b. Linearity/assay reportable range:

Linearity was assessed following NCCLS EP6-P guidelines. Different volumes of abciximab were added to blood samples from volunteers who were not on any drugs prior to testing. TEG MA parameter showed linearity from 0 μ L to 3 μ L of abciximab

*c. Traceability (controls, calibrators, or method):**d. Detection limit:**e. Analytical specificity:*

Interference factors assessment was carried out according to NCCLS EP7-P for thrombin. Results demonstrated that heparin concentrations from 4 IU/ml upward were sufficient to inhibit thrombin.

The package insert cautions the user to use sufficient amounts of heparin in the blood sample to ensure that all the thrombin is suppressed (i.e. vacutainer tubes containing > 14.5 IU heparin/ml of blood should be used in phlebotomy) and that the sample would be analyzed within two hours of blood draw.

*f. Assay cut-off:*2. Comparison studies:*a. Method comparison with predicate device:*

500 samples were obtained from adults between the ages of 18 and 85. The patient population included healthy volunteers, patients undergoing cardiopulmonary bypass surgery, and patients undergoing cardiac catheterization. Each sample was divided into two, one for TEG analysis, and one for optical aggregometry (Chrono-log). Both assays were conducted according to the manufacturers recommended instructions.

Regression analysis was performed between the two data sets ($r=0.948$, $r^2=.899$, $y = 0 + 1.2888x$).

b. Matrix comparison:

3. Clinical studies:

a. Clinical sensitivity:

Defined as the percentage of patients who are not on anti-platelet drugs and achieved a percentage of platelet inhibition $\leq 20\%$. 34 subjects were tested using the TEG Platelet Mapping Assay as labeled. Subjects were tested before and after clopidogrel or aspirin dosing.

Parameter	Clopidogrel	Aspirin
Sensitivity	80%	100%
X^2	14.275	25.108
DF	1	1
p	$\leq .001$	$\leq .001$

b. Clinical specificity:

Clinical specificity is defined as the percentage of patients who are on anti-platelet drugs and achieved a percentage of platelet inhibition $>20\%$. Clinical studies have shown that values below 20% reflect resistance to this class of drugs.

Parameter	Clopidogrel	Aspirin
Specificity	86%	92%
X^2	14.275	25.108
DF	1	1
p	$\leq .001$	$\leq .001$

c. Other clinical supportive data (when a and b are not applicable):

Aspirin Study

TEG MA measurements were taken from 10 normal volunteers before and after a 325 mg aspirin dosing. Results show a statistically significant difference ($p < .001$) between the mean MA values before and after receiving aspirin. Results showed that the MA mean in the presence of aspirin was reduced by 86.5% due to platelet inhibition by aspirin. The percent of platelet inhibition was also analyzed, and demonstrated a statistically significant difference ($p < .001$) between the % inhibition before receiving aspirin and after receiving aspirin. Results show that the % platelet inhibition after aspirin dosing increased by 94.3%.

Clopidogrel study

TEG MA measurements were taken from 67 cardiac patients both with and without 75 mg qd clopidogrel dosing. The group consisted of patients being treated for various cardiac conditions, who were either had or had not been given a loading dose of clopidogrel (300 mg) followed by daily dosing of 75 mg for various durations. Results show a statistically significant difference ($p < .001$) between the mean MA values for patients with and without clopidogrel. Results showed that the MA mean in the presence of clopidogrel was reduced by 48.3% due to platelet inhibition by clopidogrel.

4. Clinical cut-off:5. Expected values/Reference range:

For the TEG Platelet Mapping Assay, a patient serves as a “subject-specific” reference. Reference values for % platelet inhibition are individualized, in that a patient serves as his own control, providing both the lower and upper limits of activation, against which his inhibition is measured.

N. Instrument Name:

Thromboelastograph® (TEG®) Hemostasis Analyzer (formally called
Thromboelastograph® (TEG®) Coagulation Analyzer)

O. System Descriptions:1. Modes of Operation:

Manual, and simultaneous

2. Software:

FDA has reviewed applicant's Hazard Analysis and software development processes for this line of product types:

Yes ☒ or No ☐

3. Sample Identification:

Manual input or bar code

4. Specimen Sampling and Handling:

Samples are manually mixed and loaded into TEG cup wells and loaded onto instrument for testing

5. Assay Types:

4 coagulation parameters (R, K, α , MA)

6. Reaction Types:

Clotting, aggregation

7. Calibration:

Electronic calibration

8. Quality Control:

Mechanical and electronic function checks

Calibration and calibration verification

Level I and Level II biological controls

P. Other Supportive Instrument Performance Characteristics Data Not Covered In The “L. Performance Characteristics” Section Of The SE Determination Decision Summary:

Q. Conclusion:

The submitted material in this premarket notification is complete and supports a substantial equivalence decision.