DE NOVO CLASSIFICATION REQUEST FOR

N- SWEAT PATCH

REGULATORY INFORMATION

FDA identifies this generic type of device as:

Skin patch for treatment of hyperhidrosis. A skin patch for treatment of hyperhidrosis is a prescription topical patch that utilizes a chemical reaction to generate thermal energy in situ for treatment of hyperhidrosis.

NEW REGULATION NUMBER: 21 CFR 878.4425

CLASSIFICATION: Class II

PRODUCT CODE: QVX

BACKGROUND

DEVICE NAME: N-SWEAT Patch

SUBMISSION NUMBER: DEN210055

DATE DE NOVO RECEIVED: December 3, 2021

SPONSOR INFORMATION:

Candesant Biomedical, Inc.
3145 Geary Blvd, Suite 711
San Francisco, CA 94118

INDICATIONS FOR USE

The N-SWEAT Patch is indicated for treatment of primary axillary hyperhidrosis in adults.

LIMITATIONS

The sale, distribution, and use of N-SWEAT Patch are restricted to prescription use in accordance with 21 CFR 801.109.

Safety and effectiveness have not been demonstrated in patients treated with therapies that alter perspiration (including therapies directed at hyperhidrosis as well as drugs that are prescribed for other conditions but which are known to increase or decrease perspiration, including but not limited to anticholinergic medications, beta blockers, calcium channel blockers, and psychotropic medications); patients with "excessive sweating" who have not been clinically diagnosed with primary axillary hyperhidrosis; patients with diffuse hyperhidrosis or secondary hyperhidrosis; patients with gravimetric sweat production (GSP) > 300 mg / 5 minutes in either axilla; patients who have undergone surgical or device-based procedures in the axillae; and patients who have

applied topical antiperspirant products in the 2 days prior to treatment. Safety and effectiveness have not been assessed on other body sites or with repeated use of the device.

The N-SWEAT Patch is contraindicated in patients with non-intact skin (e.g., abrasions, nicks, cuts, or active skin irritation or disease at the treatment site).

PLEASE REFER TO THE LABELING FOR A COMPLETE LIST OF WARNINGS, PRECAUTIONS AND CONTRAINDICATIONS.

DEVICE DESCRIPTION

The N-SWEAT Patch is composed of metallic sodium on a polyester tape (**Figure 1, Figure 2**). This sodium bilayer is mounted to a polyethylene medical tape (adhesive backing) and covered with a release liner which is removed prior to application. The non-sterile patch is packaged in an impermeable, argon filled, foil pouch. The packaging protects the patch during transit and storage, preventing exposure to the environment including water and air. The device is provided non-sterile and is not intended to be sterilized. A disposal kit is provided with each N-SWEAT Patch to deactivate the patch after use. The kit includes a prefilled bottle of deactivation solution, a cover paper, and a plastic bag.

