K980057

V. 510(k) Summary: CareSide™ Urea Nitrogen (BUN) Safety and Effectiveness

FEB - 5 1998

I. Applicant Information

A.	Applicant Name	**Exigent Diagnostics, Inc.**
B.	Applicant/Manufacturer Address	6100 Bristol Parkway Culver City, CA 90230
C.	Telephone Number	310-338-6767
D.	Contact Person	Kenneth B. Asarch, Pharm.D., Ph.D.
E.	FAX Number	310-338-6789
F.	e-Mail Address	asarchk@worldnet.att.net
G.	Date 510(k) Summary prepared	January 28, 1998

II. Device Information

A.	Device Name (Trade)	**CareSide™ Urea Nitrogen (BUN)**
B.	Device Name (Classification)	BUN test system
C.	Device Classification	Clinical chemistry panel BUN test system Regulation Number: 21 CFR 862.1770 Regulatory Class II Product Code: 75CDN
D.	Device Tier	Tier I
E.	Special controls and performance standards	None applicable

III. Substantial Equivalence Claim

A. General equivalency claim

The ability to monitor analyte-specific biochemical reactions in dry film and other formats is widely recognized and has gained widespread acceptance for use in chemistry assays.

BUN *in vitro* diagnostic products, in both dry film and other formats, are already on the U.S. market, including BUN products which utilize urease with an ammonia indicator dye.

B. Specific equivalency claim

This CareSide™ BUN test is substantially equivalent in principle, intended use, and clinical performance to the currently marketed Vitros slides for the quantitative measurement of BUN on the Vitros DT 60 II.

Name of Predicate Device:	Johnson and Johnson's **Vitros BUN Slides** (formerly Eastman Kodak, Inc.) and Johnson and Johnson's **Vitros DT 60** (formerly Eastman Kodak's DT 60 II).
Predicate Device 510K number:	**K912844/A**
Product Code:	75CDN (urease, urea)

IV. Device Description

CareSide™ BUN cartridges are used with the Exigent Diagnostics CareSide™ Analyzer to measure BUN concentration in whole blood, plasma or serum specimens. The CareSide™ BUN cartridge, a single use disposable *in vitro* diagnostic test cartridge, aids in specimen separation and delivers a measured volume of plasma or serum to a dry film to initiate the measurement of BUN concentration. The film cartridge (patent pending) contains all reagents necessary to measure BUN concentration. When used in conjunction with the CareSide™ Creatinine cartridge on the CareSide™ Analyzer, the analyzer calculates a BUN to creatinine ratio.

A. Explanation of Device Function

Each Exigent Diagnostics CareSide™ BUN cartridge consists of a BUN-specific multi-layer reagent film mounted in a plastic base with a hinged lid. The user introduces the whole blood, serum, or plasma specimen into the cartridge sample deposition well, closes the lid and inserts the cartridge into the Exigent Diagnostics CareSide™ Analyzer.

Once loaded, the CareSide™ analyzer scans the cartridge barcode, brings the cartridge and the contained specimen to 37°C, and spins the cartridge to move the sample from the sample deposition well into the cartridge channels and chambers. As the cartridge continues to spin, the blood cells are separated from the plasma/serum and the cells accumulate in the separation well. Ten microliters of plasma (or serum, as applicable) remain in the metering passage. Any excess sample flows into an overflow well.

The ten microliters of plasma (or serum, as applicable) is automatically dispensed onto the multi-layer reagent film. The spreading layer distributes the sample evenly on the film and filters large molecular weight components such as protein and dye fragments before the specimen enters the reaction layer. Urea then reacts with water in a urease-catalyzed reaction to produce carbon dioxide and ammonia gas in the alkaline environment. The ammonia gas permeates the porous gas permeation layer to reach the detection layer where it then reacts non-enzymatically with the yellow dye, bromocresol green, to form a green dye.

Test Reaction Sequence:

$$\text{Urea} + H_2O \xrightarrow{\textit{urease}} 2NH_3 + CO_2$$

$$\text{Bromocresol green (yellow)} + NH_3 \rightarrow \text{Green dye}$$

As the cartridges spin, photodiodes measure reflectance of light emitted by wavelength-specific light emitting diodes (LEDs) at a fixed time. The analyzer uses the reflectance measurements and the lot-specific standard curve to calculate BUN concentration.

