

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

A. 510(k) Number:

k052301

B. Purpose for Submission:

Clearance of a new device

C. Measurand:

Thyrotropin (TSH)

D. Type of Test:

Quantitative Chemiluminescence Immunoassay

E. Applicant:

Qualigen, Inc.

F. Proprietary and Established Names:

FastPack[®] TSH Immunoassay

G. Regulatory Information:

1. Regulation section:

21 CFR § 862.1690, Thyroid stimulating hormone test system; 862.1660, Quality control material (assayed and unassayed); 862.1150, Calibrator

2. Classification:

Class II (Assay), Class I (Control), Class II (Calibrator)

3. Product code:

JLW, Radioimmunoassay, thyroid-stimulating hormone; JJX, Quality control material (assayed and unassayed); JIT, Calibrator

4. Panel:

Clinical Chemistry (75)

H. Intended Use:

1. Intended use(s):

See Indication(s) for use below

2. Indication(s) for use:

The FastPack[®] TSH Immunoassay is a paramagnetic particle, chemiluminescence immunoassay for the in vitro quantitative determination of Thyroid-Stimulating Hormone in human plasma. The measurements of thyroid stimulating hormone (TSH) produced by the anterior pituitary are used in the diagnosis of thyroid or pituitary disorders. The FastPack[®] TSH is designed for use with the FastPack[®] System.

The FastPack[®] TSH Calibrator is intended to calibrate the FastPack[®] System when used for the quantitative determination of TSH in human plasma.

The FastPack[®] Controls are assayed quality control materials for the verification of the accuracy and precision of the FastPack[®] System when used for the

quantitative determination of PSA in human serum and plasma, and TSH in human plasma.

3. Special conditions for use statement(s):

None

4. Special instrument requirements:

General laboratory equipment, FastPack® System

I. Device Description:

The FastPack® TSH Immunoassay is a chemiluminescence assay based on the “sandwich” principle consisting of a biotinylated mouse monoclonal TSH-specific antibody, a mouse monoclonal TSH antibody labeled with alkaline phosphatase, streptavidin-coated paramagnetic particles, chemiluminogenic substrate, and wash buffer.

J. Substantial Equivalence Information:

1. Predicate device name(s):

Abbott Laboratories IMx Ultrasensitive hTSH II

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

k942566

3. Comparison with predicate:

Similarities		
Item	Device	Predicate
Intended Use	For the <i>in vitro</i> quantitative determination of thyroid-stimulating hormone (TSH) in human plasma.	For the <i>in vitro</i> quantitative measurement of thyroid-stimulating hormone (TSH) in human serum and Heparinized plasma.
Assay Methodology	Sandwich immunoassay	Sandwich immunoassay
Data Analysis	Internal data reduction via microcomputer	Internal data reduction via microcomputer
Detector	Photomultiplier Tube (PMT)	Photomultiplier Tube (PMT)
Label	Alkaline Phosphatase	Alkaline Phosphatase

Differences		
Item	Device	Predicate
Sample Type	Plasma	Serum, Heparinized Plasma
Antibody	Monoclonal/Monoclonal	Polyclonal/Monoclonal

Differences		
Item	Device	Predicate
Solid Phase	Paramagnetic Particles	Latex Microparticles
Substrate	ImmunGlow™ (Indoxyl-3-phosphate and lucigenin)	4-Methylumbelliferyl Phosphate
Detection	Chemiluminescence	Fluorescence
Instrument Required	FastPack® System	Abbot Laboratories IMx® System

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

L. Test Principle:

A mixture of biotinylated TSH-specific antibody and TSH antibody labeled with alkaline phosphatase reacts with TSH from the patient’s sample forming a “sandwich” complex in the mixture. Streptavidin-coated paramagnetic particles are added to the reaction mixture. Wash steps remove unbound materials. Chemiluminogenic substrate is added to the bound complex and results in “glow” chemiluminescence measured in the FastPack® System. The amount of “glow” from the bound labeled-antibody is directly proportional to the concentration of TSH in the sample. The concentration is extrapolated from a standard curve generated from calibrators (sold separately) and verified by controls (sold separately).

M. Performance Characteristics (if/when applicable):

1. Analytical performance:
 - a. *Precision/Reproducibility:*

Three patient plasma pools were assayed over 10 days. The assays were run in duplicate on three analyzers using two lots of reagents. Results for precision are summarized below.

	Pool 1		Pool 2		Pool 3		Pool 4	
Grand Mean, μIU/mL	0.53		1.54		12.39		46.30	
	Std. Dev.	%CV	Std. Dev.	%CV	Std. Dev.	%CV	Std. Dev.	%CV
Run to Run	0.055	10.3	0.110	7.4	0.64	5.2	2.3	5.1
Instrument to Instrument	0.013	2.5	0.010	0.5	0.14	1.1	2.2	5.0
Lot to Lot	0.015	2.9	0.005	0.3	0.08	4.8	0.5	1.1
Total	0.057	10.8	0.15	9.7	0.93	7.5	4.4	9.5

- b. *Linearity/assay reportable range:*

A plasma sample with roughly 100 μ IU/mL was diluted with 0 μ IU/mL diluent to produce samples with 75, 50, 25, and 10 μ IU/mL TSH. Each of these samples was

assayed in triplicate. Percent recoveries ranged from 96.1-104.1% of expected. Results are summarized below.