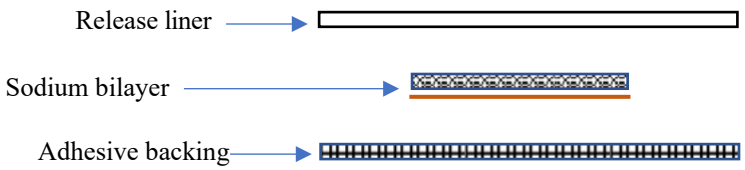

Figure 1. Cross section of N-SWEAT Patch

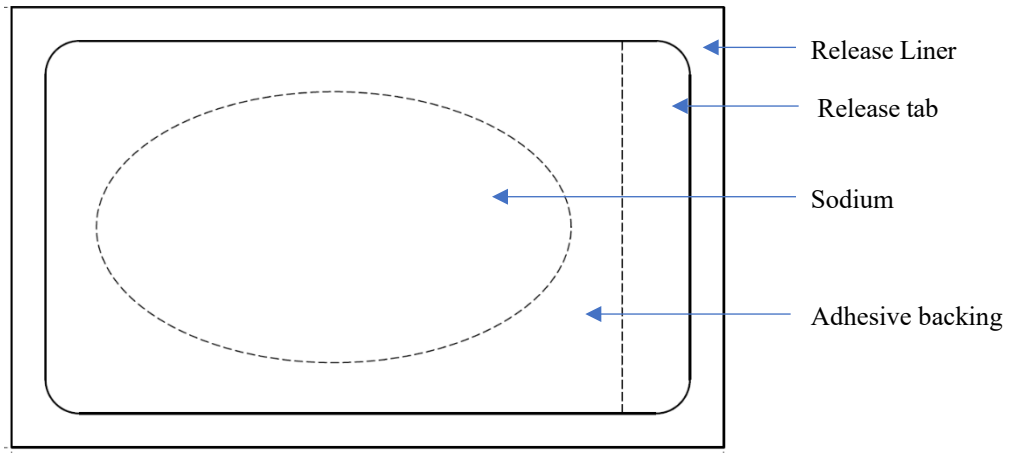

Figure 2. Schematic of N-SWEAT Patch

The N-SWEAT patch is a non-invasive, single-use topical patch device. The N-SWEAT patch is a thermal energy-based medical device that is activated by water released from sweat glands. When applied to a dry axilla by a clinician, the sodium bilayer in the patch interacts with the water component of sweat causing the patch to generate thermal energy as well as the byproduct sodium hydroxide (NaOH) (sodium hydroxide does not contribute to the therapeutic mechanism). The rapid exothermic reaction between sweat (water) and sodium is limited by both the amount and location of the sweat. The thermal energy temporarily inactivates sweat glands leading to a reduction in sweat production. In the absence of sweat, no thermal energy is generated.

The release liner is removed immediately prior to the treatment. The reactive material is a thin layer of sodium, which interacts with the patient's sweat to deliver the treatment. The polyethylene adhesive backing on which the sodium bilayer is mounted holds the patch in place during the treatment (Figure 2). The argon gas provides an inert environment in the packaging to prevent the patch from oxidizing and to increase the shelf life.

The N-SWEAT Patch is applied by a clinician to the surface of dry, unabraded, intact skin of the axilla. After the skin is cleansed and dried, the release liner is removed, and the device is applied to the skin for up to 3 minutes in a physician's office or clinic. The entire device is then removed and disposed of by medical personnel. The skin is then cleansed with water to remove any sodium hydroxide residue.

SUMMARY OF NONCLINICAL/BENCH STUDIES

BIOCOMPATIBILITY/MATERIALS

The N-SWEAT Patch is categorized as a surface device that contacts intact skin for a limited (<24 hour) contact duration. The total exposure time of the system in clinical use is no more than three minutes. The N-SWEAT Patch biocompatibility evaluation was conducted in accordance with FDA Guidance, *Use of International Standard ISO 10993-1, "Biological evaluation of medical devices -Part 1: Evaluation and testing within a risk management process".*

The following biocompatibility endpoints were addressed:

Endpoint	Test Method
Cytotoxicity	MEM Elution Test ISO 10993-5
Sensitization	Guinea Pig Maximization ISO 10993-10
Irritation	Primary dermal irritation ISO 10993-10

Additionally, a systemic toxicity assessment was conducted using a porcine abdomen model.

The results demonstrate that the N-SWEAT Patch is biocompatible.

SHELF LIFE/STERILITY

N-SWEAT Patch: The shelf life of the patch was verified to be 1 year based on sodium reactivity specifications. The validation study has been performed on both real time aging (ambient temperature for 377 days) and accelerated aging (60°C for 29 days) samples. The patch is provided non-sterile and is not intended to be sterilized.

N-SWEAT Disposal Kit: The shelf-life of the disposal kit was verified to be 6 months based on testing of disposal fluid volume, disposal bottle maximum temperature, and disposal kit effectiveness. The validation study has been performed on both real time aging (ambient temperature for 6 months) and accelerated aging (60°C for 16 days) samples.

PERFORMANCE TESTING: BENCH

THERMAL CHARACTERIZATION

Thermal characterization of the N-SWEAT Patch was performed by calorimetry and by characterizing the amount and distribution of sodium on the patch, as well as the shape and size of the patch.

