

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

A. 510(k) Number:

k053533

B. Purpose for Submission:

Changes to labeling and modified Indications for Use

C. Measurand:

Intact parathyroid hormone

D. Type of Test:

Quantitative, Chemiluminescent, Immunometric assay

E. Applicant:

Diagnostic Products Corporation

F. Proprietary and Established Names:

IMMULITE/IMMULITE 1000 Turbo Intact PTH Assay

G. Regulatory Information:

1. Regulation section:

21 CFR 862.1545 – Parathyroid hormone test system

2. Classification:

Class II

3. Product code:

CEW

4. Panel:

Chemistry (75)

H. Intended Use:

1. Intended use(s):

See Indications for Use below

2. Indication(s) for use:

For *in vitro* diagnostic use with the IMMULITE and IMMULITE 1000 Analyzers—for the quantitative measurement of intact parathyroid hormone parathyrin, PTH) test system in EDTA plasma or serum. It is intended as an aid in the differential diagnosis of hypercalcemia and hypocalcemia and can be used intraoperatively.

3. Special conditions for use statement(s):

This device is for prescription use.

4. Special instrument requirements:

IMMULITE and IMMULITE 1000 analyzers

I. Device Description:

The Turbo Intact PTH Kit is supplied with the following:

- 50 Turbo Intact PTH Units. Each unit contains one bead coated with affinity purified goat polyclonal anti-PTH (44-84) antibody
- 1 Turbo Intact Reagent Wedge. 7.5 mL alkaline phosphatase (bovine calf intestine) conjugated to affinity purified goat polyclonal anti-PTH (1-34) antibody in buffer with preservative.
- 2 vials Intact PTH Adjustors (Low and High) of lyophilized synthetic human Intact PTH in a buffered matrix

J. Substantial Equivalence Information:

1. Predicate device name(s):

IMMULITE Turbo Intact PTH Assay

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

k992105

3. Comparison with predicate:

	Similarities	
Item	Predicate	Device
Assay Principle	Solid phase, chemiluminescent immunometric assay	Same
Antibodies	Goat polyclonal anti-PTH (44-84) as the capture antibody and goat polyclonal anti-PTH (1-34) conjugated to alkaline phosphatase as the detection antibody	Same
Analytical Sensitivity	4.0 pg/mL	Same
Reference: Range	8-74 pg/mL	Same

	Differences	
Item	Predicate	Device
Indications for Use	For <i>in vitro</i> diagnostic use with the IMMULITE and IMMULITE 1000 Analyzers—for the quantitative measurement of intact parathyroid hormone (parathyrin, PTH) test system in EDTA plasma or serum. It is intended as an aid in the differential diagnosis of hypercalcemia and hypocalcemia.	For <i>in vitro</i> diagnostic use with the IMMULITE and IMMULITE 1000 Analyzers—for the quantitative measurement of intact parathyroid hormone (parathyrin, PTH) test system in EDTA plasma or serum. It is intended as an aid in the differential diagnosis of hypercalcemia and hypocalcemia and can be used intraoperatively.
Limitations	It is not intended for the diagnosis of hypercalcemia and hypocalcemia.	It is not intended for the diagnosis or monitoring of hypercalcemia and hypocalcemia. EDTA sample is the preferred sample type for rapid turnaround time particularly in the intraoperative setting

Instructions	PTH assays are used intraoperatively to verify a decline in PTH production after resection. When used intraoperatively, it has been recommended that two or more samples be collected at least 5-10 minutes apart.	PTH assays are used intraoperatively to verify a decline in PTH production after resection. When used intraoperatively, it has been recommended that intact PTH concentrations be measured at baseline before exploration and then at 5-10 minutes post tumor excision with a 50% decrease in values observed if all hypersecreting tissue has been removed.
--------------	--	--

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

None referenced

L. Test Principle:

IMMULITE/IMMULITE 1000 Turbo Intact PTH is a solid phase chemiluminescent immunometric assay utilizing a goat polyclonal anti-PTH (44-84) antibody as the capture antibody and a goat polyclonal anti-PTH (1-34) antibody conjugated to alkaline phosphatase as the detection antibody.

