April 7, 2026

Anumana, Inc.
Taylor Gold West
Director, Regulatory Affairs
One Main St., Suite 400
East Arcade, 4th Floor
Cambridge, Massachusetts 02142

Re: K253801
Trade/Device Name: ECG-AI Cardiac Amyloidosis (CA) 12-Lead Algorithm
Regulation Number: 21 CFR 870.2380
Regulation Name: Cardiovascular Machine Learning-Based Notification Software.
Regulatory Class: Class II
Product Code: SHP
Dated: November 28, 2025
Received: November 28, 2025

Dear Taylor Gold West:

We have reviewed your section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate 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 (the Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. Although this letter refers to your product as a device, please be aware that some cleared products may instead be combination products. The 510(k) Premarket Notification Database available at https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmn.cfm identifies combination product submissions. 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. Please note: CDRH does not evaluate information related to contract liability warranties. We remind you, however, that device labeling must be truthful and not misleading.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 898. In addition, FDA may publish further announcements concerning your device in the Federal Register.

FDA's substantial equivalence determination also included the review and clearance of your Predetermined Change Control Plan (PCCP). Under section 515C(b)(1) of the Act, a new premarket notification is not required for a change to a device cleared under section 510(k) of the Act, if such change is consistent with an established PCCP granted pursuant to section 515C(b)(2) of the Act. Under 21 CFR 807.81(a)(3), a new premarket notification is required if there is a major change or modification in the intended use of a device, or if there is a change or modification in a device that could significantly affect the safety or effectiveness of the device, e.g., a significant change or modification in design, material, chemical composition, energy source, or manufacturing process. Accordingly, if deviations from the established PCCP result in a major change or modification in the intended use of the device, or result in a change or modification in the device that could significantly affect the safety or effectiveness of the device, then a new premarket notification would be required consistent with section 515C(b)(1) of the Act and 21 CFR 807.81(a)(3). Failure to submit such a premarket submission would constitute adulteration and misbranding under sections 501(f)(1)(B) and 502(o) of the Act, respectively.

Additional information about changes that may require a new premarket notification are provided in the FDA guidance documents entitled "Deciding When to Submit a 510(k) for a Change to an Existing Device" (https://www.fda.gov/media/99812/download) and "Deciding When to Submit a 510(k) for a Software Change to an Existing Device" (https://www.fda.gov/media/99785/download).

Your device is also subject to, among other requirements, the Quality Management System Regulation (QMSR) (21 CFR Part 820), which includes, but is not limited to, ISO 13485 clause 7.3 (Design controls), ISO 13484 clause 8.3 (Nonconforming product), and ISO 13485 clause 8.5 (Corrective and preventative action). Please note that regardless of whether a change requires premarket review, the QMSR requires device manufacturers to review and approve changes to device design and production (ISO 13485 clause 7.3 and 21 CFR 820.70) and document changes and approvals in the device master record (21 CFR 820.181).

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Part 801); medical device reporting (reporting of medical device-related adverse events) (21 CFR Part 803) for devices or postmarketing safety reporting (21 CFR Part 4, Subpart B) for combination products (see https://www.fda.gov/combination-products/guidance-regulatory-information/postmarketing-safety-reporting-combination-products); good manufacturing practice requirements as set forth in the Quality Management System Regulation (QMSR) (21 CFR Part 820) for devices or current good manufacturing practices (21 CFR Part 4, Subpart A) for combination products; and, if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR Parts 1000-1050.

All medical devices, including Class I and unclassified devices and combination product device constituent parts are required to be in compliance with the final Unique Device Identification System rule ("UDI Rule"). The UDI Rule requires, among other things, that a device bear a unique device identifier (UDI) on its label and package (21 CFR 801.20(a)) unless an exception or alternative applies (21 CFR 801.20(b)) and that the dates on the device label be formatted in accordance with 21 CFR 801.18. The UDI Rule (21 CFR 830.300(a) and 830.320(b)) also requires that certain information be submitted to the Global Unique Device Identification Database (GUDID) (21 CFR Part 830 Subpart E). For additional information on these requirements, please see the UDI System webpage at https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance/unique-device-identification-system-udi-system.

Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR 807.97). For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to https://www.fda.gov/medical-devices/medical-device-safety/medical-device-reporting-mdr-how-report-medical-device-problems.

For comprehensive regulatory information about medical devices and radiation-emitting products, including information about labeling regulations, please see Device Advice (https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance) and CDRH Learn (https://www.fda.gov/training-and-continuing-education/cdrh-learn). Additionally, you may contact the Division of Industry and Consumer Education (DICE) to ask a question about a specific regulatory topic. See the DICE website (https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance/contact-us-division-industry-and-consumer-education-dice) for more information or contact DICE by email (DICE@fda.hhs.gov) or phone (1-800-638-2041 or 301-796-7100).

Sincerely,

STEPHEN C. BROWNING -S

LCDR Stephen Browning
Assistant Director
Division of Cardiac Electrophysiology,
Diagnostics, and Monitoring Devices
Office of Cardiovascular Devices
Office of Product Evaluation and Quality
Center for Devices and Radiological Health

Enclosure

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Food and Drug Administration

Indications for Use

Form Approved: OMB No. 0910-0120
Expiration Date: 07/31/2026
See PRA Statement below.

510(k) Number *(if known)*
K253801

Device Name
ECG-AI Cardiac Amyloidosis (CA) 12-Lead Algorithm

Indications for Use *(Describe)*
The ECG-AI Cardiac Amyloidosis 12-Lead Algorithm is software as a medical device intended to aid in earlier detection of Cardiac Amyloidosis in adults being evaluated for signs or symptoms consistent with cardiac amyloidosis. This population includes patients that have at least one condition commonly associated with cardiac amyloidosis, such as: unexplained heart failure, nephrotic syndrome, peripheral neuropathy, arrhythmias, or aortic stenosis.

The ECG-AI Cardiac Amyloidosis 12-Lead Algorithm is not intended to be a stand-alone diagnostic device for cardiac amyloidosis nor to replace current clinical practice guidelines. A positive result may suggest the need for further clinical evaluation in order to establish a diagnosis of Cardiac Amyloidosis. Additionally, if the patient is at high risk for the cardiac condition, a negative result should not rule out additional clinical evaluation. The ECG-AI Cardiac Amyloidosis 12-Lead algorithm should be applied jointly with clinician judgment.

Type of Use *(Select one or both, as applicable)*

☒ Prescription Use (Part 21 CFR 801 Subpart D)   ☐ Over-The-Counter Use (21 CFR 801 Subpart C)

CONTINUE ON A SEPARATE PAGE IF NEEDED.

510(k) Summary
ECG-AI Cardiac Amyloidosis 12-Lead Algorithm

Applicant Name: Anumana, Inc.
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Date Summary Prepared: April 7, 2026

Trade/Device Name: ECG-AI Cardiac Amyloidosis (CA) 12-Lead Algorithm

Classification Panel: Cardiology
Regulation Number: 21 CFR § 870.2380
Regulation Name: Cardiovascular machine learning-based notification software
Regulatory Class: Class II
Product Code: SHP

Predicate Device(s):
Device Name: ECG-AI Low Ejection Fraction 12-Lead algorithm
Manufacturer: Anumana, Inc.
Application Number: K250652

Device Description

The ECG-AI CA 12-Lead algorithm is software as a medical device (SaMD) which interprets 12-lead ECG voltage time series data using an artificial intelligence-based algorithm. The device analyzes 10 seconds or longer duration of a single 12-lead ECG acquisition, and within seconds detects the presence of cardiac amyloidosis in the intended patient population.

