CLIA Waiver by Application Approval Determination

Decision Summary

A. Document Number

CW250009

B. Parent Document Number

K252206

C. CLIA Waiver Type:

Dual 510(k) and CLIA Waiver by Application (Dual Submission)

D. Applicant

Nova Biomedical Corporation

E. Proprietary and Established Names

Nova Allegro UACR Assay

Nova Allegro Analyzer

F. Measurand (analyte)

Albumin

Creatinine

G. Sample Type(s)

Urine

H. Type of Test

Quantitative Immunoturbidimetric (Albumin)

Quantitative Colorimetric (Creatinine)

I. Test System Description

1. Overview

The Nova Allegro UACR Assay is a completely automated assay for the measurement of albumin and creatinine in human urine. The Nova Allegro UACR Assays are performed sequentially using a single Allegro UACR test cartridge. The Allegro UACR Test Cartridge contains all reagents required for measuring albumin and creatinine. The Nova Allegro Analyzer automatically performs all measurements and calculations. The albumin to creatinine ratio multiplied by 100, UACR, is calculated by the Nova Allegro Analyzer. At the end of the assay, the analyzer's screen displays albumin concentration, creatinine concentration, and UACR.

The Nova Allegro Analyzer is a compact multi-assay analyzer for point-of-care testing, designed to work with Nova Allegro Assay Test Cartridges. The analyzer supports multiple wavelengths that are used to measure the assay of interest. The analyzer contains two analytical bays where the single-use test cartridges are analyzed. Both cartridge bays of the Allegro Analyzer can be used with Allegro UACR Assay Test Cartridges. When the Allegro UACR Assay test cartridge bar code is scanned for analysis, one of the available bays of the analyzer will open. To support the Allegro UACR Assay, the instrument has a control feature to ensure the correct sample volume.

2. Test System Components

The system consists of:

- Nova Allegro Analyzer
- Nova Allegro UACR Test Cartridges
- External Nova Allegro UACR Quality Control (QC) material (2) different levels
- Quick Reference Guide (QRG), Allegro Analyzer Instructions for Use Manual, Allegro UACR Assay Test Cartridge Package Insert

J. Demonstrating "Simple"

- The device is a fully automated.
- The test uses direct, unprocessed urine specimens.
- An untrained operator can conduct the test by performing three steps: 1) transfer liquid sample to the cartridge with a capillary device provided with each cartridge, 2) run the test on the NOVA Allegro Analyzer, and 3) read the results.
- There is no reagent handling. All reagents are inside the single use cartridge. The test cartridges are barcoded.
- The test does not require any operator intervention during the analysis step.
- Technical or specialized training is not required for troubleshooting or error code interpretation. If an error code is shown, instructions are provided to the operator in the QRG.
- Results are displayed on the instrument screen and may be printed. No calculation by the operator is required.
- NOVA Allegro screen features a color display that facilitates easy-to-read messages including results for Albumin, Creatinine, and UACR. Error messages are unambiguous and include easy-to-interpret solutions.
- The Quick Reference Guide (QRG) and instructions for the CLIA waived user provided in the Analyzer Instructions for Use Manual were written at no higher than a 7th grade comprehension level.

K. Demonstrating "Insignificant Risk of an Erroneous Result"- Failure Alerts and Fail-safe Mechanisms

1. Risk Analysis

A comprehensive risk analysis was conducted by the sponsor for the test system to assess the risks of providing incorrect patient results and the safety risks to the patient or operator associated with the operation of the system and to demonstrate that the system is robust to known sources of error. All risks of harm to the patient or operator were mitigated to an acceptable level, and the system was demonstrated to be robust to known sources of error.

2. Fail-Safe and Failure Alert Mechanisms

a. Failure alerts, error messages and fail-safe mechanisms (lockout functions)

The Nova Allegro UACR Assay Test Cartridge on the Nova Allegro Analyzer will provide an alert, an error code, or a lockout function, that will not allow output of patient or QC samples results for the following conditions:

- **Lot Expired:** This alert occurs after scanning a QC or Cartridge lot that is expired. The user is instructed to use a new, unexpired QC or test Cartridge, and if the alert recurs, contact Tech Support.
- **QC Locked:** This alert occurs if QC results fall outside their expected ranges, and the QC Lockout feature prevents test cartridge use. The user is instructed to:
  1. Check the QC samples for the expiration date.
  2. Check that the QC bottle has not been in use longer than its open QC bottle stability.
  3. Ensure proper storage of Test Cartridges and QC Solution.
  4. Use a new QC bottle to retest.
  5. To clear the lockout, press the "X" on the display and rerun QC with a new QC bottle and new cartridge.
  6. If the alert recurs, contact Tech Support.
- **Software errors:** For "xxx Software" error codes, xxx will be reported as a 3-digit number, displayed and logged in the error log. If a software error occurs, users are instructed to unplug the analyzer for 30 seconds then power it back on. If the problem recurs, the user is instructed to record the displayed 3-digit software error code and contact Tech Support.
- **Hardware errors:** For "xxx Hardware" error codes, xxx will be reported as a 3-digit number, displayed and logged in the error log. If a hardware error occurs, users are instructed to unplug the analyzer for 30 seconds then power it back on. If the problem recurs, the user is instructed to record the displayed 3-digit software error code and contact Tech Support.
- **Temperature error:** "Temperature" error code occurs when the internal temperature is out of range when an analysis is attempted. The user is instructed to ensure that testing is conducted at Ambient Operating

Temperature of 15°C to 32°C (59°F to 89.6°F) and to contact Tech Support if the problem recurs.

- Blank Range Error: This error code occurs when there is an internal optical issue. The user is instructed to repeat the test using a new test cartridge with the same sample and if the problem recurs to contact Tech support.
- **Cartridge Error:** This error code occurs when the analyzer detects a defective cartridge. The user is instructed to repeat the test using a new test cartridge with the same sample and to contact Tech Support if the problem recurs.
- **Capillary Underfill:** This error code occurs when the analyzer detects that the capillary contained too little sample for an analysis, if the wrong sample type is used, and if the cartridge is damaged. The user is instructed to repeat the test using a new test cartridge, ensuring the capillary is filled with the urine sample to the fill line. If the problem recurs, the user should contact Tech Support.
- **Door Failure:** This error code occurs when a cartridge bay door was not able to completely open or close. The user is instructed to confirm there are no objects interfering with door operation, and if the problem recurs, the user should contact Tech Support.
- **Tip Present:** This error code occurs when a defective cartridge is used. The user is instructed to reboot the machine and repeat the test using a new test cartridge with the same sample.
- **Tip Not Present:** This error code occurs when a defective cartridge is used. The user is instructed to repeat the test using a new test cartridge with the same sample, and if the problem recurs, contact Tech Support.
- **Cover Present:** This error code occurs when a defective cartridge is used. The user is instructed to reboot the machine and repeat the test using a new test cartridge with the same sample.
- **Cover Not Present:** This error code occurs when a defective cartridge is used. The user is instructed to repeat the test using a new test cartridge with the same sample, and if the problem recurs, contact Tech Support.
- **Capillary Holder Present:** This error code occurs when a defective cartridge is used. The user is instructed to repeat the test using a new test cartridge with the same sample, and if the problem recurs, contact Tech Support.
- **Capillary Holder Not Present:** This error code occurs when a defective cartridge is used. The user is instructed to repeat the test using a new test cartridge with the same sample, and if the problem recurs, contact Tech Support.

The following alerts were also validated to demonstrate that they function as intended.

- **Bay Not Usable:** alert occurs if the analytical bays are not warmed up.
- **No Configuration:** alert occurs when the QC Insert has not been scanned prior to the QC vial being scanned.

- **Cannot Analyze the Cartridge:** alert occurs if a bay is unavailable due to another test being performed.
- **Invalid Scan QC**: alert occurs when a QC vial has been scanned while a patient sample is in process.
- **Unrecognized Barcode Type**: alert occurs when a non-Allegro or unreadable barcode has been scanned.
- **Invalid Scan**: alert occurs after scanning a QC vial and an incorrect test cartridge is scanned (QC type and cartridge type do not match).

b. External Control Material

The use of external Allegro UACR Quality Control material is recommended to demonstrate that the Allegro UACR Assay and Allegro Analyzer are working properly. Instructions for use, frequency of running quality controls, and storage and stability are stated in the labeling. Quality Control (QC) ranges are automatically downloaded into the Allegro Analyzer when a new QC lot number is set up by scanning the barcode on the package insert sheet. The barcode contains the lot number, expiration date, and expected range. When a QC specimen is analyzed, the Albumin and Creatinine results are automatically compared to the expected ranges stored in the Nova Allegro analyzer and the analyzer display will indicate that the results are either within the range, above the upper limit of the range, or below the lower limit of the range. QC Lockout prevents test cartridge use if QC results for either Albumin or Creatinine or both fall outside their expected ranges, if the QC material is expired, or if a scheduled QC has not been run. Instructions for a CLIA waived operator to repeat QC are included in the labeling. Two different QC levels should be run and both QC levels should pass.