IMMULITE/IMMULITE 1000 Turbo mode processes samples at an accelerated rate, with time to first result being 15 minutes and subsequent samples are generated every 45 seconds.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. Precision/Reproducibility:

Performance Characteristics were established in k992105

b. Linearity/assay reportable range:

Performance Characteristics were established in k992105.

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

Performance Characteristics were established in k99105.

d. Detection limit:

Performance Characteristics were established in k992105.

e. Analytical specificity:

Performance Characteristics were established in k992105.

f. Assay cut-off:

Performance Characteristics were established in k992105.

2. Comparison studies:

a. Method comparison with predicate device:

Performance Characteristics were established in k992105.

b. Matrix comparison:

Performance Characteristics were established in k992105.

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):

Clinical studies were performed at the Mayo Clinic¹, Rochester, MN (Kao, PC et al.) and Washington University School of Medicine/Barnes Jewish Hospital², St. Louis, MO (Johnson, LR, et. al) to evaluate the Immulite/Immulite 1000 Turbo Intact PTH assay results on patients undergoing parathyroidectomy. These assay results were compared to clinical data and reported in the following peer reviewed journals:

1. Kao PC, van Heerden JA, Farley DR, et al. Intraoperative monitoring of parathyroid hormone with a rapid automated assay that is commercially available. *Annal of Clin & Lab Science* 2002; 32(3):244-251.

2. Johnson LR, Doherty G, Lairmore T, et al. Evaluation of the performance and clinical impact of a rapid intraoperative parathyroid hormone assay in conjunction with preoperative imaging and concise parathyroidectomy. *Clin Chem* 2001; 47(5):919-925.

Study #1:

The Mayo Clinic Study was conducted between July 1999 and October 2001 using the currently marketed Immulite/Immulite 1000 Turbo Intact PTH assay.

EDTA blood specimens were collected from forty seven patients undergoing parathyroidectomy at the following time intervals: baseline (prior to removing the parathyroid gland) and 5, 10, and 20 minutes after parathyroid resection. Turbo Intact PTH results on ninety-four specimens were immediately analyzed. These results were compared to the in-house rapid assay and generated the following correlation: $y = 1.047x + 0.186$; $r = 0.968$.

45 of 47 patients (96%) had their plasma PTH levels decrease to <25 % of the baseline levels. In 41 of 47 patients (87%), the PTH value decreased to <5pmol/L (provisional reference range) within 20 minutes after tumor excision.

The assay met the generally accepted criterion of a > 50% decrease from baseline (before incision) with complete tumor removal.

Study #2:

The Washington University Barnes Jewish Hospital Study evaluated the IMMULITE and IMMULITE 1000 *Turbo* iPTH assay intraoperatively in 49 patients and compared clinical outcomes to a “control” group of 55 patients that underwent parathyroidectomies without intraoperative PTH determinations. This study also employed the generally accepted guideline that a $\geq 50\%$ decrease in the iPTH value from baseline suggests complete tumor removal. Samples were drawn in the operating room before incision and during the period 10-12 minutes after excision of suspected diseased parathyroid gland tissue. Of the 49 patients in the study group, 46 had a > 50% decrease in iPTH values within the first three post-resection samples. When the control and study groups with similar sex, age, and diagnoses were compared, 44/49 (90%) of the patients in the study group and 49/55 (89%) of the control patients achieved normocalcemia postoperatively. The surgery guided by intraoperative IMMULITE/IMMULITE *Turbo* Intact PTH measurements had identical physiologic outcomes. Frozen section use in the experimental group was statistically significantly less ($p < 0.0001$) than in the control group.

The assay met the generally accepted criterion of a > 50% decrease from baseline (before incision) with complete tumor removal.

4. Clinical cut-off:

Not applicable

5. Expected values/Reference range:

Performance Characteristics were established in k992105.

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.