B. Test Summary

Urea is the principal waste product of protein catabolism. Urea is synthesized in the liver from ammonia which is produced as a result of deamination of amino acids. Normally, urea nitrogen in the blood comprises only about 45% of protein nitrogen. Urea nitrogen determinations are important in evaluating the function of the kidneys and the liver. Increases in urea nitrogen levels may be due to prerenal causes (cardiac decompensation, water depletion due to increased intake or excessive loss, or increased catabolism), or renal causes (acute glomerulonephritis, chronic nephritis, polycystic kidney). Increases in urea nitrogen are also seen in metallic poisoning, pneumonia, Addison's disease, peritonitis, and surgical shock. Decreases in blood urea nitrogen are seen with nephrosis, acute liver destruction, amyloidosis and pregnancy.

V. Intended Use

A. Intended Use

The CareSide™ BUN cartridge is intended for *in vitro* diagnostic use in conjunction with the Exigent Diagnostics CareSide™ Analyzer to quantitatively measure urea nitrogen from whole blood, plasma or serum by laboratory professionals. When used in conjunction with the Exigent Diagnostics CareSide™ Creatinine test cartridge on the Exigent Diagnostics CareSide™ Analyzer, the BUN product may be used to calculate a BUN to creatinine ratio. The CareSide™ BUN test aids in the diagnosis and treatment of various renal and metabolic diseases.

B. Indications for Use

This product is indicated for use with patients with various renal and metabolic diseases.

VI. Technological Characteristics

A. Similarities

	CareSide™ BUN	**Vitros BUN DT Slides**
Intended Use	Primarily to aid in the diagnosis and treatment of certain renal and metabolic diseases.	Same
Indications	For *in vitro* diagnostic use. For professional use only.	For *in vitro* diagnostic use.
Measurement	Quantitative	Same
Reportable range	5 to 140mg/dL	1 to 100mg/dL
Method Principle	Dry film based urease conversion to ammonia and reaction with ammonia indicating dye. Chromogen quantitated by reflectance measurement after fixed time.	Same
Specimen dilution	Not required	Same
Materials Source	Urease: (*Canavalia ensiformis*) Indicator: Bromocresol green (synthetic)	Urease: (*Jack bean*) Indicator: N-propyl-4-(2,6-dinitro-4-chlorobenzyl)-quinoliniomethane sulfonate (synthetic)
Detector	Reflectance (615 nm)	Reflectance (660 nm)
Test time	Approximately 4 minute warm-up (on-board) plus 6 minute test time.	15 minutes slide warm-up (off-line) plus 5 minutes test time.
Reference Method	Urease conversion to ammonia. Glutamic dehydrogenase linked NADH oxidation of ammonia.	Same
Sample Type	Serum, plasma, whole blood (wb) [wb applied sample, plasma test sample]	serum, plasma
Specimen volume	10 µl test volume (85 ± 15 µl applied volume)	10 µl
Calibration	Calibration information bar-coded on each cartridge. Calibration information may change with each lot.	Run Vitros DT II calibrators whenever a new slide lot is used or when necessary.
Quality Control	2 levels	Same
Reporting Units	mg/dL or mmol/L	Same
Reaction Temp.	37 °C	Same

B. Differences

	CareSide™ BUN	Vitros BUN DT Slides
Direct blood specimen	Yes, whole blood	No, requires separation of whole blood prior to sample application
Accurate pipetting	Not required	Required
Reagent pre-warming	Not required	Required