It is recommended that two different levels of Allegro UACR Quality Control solutions be run as follows:

- With each new shipment of Test Cartridges
- With each new lot of Test Cartridges
- At least every 10 days
- Each new operator (operator who performs an UACR test for the first time)
- Operator who has not performed the test recently
- Whenever problems are identified such as unexpected patient test results

3. Flex Studies

The following flex studies were designed to evaluate the robustness of the test system by challenging it under conditions of stress such as potential operator errors, factors affecting specimen, test system integrity, and environmental factors. The following flex studies were performed based on the identification of potential errors from the sponsor's risk assessment that may contribute to erroneous results when the system is used in the intended use settings:

a. Operator Error/Human Factors and Specimen Integrity/Handling

i. Aggressive Cartridge Insertion:

To assess the impact on the system when the Allegro UACR cartridges are aggressively inserted into the analyzer, a study was conducted using three (3) Allegro Analyzers, one (1) lot of UACR cartridges, and urine samples. The Albumin, Creatinine, and UACR results from the aggressively inserted cartridges were compared to the results from the control condition where cartridges were inserted correctly. The study demonstrated that the system generates the expected Albumin, Creatinine, and UACR results when cartridges are aggressively inserted into the analyzer.

ii. Incorrect Insertion of Cartridge:

A study was conducted to assess the impact on the system when Allegro UACR cartridges are inserted into the analyzer incorrectly, not clicked or snapped into place. The labeling instructions state to “Place the Test Cartridge into the open bay immediately. Press down until the cartridge clicks into place.” The study was conducted using three (3) Allegro Analyzers, one (1) lot of UACR cartridges, and urine samples. The Albumin, Creatinine, and UACR results from the cartridges inserted into the analyzer incorrectly, not clicked or snapped into place, were compared to the results from the control condition where cartridges were inserted correctly, clicked or snapped into place. The study demonstrated that the system generates the expected Albumin, Creatinine, and UACR results when cartridges are incorrectly inserted into the analyzer. The analyzer snaps them into place, then continues with the analysis.

iii. Delayed Analysis Time After Capillary Filled:

To assess the impact on the system when analysis was delayed more than one minute after the capillary was filled, a study was conducted using two (2) Allegro

Analyzers, one (1) lot of UACR cartridges, and urine samples that were filled, inserted into a cartridge, and left on the lab bench for 15 minutes, 30 minutes, 60 minutes, 120 minutes, 240 minutes, or 300 minutes. These were compared to the results from the control condition in which urine was tested within one minute after filling the capillary. The study demonstrated that the system generates the expected Albumin, Creatinine, and UACR results when tested after up to a 120-minute delay. The study results demonstrate that the Allegro analyzer generates consistent Albumin, Creatinine, and UACR results when urine samples are collected in the UACR capillary, placed in the cartridge, and left sitting on the bench prior to analysis for up to 120 minutes. The labeling instructs the user to begin testing immediately.

iv. Bubbles in Specimen:

A study was conducted to assess the impact on the system when there is a bubble in the specimen. The Albumin, Creatinine, and UACR results from the samples with bubbles were compared to the results from the control condition in which samples used properly filled capillaries for the UACR test. The study was conducted using three (3) Allegro Analyzers, one (1) lot of UACR cartridges, and urine samples. The samples with bubbles produced the error code "**Capillary Underfill.**" The study demonstrated that when air bubbles are present in the specimen, the system terminates the test and produces the correct error message. This feature was validated and shown to function as intended.

v. Discolored Specimen:
A study was conducted to assess the impact on the sample volume verification control feature when different discolored urine specimens are used. Samples with 9 varying colors and translucency were used in the study. The different colors tested were a very light/clear urine sample, a dark yellow urine sample, a urine sample with blood cells, a brown urine sample, a cloudy urine sample, an orange urine sample, a greenish-blue urine sample, a riboflavin spiked sample (bright yellow), and a conjugated bilirubin spiked sample. The study demonstrated that the control feature works irrespective of urine color.

vi. Capillary Fill Volume:

A study was conducted to assess the impact on the system when partially filled capillaries are tested for Allegro UACR using three (3) Allegro Analyzers, one (1) lot of UACR cartridges, and urine samples. The UACR results from partially filled capillaries (~ 95% full and ~ 90% full) were compared to the results from fully filled capillaries. The study demonstrated that the system generates the expected Albumin, Creatinine, and UACR results or terminates the test, displaying the error

code **"Capillary Underfill."** This feature was validated and was shown to function as intended.

vii. Covering Capillary Vent:

A study was conducted to assess the impact on the system when blocking the vent on top of the capillaries. The study was conducted using three (3) Allegro Analyzers, one (1) lot of UACR cartridges, and urine samples. The UACR results measured when blocking the vent on top of the capillaries were compared to the results measured without blocking the vent. The study demonstrated that the system generates the expected Albumin, Creatinine, and UACR results when measured while blocking the vent on top of the capillaries.

