510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
DEVICE ONLY TEMPLATE

A. 510(k) Number:
k042015

B. Purpose for Submission:
Addition of new matrix (cerebrospinal fluid)

C. Analyte:
Glucose

D. Type of Test:
Quantitative enzymatic tests

E. Applicant:
Bayer Healthcare LLC

F. Proprietary and Established Names:
Bayer ADVIA Chemistry Glucose Oxidase Assay
Bayer ADVIA Chemistry Glucose Hexokinase Assay

G. Regulatory Information:

1. Regulation section:
   21 CFR §862.1345

2. Classification:
   Class II

3. Product Code:
   CGA and CFR

4. Panel:
   Chemistry (75)

H. Intended Use:

1. Intended use(s):
   Glucose hexokinase:
   "The *Bayer ADVIA 1650* Glucose Hexokinase II assay is an *in vitro* diagnostic device for use in the quantitative determination of glucose in human cerebrospinal fluid (CSF), serum, plasma (lithium heparin), and urine on the ADVIA 1650 Chemistry system. Such measurements are used in the diagnosis and treatment of carbohydrate metabolism disorders including diabetes

mellitus, neonatal hypoglycemia, idiopathic hypoglycemia and insulin overdose."

Glucose oxidase:
"The *Bayer ADVIA 1650* Glucose Hexokinase II assay is an *in vitro* diagnostic device for use in the quantitative determination of glucose in human cerebrospinal fluid (CSF), serum, plasma (lithium heparin), and urine on the ADVIA 1650 Chemistry system. Such measurements are used in the diagnosis and treatment of carbohydrate metabolism disorders including diabetes mellitus, neonatal hypoglycemia, idiopathic hypoglycemia and insulin overdose."

2. Indication(s) for use:
   See above.

3. Special condition for use statement(s):
   For prescription use only

4. Special instrument Requirements:
   Bayer ADVIA Chemistry Analyzers

I. Device Description:

Glucose hexokinase assay:
Three individual liquid components comprise the device. Reagents 1 and 2 contain buffer, sodium azide, ATP, and NAD, while the Reagent 2 Mix contains glucose-6-phosphate dehydrogenase and hexokinase in buffer. Reagent 2 Mix is added to Reagent 2 and mixed before being transferred into the R2 container on the ADVIA 1650.

Glucose oxidase assay:
This assay consists of a single, ready-to-use reagent containing buffer, phenol, indicator, sodium azide, glucose oxidase, and peroxidase.

J. Substantial Equivalence Information:

1. Predicate device name(s):
   Roche Glucose Hexokinase

2. Predicate K number(s):
   K953847

3. Comparison with predicate:
   Glucose hexokinase:
   The predicate and the proposed assay have in common: the same intended use, the same reaction methodology and test principle, the same matrices (serum, plasma, urine, or CSF), storage conditions, and both are provided in a single

system-specific vial of ready-to-use liquid. They differ in their manufacturer and in the instrument system they are used on.

Glucose oxidase:
The predicate and the proposed assay have in common the same intended use and the same matrices (serum, plasma, urine, or CSF). They differ in manufacturer, reaction methodology and test principle, and test format.

K. Standard/Guidance Document Referenced (if applicable):
The sponsor referenced NCCLS EP5-A for precision studies.

L. Test Principle:
Both assays are based on enzymatic reactions that are measured by changes in absorbance on a spectrophotometer.

Glucose hexokinase:
Glucose is phosphorylated by ATP in the presence of hexokinase. The glucose-6-phosphate that forms is oxidized in the presence of glucose-6-phosphate dehydrogenase causing the reduction of NAD to NADH. Thus the concentration glucose is directly proportional to the NADH concentration. The assay is read at 340 nm.

Glucose oxidase:
Glucose is oxidized in the presence of glucose oxidase. The resulting hydrogen peroxide reacts under catalysis of peroxidase with phenol and 4-aminophenazone to form a red-violet quinoneimine dye as an indicator.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:
   Analytical performance in plasma, serum, and urine were established in the predicate submissions (k011963 and k991576).

   a. ***Precision/Reproducibility:***
   CSF precision studies were based on NCCLS EP5-A guidelines; over 12 days, two runs per day, with two levels of commercially available CSF quality controls tested in duplicate.

Precision of Bayer Glucose Hexokinase II Assay (CSF)

		Assayed	**Within Run**		**Total Imprecision**	
Level	n=	**Value** (mg/dL)	Std Dev	% CV	Std Dev	% CV
1	43	37	0.6	1.7	1.2	3.1
2	43	60	0.7	1.2	1.6	2.7

Precision of Bayer Glucose Oxidase Assay (CSF)

		Assayed	Within Run		Total Imprecision	
Level	n=	Value (mg/dL)	Std Dev	% CV	Std Dev	% CV
1	42	34	0.4	1.1	1.2	3.4
2	42	58	0.6	1.0	1.8	3.1

b. Linearity/assay reportable range:
A high glucose CSF sample was diluted with saline to yield a series of dilutions that were used to test the linearity of both assays. The mean of three readings was used to calculate the recovery. Both assays had ≤5% deviation from the calculated value. This study supports the linear range claims for both assays: Glucose Hexokinase II 0-700 mg/dL, and Glucose oxidase 0-750 mg/dL.

c. Traceability, Stability, Expected values (controls, calibrators, or method):
Stability was established in the predicate submissions.

d. Detection limit:
Detection limits were established in the predicate submissions.

e. Analytical specificity:
Analytical specificity was established in the predicate submissions.

f. Assay cut-off:
Not applicable.

2. Comparison studies:

a. Method comparison with predicate device:
Values obtained from patient CSF samples tested on an ADVIA 1650 analyzer were compared to the values obtained with the predicate assay on the predicate's system.

Method Comparison of Glucose Assays in CSF Matrix: Bayer Assays versus the Predicate

	Hexokinase II	Oxidase
Slope	1.026	0.973
Intercept	1.25	4.47
R value	0.987	0.994
N	55	56
Range	39 – 214 mg/dL	37 – 530 mg/dL

b. Matrix comparison:
Not applicable.

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:
   The expected values (Tietz, 3rd Edition) for these assay methods depend on the matrix:

Plasma/Serum:	74 to 106 mg/dL (normal population)
Urine:	<0.5 g/day
CSF:	60-80 mg/dL pediatric, 40-70 mg/dL adults

N. Conclusion:

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