SODIUM REACTIVITY TEST

The purpose of the sodium reactivity test was to demonstrate that the device performed as intended under anticipated conditions of use. Sodium reactivity test was performed on each patch by distributing a specified volume of water uniformly on a piece of filter paper which had been cut to the shape of the sodium and mounted to the test fixture. The patch was then placed on the test fixture, with the sodium contacting the wetted filter paper, and the maximum temperature rise of the plate was measured. Samples with real time aging and accelerated aging showed reactivity of average 8.5°C and 10.5°C temperature increases, respectively which met 5~18.5 °C acceptance criterion. The sodium reactivity result demonstrated the 1-year shelf-life of the N-SWEAT Patch.

PATCH INTEGRITY

Patches were inspected for cracks, tears and separations of the peel-off liner and backing layer and that all components were intact, in position and there was no sodium present external to the peel-off liner and backing layer.

PATCH ADHESIVENESS

Patch adhesiveness was measured according to ASTM D3330 on 7/16” strips of adhesive backing which were removed from the finished patches. The test passed if adhesiveness ranged from 15 to 440 grams.

RELEASE-LINER PEEL FORCE

Release liner peel force was measured according to ATM D5375 on 7/16" strips of adhesive backing which were removed from the finished patches. The test passed if the liner peel strength ranged from 3 to 100 grams.

SUMMARY OF CLINICAL INFORMATION

A. Study Design

A randomized, double-blinded, sham-controlled, pivotal study was performed to assess the clinical performance of the N-SWEAT Patch. The study included 11 clinical trial sites and 120 participants who had gravimetric sweat production (GSP) of ≥50mg/5min, a Hyperhidrosis Disease Severity Scale (HDSS) score of 3 or 4, and a medical history consistent with primary axillary hyperhidrosis. Participants were randomized to receive a single treatment with either the active device or a sham device and monitored virtually or in person at 24 hours, 48-72 hours, then every 2 weeks. Response was assessed at 4 weeks and monitored for 12 weeks. Effectiveness (sweat reduction) was monitored by assessing HDSS and GSP values. The primary endpoint was based on post-treatment HDSS scores of 1 or 2 at 4-weeks in the active vs. sham control groups. Secondary endpoints were the 4-week assessment of: the Quality of Life (QoL) measures of Bother and Impact; the improvement of HDSS by 2 points; and the reduction in GSP by ≥50%.

The study was originally designed to assess performance in the Intent to Treat (ITT) population. However, some participants were identified as being treated with medications that could alter (increase or decrease) perspiration. Therefore the primary effectiveness endpoint was assessed in the Per Protocol (PP) population. Of the original 120 patients enrolled (10 treated with the active device in an early safety roll in, 110 randomized to treatment), 20 were excluded from the PP analysis due to confounding medications. Medications leading to exclusion included psychotropic medications (desvenlafaxine, dextroamphetamine, escitalopram, lisdexamfetamine, paroxetine, venlaxafine); antihistamines (loratadine); proton pump inhibitors (omeprazole); hormonal therapies (levothyroxine, medroxyprogesterone); beta-adrenergic agonists (albuterol); and others (sildenafil, metformin, statins).

B. Demographic information

Baseline demographics for the randomized subjects are summarized in the table below. No significant differences in characteristics were identified between the N-SWEAT treated group and the sham treated control group.

Subject Characteristics	ITT			PP		
	N-SWEAT Treated	Sham	P-value	N-SWEAT Treated	Sham	P-value
Age (years)			0.15			0.24
N	53	57		46	44	