viii. Dirty Optical Window:

A study was conducted to assess the impact on the system when the cartridge optical window is contaminated with external fingerprints. The study was conducted using three (3) Allegro Analyzers, one (1) lot of UACR cartridges, and urine samples. The UACR results measured with a visible fingerprint on the optical window were compared to the results measured with clean optical windows. The study demonstrated that the system generates the expected Albumin, Creatinine, and UACR results when measured with a dirty optical window, and a dirty optical window does not impact the results of UACR testing.

ix. Dropped Cartridge Study:
A study was conducted to assess the impact of using a cartridge that has been dropped on the floor. This was demonstrated by knocking the cartridge from counter height (35 inches) to the floor prior to filling the capillary and after filling the capillary. The study was conducted using three (3) Allegro Analyzers, one (1) lot of UACR cartridges, and urine samples. The UACR results measured using a cartridge dropped before filling the capillary or a cartridge dropped after filling the capillary were compared to results measured using a cartridge that had not been dropped. The study demonstrated that the system generates the expected Albumin, Creatinine, and UACR results or terminated the test displaying the error code **"Capillary Underfill"**. This feature was validated and was shown to function as intended.

x. Damaged Cartridge:
A study was conducted to assess the impact of using a cartridge that has been damaged. This was demonstrated by replicating user abuse including bench contact (rubbing the capillary across the bench), cover contact (rubbing the inside of the cover hole), and scratch/ gouge (making a scratch down the length of the exterior surface of the capillary. The study was conducted using three (3) Allegro Analyzers, one (1) lot of UACR cartridges, and urine samples. The study

demonstrated that the system terminated the test displaying the error code "Capillary Underfill" for damaged cartridges or returns expected results. This feature was validated and was shown to function as intended.

xi. Empty Capillary Use:

A study was conducted to assess the impact when empty capillaries are inserted into Allegro UACR Assay Test Cartridges and run on the analyzer. The study was conducted using three (3) Allegro Analyzers, one (1) lot of UACR cartridges, and urine samples. The UACR results from empty capillaries inserted into Allegro UACR Assay Test Cartridges were compared to the results from fully filled capillaries inserted into Allegro UACR Assay Test Cartridges. The study demonstrated that the system terminates the test, displaying the error code **"Cartridge error"** when empty capillaries are inserted. This feature was validated and was shown to function as intended.

xii. Incorrect Capillary Use with UACR Cartridge:

A study was conducted to assess the impact on the system when Allegro UACR cartridges are run using an incorrect cartridge capillary. The study was conducted using three (3) Allegro Analyzers, one (1) lot of UACR cartridges, capillaries from different cartridge types, and urine samples. The UACR results from Allegro UACR cartridges run using a correct cartridge capillary were compared to the results from Allegro UACR cartridges run using an incorrect cartridge capillary. The study demonstrated that the system terminates the test, displaying the error code **"Capillary underfill"** when a urine sample is collected in an incorrect capillary type instead of an Allegro UACR capillary. This feature was validated and was shown to function as intended.

xiii. Incorrect Specimen Use:

A study was conducted to assess the impact when an incorrect specimen is run on the Allegro UACR cartridge. The study was conducted using three (3) Allegro Analyzers, one (1) lot of UACR cartridges, whole blood samples, and urine samples. The study demonstrated that the system terminates the test and displays the error code **"capillary underfill"** when whole blood samples were used instead of urine samples. This feature was validated and was shown to function as intended.

xiv. Previously Used Cartridge
A study was conducted to assess the impact on the system when a used Allegro test cartridge is removed from the Allegro analyzer and then placed back into the analytical bay for a repeat analysis. The study was conducted using three (3) Allegro Analyzers, one (1) lot of UACR cartridges, and urine samples. The study demonstrated that the system terminates the test displaying the error code

"Cartridge Error" when a used Allegro test cartridge is placed back into the analytical bay for a repeat analysis. This feature was validated and was shown to function as intended.

xv. Tilting Sample Capillaries Prior to Running:

A study was conducted to assess the impact on the system when the UACR capillary sampling device was tilted after it had been filled with sample. This was demonstrated by inverting the capillary fully, the worst-case scenario. The study was conducted using three (3) Allegro Analyzers, one (1) lot of UACR cartridges, and urine samples. The UACR results from Allegro UACR cartridges run according to labeled instructions were compared to the results from Allegro UACR cartridges run after the capillary sample was turned upwards fully vertical for five (5) seconds after filling, then inserted into the cartridge and run on the Allegro analyzer. The study demonstrated that the system generates the expected Albumin, Creatinine, and UACR results when the UACR capillary sampling device was tilted after it has been filled with sample and that tilting the sample-filled capillaries prior to running does not impact the results of UACR testing.