C. Comparative Performance Characteristics

	CareSide™ BUN	Vitros BUN DT Slides
Detection limit	5 mg/dL	1 mg/dL
Reportable range	5 to 140 mg/dL	1 to 100 mg/dL
Accuracy	Mean recovery 100%	Not provided
Precision	Total CV, 26 mg/dL, 3.3%	Total CV, 27 mg/dL, 3.3%
Method comparison	CareSide™ = 1.00 (Vitros BUN DT) - 3.0, r=0.99	
Linearity	Mean deviation approx –6%, r>0.99	Not provided
Interference	No significant interference observed at tested concentration of interferent: Ascorbic Acid, 10 mg/dL Bilirubin, 20 mg/dL Hemoglobin, 500 mg/dL Triglycerides 3000 mg/dL	Not provided
Specimen Types & Anticoagulants	No clinically significant difference between heparinized whole blood, serum, heparin plasma, and EDTA plasma.	No clinically significant difference between serum and and heparin plasma. Whole blood is unsuitable.
Expected Values	6 to 16 mg/dL (combined male and female) Central 95% interval	9 to 20 mg/dL (male) 7 to 17 mg/dL (female) Central 95% interval

D. Conclusion

The nonclinical and clinical data provided demonstrate that the CareSide™ BUN product is as safe, effective, and performs as well as or better than the legally marketed predicate device.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
2098 Gaither Road
Rockville MD 20850

FEB - 5 1998

Kenneth B. Asarch, Ph.D.
VP Quality Systems and Regulatory Affairs
Exigent Diagnostics Inc.
6100 Bristol Parkway
Culver City, California 90230

Re: K980057
CareSide™ BUN
Regulatory Class: II
Product Code: CDQ
Dated: December 30, 1997
Received: January 6, 1998

Dear Dr. Asarch:

We have reviewed your Section 510(k) notification of intent to market the device referenced above and we have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration.

If your device is classified (see above) into either class II (Special Controls) or class III (Premarket Approval), it may be subject to such additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 895. A substantially equivalent determination assumes compliance with the Good Manufacturing Practice for Medical Devices: General (GMP) regulation (21 CFR Part 820) and that, through periodic GMP inspections, the Food and Drug Administration (FDA) will verify such assumptions. Failure to comply with the GMP regulation may result in regulatory action. In addition, FDA may publish further announcements concerning your device in the Federal Register. Please note: this response to your premarket notification submission does not affect any obligation you might have under sections 531 through 542 of the Act for devices under the Electronic Product Radiation Control provisions, or other Federal laws or regulations.

Under the Clinical Laboratory Improvement Amendments of 1988 (CLIA-88), this device may require a CLIA complexity categorization. To determine if it does, you should contact the Centers for Disease Control and Prevention (CDC) at (770) 488-7655.

This letter will allow you to begin marketing your device as described in your 510(k) premarket notification. The FDA finding of substantial equivalence of your device to a legally marketed predicate device results in a classification for your device and thus, permits your device to proceed to the market.

If you desire specific advice for your device on our labeling regulation (21 CFR Part 801 and additionally 809.10 for in vitro diagnostic devices), please contact the Office of Compliance at (301) 594-4588. Additionally, for questions on the promotion and advertising of your device, please contact the Office of Compliance at (301) 594-4639. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR 807.97). Other general information on your responsibilities under the Act may be obtained from the Division of Small Manufacturers Assistance at its toll-free number (800) 638-2041 or (301) 443-6597 or at its internet address "http://www.fda.gov/cdrh/dsmamain.html".

Sincerely yours,

Steven Gutman

Steven I. Gutman, M.D., M.B.A.
Director
Division of Clinical
Laboratory Devices
Office of Device Evaluation
Center for Devices and
Radiological Health

Enclosure

510(k) Number (if known): K980057

Device Name: _____

VII. Indications for Use

510(k) Number: To be assigned

Device Name: CareSide™ BUN

Indications for use: For *in vitro* diagnostic use with Exigent Diagnostics CareSide™ Analyzer to measure BUN in whole blood, plasma or serum specimens by professionals to aid in the diagnosis and treatment of various renal and metabolic diseases.

(PLEASE DO NOT WRITE BELOW THIS LINE-CONTINUE ON ANOTHER PAGE IF NEEDED)

Concurrence of CDRH, Office of Device Evaluation (ODE)

Prescription Use ✓ OR Over-The-Counter Use ____
(Per 21 CFR 801.109)

(Optional Format 1-2-96)

(Division Sign-Off)
Division of Clinical Laboratory Devices
510(k) Number 980057