The ECG-AI CA 12-Lead algorithm is integrated into existing clinical workflows to support overall assessment and to enable physicians to determine whether further workup or referral to a cardiac amyloidosis specialist is clinically indicated. The ECG-AI CA 12-Lead algorithm is intended to be used by clinicians that diagnose and/or treat patients with signs, symptoms, or co-morbidities, associated with cardiac amyloidosis.

The software module can be integrated into a client application to be accessed by clinicians and results viewed through an Electronic Medical Record (EMR) system or an ECG Management System (EMS) accessed via a PC, mobile device, or another medical device. In each case, the physician imports 12-lead ECG data in digital format. The tool analyzes the 10 seconds or longer duration of voltage data collected during a standard 12-lead ECG and outputs a binary result of the likelihood of cardiac amyloidosis as an Application Programming Interface (API) result.

Indications for Use

The ECG-AI Cardiac Amyloidosis 12-Lead algorithm is software as a medical device intended to aid in earlier detection of Cardiac Amyloidosis in adults being evaluated for signs or symptoms consistent with cardiac amyloidosis. This population includes patients that have at least one condition commonly associated with cardiac amyloidosis, such as: unexplained heart failure, nephrotic syndrome, peripheral neuropathy, arrhythmias, or aortic stenosis.

The ECG-AI Cardiac Amyloidosis 12-Lead algorithm is not intended to be a stand-alone diagnostic device for cardiac amyloidosis nor to replace current clinical practice guidelines. A positive result may suggest the need for further clinical evaluation in order to establish a diagnosis of Cardiac Amyloidosis. Additionally, if the patient is at high risk for the cardiac condition, a negative result should not rule out additional clinical evaluation. The ECG-AI Cardiac Amyloidosis 12-Lead algorithm should be applied jointly with clinician judgment.

Technological Characteristics

The ECG-AI CA 12-Lead algorithm is provided as a software module packaged in a Docker container to facilitate installation. Technical installation details including access to docker hub, docker hub path, software upgrades, and associated access rights can be found in the Installation Manual - ECG-AI Cardiac Amyloidosis 12-Lead algorithm. The ECG-AI CA 12-Lead algorithm does not provide a graphical user interface (GUI) of its own. It is integrated with other medical systems such as Electronic Medical Record (EMR) systems or ECG Management Systems (EMS). The third-party integrating software will furnish a 12-lead ECG digital waveform as input to ECG-AI CA 12-Lead algorithm and record the output from the device for display or for printing in an offline report.

Predetermined Change Control Plan

This device has been cleared by the U.S. Food and Drug Administration (FDA) with a Predetermined Change Control Plan (PCCP). As part of this authorization, the device software may be updated periodically to enhance performance, including for higher sensitivity and/or specificity.

The first modification, related to device performance improvement, will be validated through a multi-center retrospective clinical study that uses a combination of new and existing data. This approach involves supplementing the validation dataset with at least 20% new data for each iteration to ensure it remains current and representative. To be implemented, a modified version must demonstrate improved performance by meeting pre-specified acceptance criteria. These criteria require the new version's sensitivity and specificity point estimates and lower bound of the 95% confidence interval to be greater than those of the previous version.

The second modification, which pertains to the expansion of ECG device compatibility, will be validated through a retrospective clinical study utilizing newly acquired clinical data from ECG devices targeted for inclusion under the expanded compatibility claim. To be implemented, the modified version must demonstrate that performance on ECGs obtained from the target cardiographs exceeds the minimum performance observed on accepted cardiographs from the original clinical validation study, plus any performance gain resulting from the implementation of the first modification. These criteria require the new version's sensitivity point estimate and lower bound of the 95% confidence interval to be greater than the minimum threshold, plus any performance gain resulting from implementation of the first modification, and specificity lower bound of the 95% confidence interval to be greater than the minimum threshold, plus any performance gain resulting from implementation of the first modification.

Users will be informed of each applicable update through revised labeling, release notes, or other appropriate communication channels. It is important to review updated instructions and performance summaries accompanying each software version to ensure continued proper use of the device.

