K961500

510(k) Summary

JUN 11 1996

[redacted]

Introduction

According to the requirements of 21 CFR 807.92, the following information provides sufficient detail to understand the basis for a determination of substantial equivalence.

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1) Submitter name, address, contact

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Date Prepared: April 12, 1996

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2) Device name

Proprietary name: Elecsys Troponin T

Common name: troponin test

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3) Predicate device

We claim substantial equivalence to the CARDIAC T® Troponin T Enzymun Test assay.

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4) Device Description

The Elecsys ® Troponin T test principle is based on a two step sandwich with streptavidin microparticles and electrochemiluminescence detection.

Total duration of assay: 9 minutes.

- 1st incubation: 15 µl of sample, a biotinylated monoclonal troponin T-specific antibody and a monoclonal troponin T-specific antibody labeled with a ruthenium complex react to form a sandwich complex
- 2nd incubation: after the addition of streptavidin-coated microparticles, the complex becomes bound to the solid phase via interaction of biotin and streptavidin
- The reaction mixture is aspirated into the measuring cell where the microparticles are magnetically captured onto the surface of the electrode. Unbound substances are then removed with ProCell. Application of a voltage to the electrode then induces chemiluminescent emission which is measured by a photomultiplier

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4) Device Description, cont.

- Results are determined via a calibration curve which is instrument-specifically generated by 2-point calibration and a master curve provided via the reagent bar code

5) Intended use

For the *in vitro* quantitative determination of troponin T in human serum and plasma.

5) Indications for use

Diagnosis of acute myocardial infarction (AMI) is generally based on the presence of at least two of three classic findings: clinical symptoms, diagnostic ECG, and serological findings of abnormal levels of total CK, LD or their isoenzymes. Often, due to the presence of clinical symptoms and changes in the ECG, the CK, CK-MB, LD and LD1 serve primarily to confirm and monitor the course of the infarction. At other times, when chest pain is atypical, or ECG changes are non-diagnostic or absent, these markers provide important diagnostic information. Limitations to these serum markers include a relatively narrow diagnostic window, difficulty in interpreting small increases and a lack of cardiac specificity. Troponin T can be an effective serum marker whose cardiac specificity and wide diagnostic window makes it a valuable tool in the diagnosis of AMI.[2,4]

Troponin T has been shown to be elevated in all patients with AMI who are diagnosed by World Health Organization (WHO) criteria.[1] Troponin T frequently appears in serum as early as one to three hours after the onset of pain.[2,5] The sensitivity of troponin T reaches 100% within hours and remains at a high sensitivity level until day five. After 48 hours the CK-MB assay is frequently of little diagnostic value.[1] Troponin T also remains elevated longer than total LD.[3] Its levels can be measured for up to 14 days.[5] Thus, the diagnostic window is broader due to the length of time troponin T is elevated in serum. The time interval of elevation in serum ranges from three hours to > 14 days.[1,5]

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5) Indications for use, (cont.)

The specificity and sensitivity of troponin T measurements aid in both the early and late diagnosis of AMI. [6] Troponin T elevations have also been measured in patients with the clinical diagnosis of unstable angina due to the sensitivity of troponin T for detecting minor myocardial damage. In cases of AMI with minimal cardiac damage, low elevations of CK and CK-MB are difficult to interpret due to the presence of normal levels of these enzymes in the blood, and their lack of cardiac specificity. The specificity of troponin T to cardiac tissue is of value in these difficult patients. [4,6]

References

1. Katus HA, Scheffold T, Remppis A, And Zehlein J. Proteins of the troponin complex. Laboratory Medicine. 1992;23(No. 5):311-317.
2. Katus HA, Remppis A, Neumann FJ, et al. Diagnostic efficiency of troponin T measurements in acute myocardial infarction. Circulation. 1991;83(No. 3):902-912.
3. Katus HA, et al. Enzyme linked immuno assay of cardiac troponin T for the detection of acute myocardial infarction in patients. J Mol Cell Cardiol 1989;21:1349-1353.
4. Remppis A, Katus HA, Scheffold T, et al. Diagnostic efficiency of troponin T measurements in acute myocardial infarction. Eur Heart J 11. 1990;(suppl):351.
5. Mair J, Artner-Dworzak E, Puschendorf B, and Dienstl F. Plasma troponin T in acute myocardial infarction. Eur Heart J 11. 1990;(suppl):351.