xvi. Expired Quality Control Material:

A study was conducted to assess the impact on the system when expired Allegro quality control (QC) material is used on the Allegro analyzer. The study was conducted using three (3) Allegro Analyzers one, (1) lot of UACR cartridges, and one (1) lot of expired UACR QC material. The operator scanned multiple levels of QC material on each of the three (3) analyzers. In each case the "Lot Expired" alert was displayed. This feature was validated and was shown to function as intended.

xvii. QC Material Not Mixed Properly:

A study was conducted to assess the impact when improperly mixed UACR QC vials are used. The study was conducted using three (3) Allegro Analyzers, one (1) lot of UACR cartridges, and one (1) lot of UACR control material (level 1 and level 2). The UACR results using control vials mixed following the labeled instructions were compared to the UACR results from control vials improperly mixed, both unmixed and vigorously mixed. The study demonstrated that the system generates the expected QC results when improperly mixed UACR QC vials are used and that not mixing or vigorously mixing QC material vials does not impact the UACR QC results.

xviii. Sampling QC Material on Evaporated Sample:

A study was conducted to assess the impact on the system when sampling QC material placed on top of an evaporated QC sample occurs. This was

demonstrated by running QC material analysis as normal, letting the drop dry, and then dropping more QC material onto the previously dried drop and running the analysis. The study was conducted using three (3) Allegro Analyzers, one (1) lot of UACR cartridges, and one (1) lot of UACR control material (level 1 and level 2). The UACR results using control material according to the labeled instructions were compared to the UACR results from control material placed on an evaporated QC sample before testing. The study demonstrated that the system generates the expected QC results when sampling QC material placed on an evaporated QC sample occurs and that placing a drop on a previously dried drop does not impact the UACR QC results.

b. Reagent Integrity (Reagent viability)

i. Use Of Cartridges Past Expiration:

A study was conducted to assess the impact when expired Allegro UACR Assay Test Cartridges are used on the Allegro analyzer. The study was conducted using three (3) Allegro Analyzers one and (1) lot of expired UACR Assay Test Cartridges. The operator scanned multiple expired UACR Assay Test Cartridges on each of the three (3) analyzers. In each case the "Lot Expired" alert was displayed. This feature was validated and was shown to function as intended.

ii. Damaged Cartridge Pouch:

A study was conducted to assess the impact when Allegro UACR Test Cartridges with a damaged pouch are used. This was demonstrated by removing Allegro cartridges from their pouches (test condition) and storing them at the recommended conditions (4-8°C) with unopened pouch cartridges (control condition) from the same production batch. Both open and unopen cartridges were tested after 3.5 months. The study was conducted using three (3) Allegro Analyzers, one (1) lot of UACR cartridges, and urine samples. The UACR results using Allegro test cartridges with a damaged (open) pouch were compared to UACR results using Allegro test cartridges stored in properly sealed pouches. The study demonstrated that the system generated the expected Albumin, Creatinine, and UACR results when Allegro test cartridges in a damaged pouch for up to 3.5 months were used and that the Allegro analyzer UACR assay is not affected by being stored in a damaged or open pouch for up to 3.5 months. The labeling states that open pouches must be used within 24 hours.

c. Hardware, Software and Electronics Integrity

i. UACR Analytical Limits:

A study was conducted to assess the impact on the system when samples with UACR concentrations outside of the Allegro UACR measuring range were tested. The study was conducted using three (3) Allegro Analyzers, one (1) lot of UACR cartridges, and urine samples with Albumin concentrations <5 mg/L and >300mg/L and Creatinine concentrations <15 mg/dL and >500 mg/dL. In each case the analyzer did not display a numerical UACR result. The analyzer screen displayed "<5 mg/L" and ">300mg/L" for albumin and "<15 mg/dL" and ">500 mg/dL" for creatinine. When both Albumin and Creatinine are out of range, UACR is not calculated. This feature was validated and was shown to function as intended.

d. Environmental Factors

i. Operating Conditions Testing:

Studies were conducted to assess the impact when samples were run under various temperature and humidity conditions. One Allegro analyzer was placed into an environmental chamber and tested at four settings, including 15°C/20%RH, 15°C/85% RH, 32°C/20%RH, and 32°C/85%RH. The Allegro analyzer run at ambient setting was used as the control condition. The study used one (1) lot of UACR cartridges and urine samples. The study results support the labeled operating conditions claim of 15°C to 32°C (59 to 89.6°F) and relative humidity range of 20% to 85%. A supplemental study was conducted to test the system to the functional operational limits of the device using urine samples and (1) lot of UACR cartridges. Testing was performed in an environmental chamber at -5°C/15%RH, -4°C/15%RH, -3°C/15%RH, -2°C/15%RH, 0°C/15%RH, 5°C/15%RH, and 10°C/15%RH to test the lower limit and at 37/90%RH and 38/90%RH to test the upper limit. Test results were compared to the results from an Allegro UACR system run at ambient temperature. The study demonstrated that the system generated the expected Albumin, Creatinine, and UACR results or displayed the "**Temperature**" error code.

ii. External Light - Ambient vs Dark Operation:

A study was conducted to assess the impact on the system when operated under different external lighting conditions. This was demonstrated by completely blocking out ambient light while samples are being tested. The study was conducted using three (3) Allegro Analyzers, one (1) lot of UACR cartridges, and urine samples. The UACR results from analyzers that were operated in the dark covered by a large box were compared to the UACR results from analyzers that were operated in ambient light (a well-lit indoor laboratory). The study

demonstrated that the system generates the expected Albumin, Creatinine, and UACR results when tested on analyzers that were operated under the different external lighting conditions.

iii. Delayed Cartridge Use:

A study was conducted to assess the impact on the system when an analysis is delayed while the cartridge and sample reside in the analyzer. A delay could be caused if analysis is accidentally terminated, or not started after the cartridge has been inserted into the analyzer, and the analysis is restarted after being warmed in the optical nest of the analyzer, resulting in a warmed cartridge. The study was conducted using three (3) Allegro Analyzers, one (1) lot of UACR cartridges, and urine samples. The UACR results from delayed analyses in which cartridges were incubated for a specified period of time (10 minutes, 20 minutes, 30 minutes, 40 minutes, 60 minutes, 90 minutes, 180 minutes), then the analysis was restarted, were compared to the UACR results from analyses performed according to the labeled instructions for use. The study demonstrated that the system generates the expected Albumin, Creatinine, and UACR results when an analysis is delayed up to 40 minutes while the cartridge and sample reside in the analyzer. Exceeding 40 minutes results in an analysis canceled display on the instrument instructing users to remove and discard the cartridge and not to reuse the cartridge.

iv. Tilt Flex Study:

A flex study was conducted to assess the impact on the system when operating the analyzer on tilted/non level work surfaces. The following orientations were assessed.

- tilted left 0, 5, and 10 degrees
- tilted right 0, 5, and 10 degrees
- tilted front 0, 5, and 10 degrees
- tilted back 0, 5, and 10 degrees

The study was conducted using one (1) Allegro Analyzer, one (1) lot of UACR cartridges, and urine samples. Results showed that at up to 10° tilt (left, right, back, front) an accurate result was obtained 100% of the time.

v. Vibration Testing:

A flex study was conducted to assess the impact on the system when operating the analyzer near a source of vibration. The analyzer was placed next to a benchtop centrifuge (6 inches away) running at multiple different RPMs to test at multiple vibration frequencies. The centrifuge was programmed to run at three different speeds, 5000 RPM, 10000 RPM, and 14000 RPM. The study was conducted using one (1) Allegro Analyzer, one (1) lot of UACR cartridges, and urine samples. Results showed that an accurate result was obtained 100% of the time at up to vibrations of 14000 RPM.

vi. Electromagnetic Compatibility and Electrical Safety:
The sponsor provided documentation certifying that acceptable electrical safety and electromagnetic compatibility (EMC) testing had been performed and the system was found to be compliant. The sponsor provided software and cybersecurity documentation that was reviewed and found to be acceptable

L. Demonstrating "Insignificant Risk of an Erroneous Result" –Accuracy

To demonstrate that the Allegro Analyzer and Allegro UACR does not pose an insignificant risk of erroneous results in the hands of intended users and when performed in CLIA waived settings, the sponsor submitted a clinical study which was also used to support FDA clearance under K252206 and K221813.