Summary of Non-Clinical Performance Data

The performance characteristics for the ECG-AI CA 12-Lead Algorithm have been evaluated with the following non-clinical testing: software verification and validation (per IEC 62304), cybersecurity, labeling verification and validation, and human factors.

Summary of Clinical Performance Data

The performance characteristics for the ECG-AI CA 12-Lead Algorithm have been clinically validated for detection of cardiac amyloidosis in the intended patient population, with a sensitivity and specificity greater than the study's predetermined acceptance criteria.

Table 1: Performance Characteristics

Performance Characteristic	Value
Sensitivity	78.9 %
Specificity	91.2 %

Algorithm Training

The ECG-AI CA 12 Lead Algorithm was developed by training a Neural Network (NN), a type of artificial intelligence, to learn patterns specific to CA directly from standard 12-lead ECGs. The algorithm was trained by providing the NN with ECGs from two distinct groups of patients, CA patients (cases) and matched non-CA patients (controls).

To identify cases, a database from a large health system with CA expertise was used. The database was rigorously examined to identify patients with evidence of CA reported in natural language in clinical notes, in imaging results, in pathology results, or in structured diagnoses codes. Physicians reviewed all possible CA cases and identified a final case cohort of 4,251 patients with a confirmed diagnosis of CA and supporting evidence of the diagnosis in their clinical records. The 4,251 patients contributed a total of 4,251 ECGs (one per patient) for model training.

Controls were selected by identifying patients with a complete Transthoracic Echocardiogram (TTE) and an ECG within ± 180 days of the TTE. Patients with any evidence of cardiac amyloidosis or amyloidosis in other organs were then excluded. Control candidates were then propensity matched to cases based on age at the time of ECG acquisition, biological sex, race, and the year of the ECG acquisition. A final group of 45,730 control patients were identified, which contributed a total of 45,730 ECGs (one per patient) for model training. The ECGs from these 4,251 CA patients and 45,730 control patients were then used to train the NN to distinguish between the two groups.

Summary of Clinical Validation

Study Design

The performance of the Anumana ECG-AI CA 12-Lead algorithm was validated in a retrospective study of 25,525 patient records from four health systems in the United States. The study population included adults aged 18 years and older with both an ECG and TTE obtained within +/- 180 days of each other. The study was designed to evaluate the device's ability to identify cardiac amyloidosis using AI-based analysis of a standard 12-lead ECG.

CA cases were defined as patients with a confirmed diagnosis of cardiac amyloidosis. For these individuals, the ECG-TTE pair closest to the date of diagnosis was selected. Controls were selected from patients with medical conditions associated with CA but without a CA diagnosis. Records with a diagnosis of non-cardiac forms of amyloid were excluded.

Summary of Study Results

In total, 25,525 patient records were used for the primary analysis. The study sample was representative of the US adult population and included 52.0% male and 48.0% female participants. The racial and ethnic distribution was 72.7% White, 7.5% Hispanic, 11.3% Black/African American, 0.7% American Indian or Alaska Native, 1.9% Asian, and 13.4% Other/Multiracial. Approximately 63.0% of participants were aged 60 years or older.

The study was designed with a joint primary performance endpoint assessing sensitivity and specificity, with prespecified acceptance criteria of sensitivity ≥75% and specificity ≥80%. The device met these acceptance criteria.

Subgroup Analyses

Subgroup assessments of diagnostic performance were conducted to determine if there was heterogeneity in device performance across clinical sites, demographics, clinical characteristics, conduction disorders, ECG manufacturers, and ECG devices. To assess for heterogeneity, Breslow-Day tests for the strata were conducted on the odds ratio for condition presence given a positive ECG-AI result. The results are summarized in Table 2 below.

Table 2: Subgroup Analyses

Subgroup Analysis	Result of Test for Heterogeneity
Clinical Site	Diagnostic performance varied across sites (p<0.01), with the lowest diagnostic performance observed for UTSW, which had a high proportion of hereditary ATTR, and the highest observed for VUMC.