Mair J, Artner-Dworzak E, Lechleitner P, et al. Cardiac troponin T in diagnosis of acute myocardial infarction. Clin Chem. 1991;37(No. 6):845-854.

6) Comparison to predicate device

The Boehringer Mannheim Elecsys Troponin T is substantially equivalent to other products in commercial distribution intended for similar use. Most notably it is substantially equivalent to the currently marketed Cardiac T Troponin T Enzymun-Test.

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6) Comparison to predicate device (cont.)

The following table compares the Elecsys Troponin T with the predicate device, Cardiac T Troponin T Enzymun Test. Specific data on the performance of the test have been incorporated into the draft labeling in attachment 5. Labeling for the predicate device in provided in attachment 6.

Similarities:

- Intended use: immunoassay for the *in vitro* quantitative determination of troponin T
- The same antibodies are used for both assays - monoclonal anti-troponin T antibodies (mouse)
- Capture principle: streptavidin / biotin
- Two-step sandwich immunoassay
- for use as an adjunct to other diagnostic procedures and test currently used (i.e., WHO criteria or current clinical pathway for the diagnosis of myocardial injury

Differences:

Feature	Elecsys Troponin T	Cardiac T Troponin T Enzymun Test
Reaction test principle	streptavidin microparticles and electrochemiluminescence technology	streptavidin-coated tubes and enzyme immunoassay technology
Sample type	human serum and plasma	human serum
Sample volume	15µl	140µl
Instrument required	Elecsys 2010	ES 300
Calibration	a two point calibration renewal is recommended every 7 days or 1 month if the same reagent lot is used and the reagent pack is consumed within 7 days	a full calibration curve run is recommended every 2 weeks

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F. Substantial equivalence, (cont.) **Performance Characteristics:**

Feature	Elecsys Troponin T	Cardiac T Troponin T Enzymun Test
NCCLS (modified.) Precision		
Sample	CC1 CC2 HS1 HS2 HS3	
N	60 60 60 60 60	60 60 60
Mean	0.103 2.506 5.992 1.298 0.439	0.062 0.326 2.144
wi/in run %CV	5.12 2.94 2.93 2.35 2.90	8.6 2.3 1.3
total run %CV	7.23 5.77 5.42 4.15 4.56	18.2 6.6 4.4
Sensitivity	Lower Detection Limit: 0.01 ng/ml	Lower Detection Limit: 0.02 ng/ml
Assay range (LDL to highest standard)	0.01 - 25.0 ng/ml	0.02 - 15.0 ng/ml
Method Comparison	vs. Cardiac T Troponin T (Least Squares) N = 54 y = -0.033 + 0.996x r = 0.969 (Passing/Bablok) N = 54 y = 0.0094 + 0.96x r = 0.969	vs. Cardiac T ELISA Troponin T: (Passing/Bablok) N = 233 y = 1.07x - 0.02 r = 0.89
Interfering substances	No interference up to:	No interference up to:
Hemoglobin	1.5 g/dl	1 g/dl
Lipemia	1500 mg/dl	1500 mg/dl
Bilirubin	36 mg/dl	61 mg/dl
Biotin	100 mg/dl	20 ng/ml
Specificity	% cross reaction (to 2,000 ng/ml)	% cross reaction (to 2,000 ng/ml)
s troponinT	0.001	<0.005
c troponin I	0.002	<0.005
s tropomyosin	0.001	<0.005
c myosin light chain	0.003	<0.005