

**510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
ASSAY ONLY TEMPLATE**

A. 510(k) Number:

k140859

B. Purpose for Submission:

Adding pediatric reference ranges to previously cleared assays (cleared under k060090 and k053531)

C. Measurand:

Thyroid Stimulating Hormone (TSH)

Free Thyroxine (FT4)

D. Type of Test:

Quantitative, chemiluminescence immunoassay

E. Applicant:

Siemens Healthcare Diagnostics Inc.

F. Proprietary and Established Names:

Dimension Vista® Thyroid Stimulating Hormone Flex® reagent cartridge, TSH

Dimension Vista® Free Thyroxine Flex® reagent cartridge, FT4

G. Regulatory Information:

1. Regulation section:

21 CFR § 862.1690, Thyroid stimulating hormone test system

21 CFR §862.1695, Free Thyroxine test system

2. Classification:

Class II

3. Product code:

JLW

CEC

4. Panel:

Clinical Chemistry (75)

H. Intended Use:

1. Intended use(s):

See Indications(s) for use below

2. Indication(s) for use:

Dimension Vista® TSH Cartridge: The TSH method is an in vitro diagnostic test for the quantitative measurement of Thyroid Stimulating Hormone in human serum and plasma on the Dimension Vista® System. Measurements of thyroid stimulating hormone produced by the anterior pituitary are used in the diagnosis of thyroid or pituitary disorders.

Dimension Vista® FT4 Cartridge: The FT4 method is an in vitro diagnostic test for the quantitative measurement of Free Thyroxine in human serum and plasma on the Dimension Vista® System. Measurements obtained by this device are used in the diagnosis and treatment of thyroid diseases.

3. Special conditions for use statement(s):

For prescription use

4. Special instrument requirements:

Dimension Vista® System

I. Device Description:

Dimension Vista® TSH Cartridge:

The Dimension Vista® TSH Flex® reagent cartridge is an in vitro diagnostic device that consists of prepackaged liquid reagents in a plastic twelve-well cartridge. The device contains the following reagents: biotinylated TSH antibody (mouse monoclonal), TSH antibody coated Chemibeads (mouse monoclonal) and streptavidin Sensibeads (recombinant).

Dimension Vista® FT4 Cartridge:

The Dimension Vista® FT4 Flex® reagent cartridge is an in vitro diagnostic device that consists of prepackaged liquid reagents in a plastic twelve-well cartridge. The device contains the following reagents: liquid streptavidin Sensibeads (recombinant), liquid T3 Chemibeads and liquid FT4 biotinylated antibody (mouse monoclonal).

J. Substantial Equivalence Information:

1. Predicate device name(s):

Dimension Vista® TSH Cartridge: Dimension Vista® Thyroid Stimulating Hormone Flex® reagent cartridge

Dimension Vista® FT4 Cartridge: Dimension Vista® Free Thyroxine Flex® reagent cartridge

2. Predicate 510(k) number(s):

Dimension Vista® TSH Cartridge: k060090

Dimension Vista® FT4 Cartridge: k053531

3. Comparison with predicate:

Dimension Vista® TSH Cartridge:

Similarities and Differences		
Item	Candidate device	Predicate device Dimension Vista® Thyroid Stimulating Hormone Flex® reagent cartridge (k060090)
Intended Use	The TSH method is an in vitro diagnostic test for the quantitative measurement of Thyroid Stimulating Hormone in human serum and plasma on the Dimension Vista® System.	Same
Reagents	Dimension Vista® Thyroid Stimulating Hormone Flex® reagent cartridge	Same

Similarities and Differences		
Item	Candidate device	Predicate device Dimension Vista® Thyroid Stimulating Hormone Flex® reagent cartridge (k060090)
Instruments	Dimension Vista® 500, 1000T, 1500 and 3000T systems	Same
Analytical Measuring Range (Assay Range)	0.005 – 100 µIU/mL	Same
Adult Reference Intervals	0.358 – 3.74 µIU/mL	Same
Pediatric Reference Ranges	Infants (01 – 23 months) 0.816 – 5.91 µIU/mL Children (02 – 12 years) 0.662 - 3.90 µIU/mL Adolescents (13 – 20 years) 0.463 - 3.98 µIU/mL	None

Dimension Vista® FT4 Cartridge:

Similarities and Differences		
Item	Candidate device	Predicate device Dimension Vista® Free Thyroxine Flex® reagent cartridge (k053531)
Intended Use	The FT4 method is an in vitro diagnostic test for the quantitative measurement of Free Thyroxine in human serum and plasma on the Dimension Vista® System.	Same
Reagents	Dimension Vista® Free Thyroxine Flex® reagent cartridge	Same
Instruments	Dimension Vista® 500, 1000T, 1500 and 3000T systems	Same
Analytical Measuring Range (Assay Range)	0.1 – 8.0 ng/dL	Same
Adult Reference Intervals	0.76 – 1.46 ng/dL	Same

Similarities and Differences		
Item	Candidate device	Predicate device Dimension Vista® Free Thyroxine Flex® reagent cartridge (k053531)
Pediatric Reference Ranges	Infants (01 – 23 months) 0.88 - 1.48 ng/dL Children (02 – 12 years) 0.81 - 1.35 ng/dL Adolescents (13 – 20 years) 0.78 - 1.33 ng/dL	None

K. Standard/Guidance Document Referenced (if applicable):

Defining, Establishing and Verifying Reference Intervals in the Clinical Laboratory;
 Approved Guideline -- Third Edition (CLSI C28-A3c).