1. Clinical Study

a. Study Design

i. Study Sites and Duration

The study was conducted in four CLIA Waived sites, physician's offices located in different geographic areas in the US with patients representative of the intended use population. Each clinical study site was a typical physician's office practice that enrolled subjects during routine patient office visits.

ii. Operators

A total of 15 untrained operators participated in the clinical study across the four clinical study sites. The operators were representative of intended CLIA waived users.

iii. Instructions for Use

The operators were given the Quick Reference Guide (QRG). No other materials or instructions were provided, and the operators received no training in the use of the test.

iv. Subjects (Patients)

A total of 619 patients were enrolled in the study. Study subjects were representative of the intended use population.

v. Samples
Urine samples were collected from each subject and tested on the Nova Allegro UACR Assay on the Nova Allegro Analyzer and the comparator method (CM).

vi. Comparative Method (CM)

FDA cleared comparator methods for albumin and creatinine; testing in duplicate was performed by laboratory professionals.

b. Results and Analysis

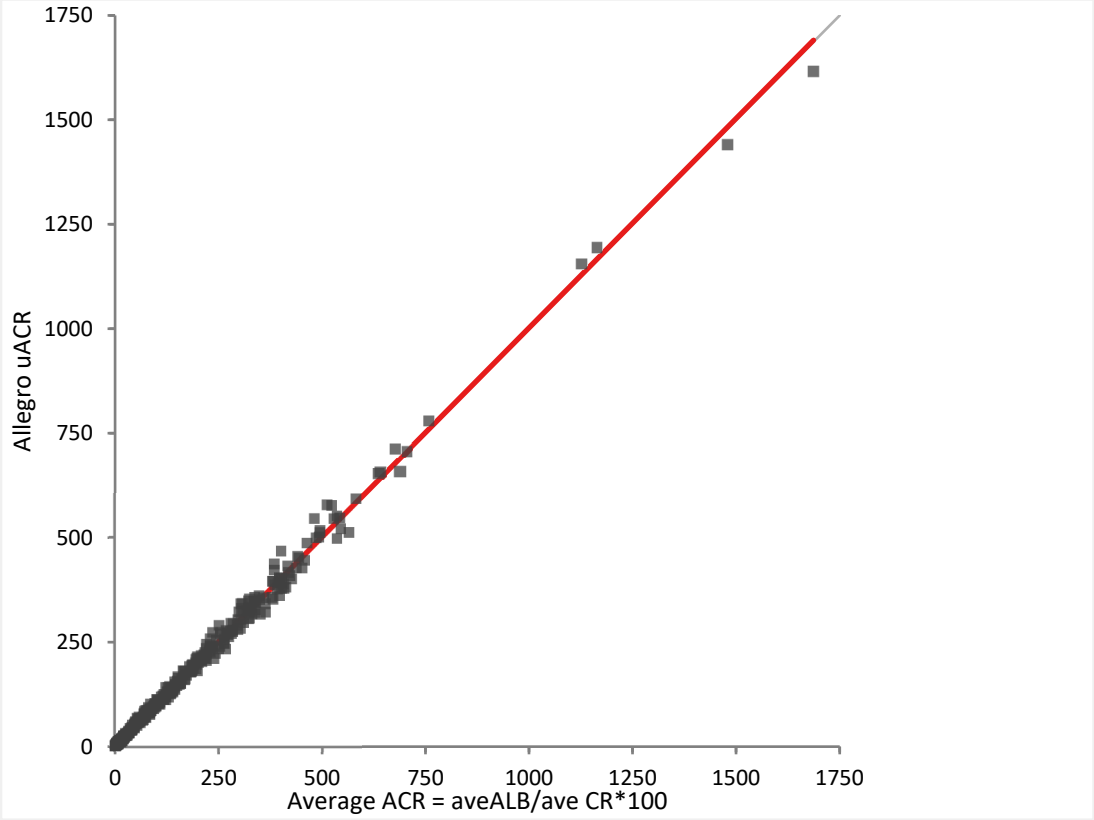
i. Regression Analysis

The results of the Nova Allegro UACR Assay on the Nova Allegro Analyzer were compared with those obtained using the comparator method. Passing-Bablok regression

analyses were performed for albumin, creatinine, and UACR. The results are shown below.

Analyte	Total No. of Samples	Sample Range	No. of Samples within AMR	Slope, 95%CI	Intercept
Albumin (mg/L)	535	5-300	535	0.987 (0.979; 0.994)	0.351 (0.031; 0.610)
Creatinine (mg/dL)	653	16-498	653	0.967 (0.958; 0.977)	1.605 (0.894; 2.398)
UACR (mg/g)	531	1-1592	531	1.002 (0.993; 1.012)	0.152 (-0.087; 0.385)

The scatter plot and Passing-Bablok regression line for UACR are presented below:



%Biases at 30 mg/g and 300 mg/g were also estimated and are presented below:

	Estimate	95%CI
%Bias at 30 mg/g	0.7%	(-0.2%; 1.6%)
%Bias at 300 mg/g	0.3%	(-0.6%; 1.2%)

ii. Allowable Total Error (ATE) and Limits for Erroneous Results (LER)