Subgroup Analysis	Result of Test for Heterogeneity
Cardiac Amyloidosis Subtypes	Diagnostic performance differed by cardiac amyloidosis subtype (p<0.01), with sensitivity highest for AL amyloidosis (87.6%) and lowest for unknown/unclear subtype (33.3%; small n), and intermediate for hereditary ATTR (69.4%), wild-type ATTR (73.2%), and ATTR not otherwise specified (84.6%).
Biological Sex	No statistically significant heterogeneity observed (p>0.01)
Race/Ethnicity	Diagnostic performance varied across racial groups (p<0.01), with the lowest diagnostic performance observed for Black participants (sensitivity 76%, specificity 88.0%) and the highest observed for White participants (sensitivity 80.6%, specificity 91.6%).
Age Group at Index Visit	Diagnostic performance varied across age groups (p<0.01), with the lowest diagnostic performance observed for the 70+ group (sensitivity 76%, specificity 91.3%) and the highest observed for the 50–59 group (sensitivity 85.6%, specificity 88.0%).
Body Mass Index	Diagnostic performance varied across BMI categories (p<0.01), with the lowest diagnostic performance observed for the 35+ group (sensitivity 66.2%, specificity 92.5%) and the highest observed for the 30–34 group (sensitivity 84.4%, specificity 92.4%).
ECG Manufacturer	Diagnostic performance varied across ECG manufacturer (p<0.01), with the lowest diagnostic performance observed for GE Healthcare (sensitivity 78.1%, specificity 80.3%) and the highest observed for Philips Medical Products (sensitivity 80.6%, specificity 92.9%), though this may be influenced by study site.
ECG Device Model	No statistically significant heterogeneity observed (p>0.01).
Comorbidities	Diagnostic performance was generally consistent across comorbidity subgroups. There was no statistically significant heterogeneity for aortic stenosis, glomerular disorders, or non-specific symptoms/signs (p>0.01), with similar performance in patients with and without these conditions. In contrast, diagnostic performance varied by cardiac arrhythmias, heart failure, and neuropathies, with lower performance observed in patients with these comorbidities and higher performance in those without; statistically significant heterogeneity was observed for each of these subgroups (p≤0.01).
Conduction Disorders	Diagnostic performance was broadly similar when stratified by conduction disorders identified from ECG XML diagnoses, and no statistically significant heterogeneity was observed between patients with and without a specified conduction disorder on ECG (p>0.01). In contrast, when conduction disorders were defined using ICD codes, diagnostic performance was lower in patients with an ICD code for a conduction disorder and higher in those without, and statistically significant heterogeneity was observed across these groups (p<0.01).

Substantial Equivalence

The following table captures the substantial equivalence comparison between the subject and predicate device, including administrative information, patient population, use environment, and key technological features.

Table 5: Substantial Equivalence Comparison of Subject Device to the Predicate

	Subject Device	Predicate	Discussion
Manufacturer	Anumana, Inc.	Anumana, Inc.	
Product Name	ECG-AI CA 12-Lead algorithm	ECG-AI LEF 12-Lead algorithm	
Application No.	K253801	K250652	
Product Code	SHP	QYE	**Equivalent**. Both product codes are assigned to the Regulation number 21 CFR 870.2380.
Regulation No.	21 CFR 870.2380	21 CFR 870.2380	**Identical.**
Regulation Name	Cardiovascular machine learning-based notification software	Cardiovascular machine learning-based notification software	**Identical.**
Intended Use/ Indications for Use	The ECG-AI Cardiac Amyloidosis 12-Lead Algorithm is software as a medical device intended to aid in earlier detection of Cardiac Amyloidosis in adults being evaluated for signs or symptoms consistent with cardiac amyloidosis. This population includes patients that have at least one condition commonly associated with cardiac amyloidosis, such as: unexplained heart failure, nephrotic syndrome, peripheral neuropathy, arrhythmias, or aortic stenosis.	The ECG-AI LEF 12-Lead algorithm is software intended to aid in earlier detection of Left Ventricular Ejection Fraction (LVEF) less than or equal to 40% in adults at risk for heart failure. This population includes, but is not limited to: • patients with cardiomyopathies • patients who are post-myocardial infarction • patients with aortic stenosis • patients with chronic atrial fibrillation • patients receiving pharmaceutical therapies that are cardiotoxic, and	**Equivalent**. The subject device's intended use is equivalent to the predicate in that both are intended to aid in earlier detection of a cardiovascular disease or condition. The only difference between the indications for use is the disease condition, which was clinically validated.