L. Test Principle:

Dimension Vista® TSH Cartridge: The TSH method is a homogeneous, sandwich chemiluminescent immunoassay based on LOCI® technology. The LOCI® reagents include two synthetic bead reagents and a biotinylated anti-TSH monoclonal antibody fragment. The first bead reagent (Sensibeads) is coated with streptavidin and contains a photosensitizer dye. The second bead reagent (Chemibeads) is coated with a second anti-TSH monoclonal antibody and contains chemiluminescent dye. Sample is incubated with biotinylated antibody and Chemibeads to form bead-TSH-biotinylated antibody sandwiches. Sensibeads are added and bind to the biotin to form bead-pair immunocomplexes. Illumination of the complex at 680 nm generates singlet oxygen from Sensibeads which diffuses into the Chemibeads, triggering a chemiluminescent reaction. The resulting signal is measured at 612 nm and is a direct function of the TSH concentration in the sample.

Dimension Vista® FT4 Cartridge: The FT4 method is a homogeneous, sequential, chemiluminescent immunoassay based on LOCI® technology. The LOCI® reagents include two synthetic bead reagents and a biotinylated anti-T4 mouse monoclonal antibody. The first bead reagent (Chemibeads) is coated with triiodothyronine (T3), a naturally occurring, weaker binding analog of T4, and contains chemiluminescent dye. The second bead reagent (Sensibeads) is coated with streptavidin and contains a photosensitizer dye. In a first step, sample is incubated with biotinylated antibody which allows T4 from the sample to saturate a fraction of the biotinylated antibody that is directly related to the free T4 concentration. In a second step, T3 chemibeads are added and form bead/ biotinylated antibody immunocomplexes with the non-saturated fraction of the biotinylated antibody. Sensibeads are then added and bind to the biotin to form bead pair immunocomplexes. Illumination of the complex at 680 nm generates singlet oxygen from Sensibeads which diffuses into the Chemibeads, triggering a chemiluminescent reaction. The resulting signal is measured at 612 nm and is an inverse function of the FT4 concentration in the sample.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. Precision/Reproducibility:

Provided in k060090 and k053531.

b. Linearity/assay reportable range:

Provided in k060090 and k053531.

c. Traceability, Stability, Expected values (controls, calibrators, or methods):

Provided in k060090 and k053531.

d. Detection limit:

Provided in k060090 and k053531.

e. Analytical specificity:

Provided in k060090 and k053531.

f. Assay cut-off:

Provided in k060090 and k053531.

2. Comparison studies:

a. Method comparison with predicate device:

Provided in k060090 and k053531.

b. Matrix comparison:

Provided in k060090 and k053531.

3. Clinical studies:

a. Clinical Sensitivity:

Not Applicable

b. Clinical specificity:

Not Applicable

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

Not Applicable

4. Clinical cut-off:

Not Applicable

5. Expected values/Reference range:

Serum samples were collected at 8 US sites to be representative of the US population diversity. Data from a total of 421 patients (82 infants, 191 children, and 148 adolescents) were analyzed on one Dimension Vista 1500 instrument to establish the Dimension Vista FT4 and TSH assay reference ranges for the studied pediatric population. Two lots of each cartridge type were used in these studies. Results from the 2.5th to 97.5th percentile were used as the pediatric reference range.

The TSH reference interval for the infant group was calculated by performing a log-transformation of the raw data followed by the application of the robust symmetric method to the transformed data. This approach was selected to be most appropriate for the smaller sample size as the data from this population was highly skewed to the right and a transformation was necessary to obtain a normal distribution. The sponsor has added language to their package insert explaining the uncertainty in the value for the upper limit of the reference range. A non-parametric approach was used to establish the reference intervals for children and adolescents.

Age Range	Reference Ranges
Infants (01 – 23 months)	0.816 - 5.91 μ IU/mL
Children (02 – 12 years)	0.662 - 3.90 μ IU/mL
Adolescents (13 – 20 years)	0.463 - 3.98 μ IU/mL

Confidence intervals for the limits of the infant reference range are as follows:

	Lower Limit of reference range	Upper Limit of reference range
90% confidence intervals:	0.683 - 0.962 μ IU/mL	5.06 - 7.09 μ IU/mL

The FT4 reference interval for the infant group was calculated using the robust symmetric method to accommodate the smaller sample size of this population. A non-parametric approach was used to establish the reference intervals for children and adolescents.

Age Range	Reference Ranges
Infants (01 – 23 months)	0.88 - 1.48 ng/dL
Children (02 – 12 years)	0.81 - 1.35 ng/dL
Adolescents (13 – 20 years)	0.78 - 1.33 ng/dL

Confidence intervals for the limits of the infant reference range are as follows:

	Lower Limit of reference range	Upper Limit of reference range
90% confidence intervals:	0.82 – 0.95 ng/dL	1.42 – 1.53 ng/dL

N. Proposed Labeling:

The labeling is sufficient and it satisfies the requirements of 21 CFR Part 809.10.

O. Conclusion:

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