Sample	Expected Value, $\mu\text{IU/mL}$	Observed Value, $\mu\text{IU/mL}$	% Recovery
TSH 100	111.8	111.8	100
TSH 75	83.9	80.6	96.1
TSH 50	55.9	58.2	104.1
TSH 25	28.0	28.8	103
TSH 10	11.2	11.8	105
Diluent	0.0	0.0	-

Observed = 0.9947(Expected); $r = 0.9991$

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

For the calibrator, a master curve is generated in the factory for each lot of the FastPack reagents. The 6-point master curve is generated using master calibrators referenced to the WHO 2nd IRP 80/558 standard. The master curve information is transferred to the FastPack System through the barcode on the FastPack.

For the control, TSH antigen is procured as a purified powder (>90%). An antigen stock is prepared by adding the purified powder to a Tris buffer containing bovine serum albumin, and sucrose. The intermediate stock is used to prepare the final concentration of TSH in the calibrator/control matrix. The values are assigned using standards (Monobind, Inc.) traceable to the WHO 2nd IRP 80/558 standard.

The calibrator and control stability was tested using five different accelerated stability testing groups each with samples being tested at 30°C and 37°C. Based on the accelerated stability data, twelve month stability at 2-8°C is claimed for the TSH calibrators and controls. Real-time studies will continue to confirm and extend the dating.

d. Detection limit:

Functional sensitivity was determined by measuring twenty-seven plasma samples on three FastPack instruments using two lots of TSH FastPack assayed over a period of one week. The concentration at which assay imprecision was calculated to be 20 % CV (by interpolation) is 0.13 $\mu\text{IU/mL}$.

The analytical sensitivity, defined as the lowest signal that can be distinguished from the zero standard by 2 standard deviations, was assessed by measuring 10 replicates on three FastPack instruments using two reagent lots of the zero level calibrator. The analytical sensitivity was determined to be 0.01 $\mu\text{IU/mL}$.

The potential for a high dose hook effect was evaluated for this assay by spiking a human serum standard that had been completely depleted of TSH. Spiking ranged from 0

μIU/mL to 5000 μIU/mL. No effect was observed at 5000 μIU/mL.

e. Analytical specificity:

To test the crossreactivity of this device to similar endogenous analytes, plasma samples were spiked with hCG, LH, and FSH at 200000, 500, and 500 mIU/mL, respectively, and compared to a non-spiked base pool. No analytes tested significantly cross-reacted in this analysis as the cross-reactivity was shown to be 0.00% for all analytes.

A patient sample was spiked with specific concentrations of potential interfering substances, and the TSH values were obtained using the FastPack® TSH Immunoassay. No interference was found. Results are summarized below.

			Control	Test	
Heparin Plasma		mg/dL	[TSH]	[TSH]	
[TSH] = normal		added	μIU/mL	μIU/mL	% Recovery of Ctrl
	Bilirubin	40	2.16	2.19	101%
	Hemoglobin	1,000	1.99	2.08	105%
	Triglycerides	1,000	2.14	2.12	99%

f. Assay cut-off: N/A

2. Comparison studies:

a. Method comparison with predicate device:

Clinical samples (n=96 obtained as frozen plasma samples through outside laboratories) were tested using the device and the predicate and compared. Results were determined using linear regression and are summarized below.

$$\text{Device} = 1.03(\text{Predicate}) + 0.83; r = 0.97$$

b. Matrix comparison:

A heparin plasma pool from four patients was aliquoted into four equal portions which were then spiked with TSH to produce final concentrations of 0.5, 2.5, 5.0, and 20.0 μIU/mL. These samples as well as the original pool were then assayed for TSH using the FastPack System and the FastPack TSH Immunoassay to determine the percent recoveries of the spiked TSH. Results are summarized below.

Sample Number	Expected Value, μIU/mL	Observed Value, μIU/mL	% Recovery
1	1.58	1.58	100
2	2.08	2.07	99.8
3	4.08	4.37	107.2
4	6.58	6.97	105.9
5	21.58	20.93	97.0

3. Clinical studies:
 - a. *Clinical Sensitivity:*
 - b. *Clinical specificity:*
 - c. *Other clinical supportive data (when a. and b. are not applicable):*
4. Clinical cut-off:
5. Expected values/Reference range:

Plasma samples from 211 normal, apparent healthy individuals were obtained from a commercial source and assayed with the FastPack[®] TSH Immunoassay. The expected normal range for the FastPack[®] TSH Immunoassay was found to be 0.66-5.45 μ IU/mL based on the central 95% of the frequency distribution.

N. Proposed Labeling:

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

O. Conclusion:

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