- The ATE Zone was set at
    - Albumin: ±2.8 mg/L for values <35 mg/L and ±8% for values ≥35 mg/L of the comparator method result.
    - Creatinine: ±10% of the comparator method result.
    - UACR: ± 4.2 mg/g for values <30 mg/g and ±14% for values ≥30 mg/g.
- The LER Zone across the measuring range was set as:
    - Albumin: ±6 mg/L (<35 mg/L), ±20% (≥35 mg/L)
    - Creatinine: ± 30%
    - UACR: ±6 mg/g (<30 mg/g), ±20% (≥30 mg/g)

Allowable Total Error (ATE) analysis for the Allegro UACR assay for all sites is shown below. The analysis indicates that:

- 95.6% (629/658), 95%CI: (93.7%; 96.9%), Albumin results were within the ATE
- 97.1% (640/659), 95%CI: (95.5%; 98.1%), Creatinine results were within the ATE
- 95.1% (633/658), 95%CI: (94.5%; 97.4%), UACR test results were within the ATE

Table 1 Albumin ATE zone ±2.8 mg/L for values <35 mg/L and ±8% for values ≥35 mg/L

Albumin Subinterval	Range mg/L	Number of samples	Number of samples within ATE zone	Percent of samples within ATE zone
Below LLoQ	<5	82	81	97.6%
Low	5 - <30	203	190	93.6%
Medium	30 - <100	71	65	91.0%
High	100 - 300	253	244	96.4%
Above ULoQ	>300	49	49	100%
<5 to >300	<5 - >300	658	629	95.6% (629/658) 95%CI: (93.7%; 96.9%)

Table 2: Creatinine ATE zone is ±10% for the entire range of values

Creatinine Subinterval	Range mg/dL	Number of samples	Number of samples within ATE zone	Percent of samples within ATE zone
Below LLoQ	<15	5	5	100%
Low	15-100	330	319	96.7%
Medium	101-300	275	269	97.8%
High	301-500	46	45	97.8%
Above ULoQ	>500	3	2	100%
Entire range	<15 - >500	659	640	97.1% (640/659), 95%CI: (95.5%; 98.1%)

Table 3: UACR ATE zone is ± 4.2 mg/g for values <30 mg/g and ±14% for values ≥30 mg/g.

uACR Subinterval	Range mg/g	Number of samples	Number of samples with UACR numeric values inside ATE	Number of samples with non-numeric values	Cannot calculate	Percent of samples within ATE zone
Low	1- <30	292	206	79	5	97.6% (285/292)
Medium	30- <300	255	229	11	1	94.1% (240/255)
High	300-3288	111	78	30	0	97.3% (108/111)
	1-3288	658	513	120	6	96.2% (633/658) 95%CI: (94.5%; 97.4%)

Table 4: LER Zone Analysis

Measurand	Percent of Results in LER	95%CI
Albumin	0.00% (0/658)	(0.00%; 0.58%)
Creatinine	0.00% (0/659)	(0.00%; 0.58%)
UACR	0.00% (0/652)	(0.00%; 0.59%)

2. Operator Questionnaire

Upon completion of the clinical study, each of the CLIA waived operators completed a questionnaire to evaluate the ease of understanding and performing the test procedure. The participants found the Allegro UACR assay on the Allegro UACR Analyzer easy to use and the instructions in the QRG clear and easy to follow.

M. Labeling for Waived Devices

The labeling consists of:

1. Allegro UACR Assay Test Cartridge Package Insert
2. Allegro UACR Assay Quick Reference Guide (QRG)
3. Nova Allegro Analyzer Instructions for Use Manual that contains information for the CLIA waived user
4. Nova Allegro UACR Control Solution Package Inserts

The following elements are appropriately present:

- The Quick Reference Guide and Nova Allegro Analyzer Instructions for Use Manual (Sections labeled for CLIA waived Operators use) are written at no higher than a 7th grade reading level.
- The Nova Allegro Analyzer Instructions for Use Manual, Quick Reference Guide, and Allegro UACR Assay Test Cartridge Package Insert identify the UACR test as CLIA waived.
- The Nova Allegro Analyzer Instructions for Use Manual, Quick Reference Guide, and Allegro UACR Assay Test Cartridge Package Insert contain a statement that a Certificate of Waiver is required to perform the test in a waived setting.
- The Nova Allegro Analyzer Instructions for Use Manual, Quick Reference Guide, and Allegro UACR Assay Test Cartridge Package Insert contain a statement that laboratories with a Certificate of Waiver must follow the manufacturer's instructions for performing the test.
- The Nova Allegro Analyzer Instructions for Use Manual and Quick Reference Guide provide instructions for conducting quality control procedures.

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

O. Conclusion:

The submitted information in this CLIA waiver application supports a CLIA waiver approval decision.