	Subject Device	Predicate	Discussion
Manufacturer	Anumana, Inc.	Anumana, Inc.	
Product Name	ECG-AI CA 12-Lead algorithm	ECG-AI LEF 12-Lead algorithm	
	The ECG-AI Cardiac Amyloidosis 12-Lead Algorithm is not intended to be a stand-alone diagnostic device for cardiac amyloidosis nor to replace current clinical practice guidelines. A positive result may suggest the need for further clinical evaluation in order to establish a diagnosis of Cardiac Amyloidosis. Additionally, if the patient is at high risk for the cardiac condition, a negative result should not rule out additional clinical evaluation. The ECG-AI Cardiac Amyloidosis 12-Lead algorithm should be applied jointly with clinician judgment.	• postpartum women. The ECG-AI LEF 12-Lead algorithm is not intended to be a stand-alone diagnostic device for cardiac conditions, should not be used for monitoring of patients, and should not be used on ECGs with a paced rhythm. A positive result may suggest the need for further clinical evaluation in order to establish a diagnosis of Left Ventricular Ejection Fraction (LVEF) less than or equal to 40%. Additionally, if the patient is at high risk for the cardiac condition, a negative result should not rule out further non-invasive evaluation. The ECG-AI LEF 12-Lead algorithm should be applied jointly with clinical judgement.	
Diagnostic Application	Cardiac Amyloidosis	Left Ventricular Ejection Fraction (LVEF) less than or equal to 40%	**Equivalent**. The predicate device is designed for a different disease but the subject device similarly helps to detect cardiac amyloidosis. Additional clinical validation was conducted to support equivalence.

	Subject Device	Predicate	Discussion
Manufacturer	Anumana, Inc.	Anumana, Inc.	
Product Name	ECG-AI CA 12-Lead algorithm	ECG-AI LEF 12-Lead algorithm	
Target Population	Adults presenting with signs and symptoms consistent with cardiac amyloidosis	Adults at risk for heart failure	**Equivalent**. Both devices are intended to target adults with cardiovascular symptoms and/or risk factors.
Intended User	Clinicians	Clinicians	**Identical**.
Principal of Operation	Machine learning-based algorithm	Machine learning-based algorithm	**Identical**.
Data Acquisition	Acquires data from 12-Lead ECGs	Acquires data from 12-Lead ECGs	**Identical**.
Device Output Format	Algorithm output is provided to third party software that displays a binary result to clinicians. Output provided for each ECG is "Detected," "Not Detected" or "Error".	Algorithm output is provided to third party software that displays a binary result to clinicians. Output provided for each ECG is "Detected," "Not Detected" or "Error".	**Identical**.
Cybersecurity	Compliant with FDA Guidance on Cybersecurity	Compliant with FDA Guidance on Cybersecurity	**Identical**.

Substantial Equivalence Conclusion

The subject device, Anumana ECG-AI CA 12-Lead algorithm, is substantially equivalent to the predicate device, Anumana ECG-AI LEF 12-Lead algorithm (K250652). The devices have equivalent intended uses, principles of operation and technical characteristics. Where differences occur between the subject device and the predicate, results of clinical performance and non-clinical verification and validation demonstrate that the subject device is as safe and as effective as the predicate.