Mean (SD)	32.6 (7.3)	34.8 (8.4)		32.8 (7.3)	34.4 (7.3)	
Median	33.0	35.0		33.0	34.5	
Min, Max	22.0, 56.0	22.0, 59.0		22.0, 56.0	22.0, 57.0	
Gender			0.56			0.40
Male	43.4% (23/53)	36.8% (21/57)		45.7% (21/46)	36.4% (16/44)	
Female	56.6% (30/53)	63.2% (36/57)		54.3% (25/46)	63.6% (28/44)	
Ethnicity			0.40			0.76
Hispanic / Latino	9.4% (5/53)	15.8% (9/57)		10.9% (5/46)	13.6% (6/44)	
Non-Hispanic / Latino	90.6% (48/53)	84.2% (48/57)		89.1% (41/46)	86.4% (38/44)	
Race			0.69			0.25
America Indian	1.9% (1/53)	3.5% (2/57)		202% (1/46)	4.5% (2/44)	
Asian	15.1% (8/53)	8.8% (5/57)		17.4% (8/46)	4.5% (2/44)	
Black /African American	22.6% (12/53)	22.8% (13/57)		21.7% (10/46)	27.3% (12/44)	
Native Hawaiian/Pacific Islander	1.9% (1/53)	0% (0/57)		2.2% (1/46)	0% (0/44)	
White	58.5% (31/53)	64.9% (37/57)		56.5% (26/46)	63.6% (28/44)	
Baseline HDSS			0.70			0.67
3	39.6% (21/53)	43.9% (25/57)		39.1% (18/46)	45.5% (20/44)	
4	60.4% (32/53)	56.1% (32/57)		60.9% (28/46)	54.5% (24/44)	
Baseline GSP			0.09			0.29
N	53	57		46	44	
Mean (SD)	125.5 (56.2)	105.4 (39.9)		124.9 (57.1)	108.9 (41.3)	
Median	111.1	100.1		110.5	102.8	
Min, Max	53.9, 266.3	54.6, 236.0		53.9, 266.3	57.3, 236.0	
Body Mass Index			0.41			0.14
N	53	57		46	44	
Mean (SD)	28.3 (6.8)	27.0 (7.2)		28.8 (5.8)	26.2 (7.7)	
Median	27.3	27.6		27.5	26.3	
Min, Max	0.0, 43.4	0.0, 47.4		20.1, 43.4	0.0, 47.4	
Fitzpatrick Skin Type			0.82			0.65
Type I	13.2% (7/53)	8.8% (5/57)		15.2% (7/46)	9.1% (4/44)	
Type II	26.4% (14/53)	29.8% (17/57)		23.9% (11/46)	29.5% (13/44)	
Type III	20.8% (11/53)	26.3% (15/57)		19.6% (9/46)	25.0% (11/44)	
Type IV	18.9% (10/53)	12.3% (7/57)		21.7% (10/46)	11.4% (5/44)	
Type V	17.0% (9/53)	15.8% (9/57)		15.2% (7/46)	15.9% (7/44)	
Type VI	3.8% (2/53)	7.0% (4/57)		4.3% (2/46)	9.1% (4/44)	

C. Inclusion and Exclusion criteria

Inclusion Criteria:

- At least 22 years old at the time of consent
- Healthy female or male, who experiences excessive sweating or has been diagnosed with primary axillary focal hyperhidrosis
- GSP >50mg/5min in each axilla at room temperature/humidity (20-25.6°C/20-80%) at both screening and baseline
- Reports a HDSS score of 3 or 4 at both screening and baseline
- Subject agrees to avoid use of topical aluminum compounds, antiperspirants, anticholinergic medications or steroids for the duration of study participation.

Exclusion Criteria:

- Active skin disease, irritation, or abrasions at either axilla based on physical examination by physician at Baseline

- Subject's medical history is indicative of secondary or diffuse hyperhidrosis and/or subject has a diagnosis of secondary or diffuse hyperhidrosis
- GSP exceeds 300 mg/5min in either axilla at either screening or baseline
- GSP readings differ by more than 100% in either axilla between screening and baseline
- Treatment with botulinum toxin for excessive sweating or hyperhidrosis within 1 year
- Undergone any procedures, including for hyperhidrosis, which may affect the axillary areas
- Use of topical aluminum compounds, antiperspirants and antiperspirant deodorants for 2 days prior to screening, oral or topical anticholinergic medications, beta blockers, calcium channel blockers, a topical steroid, etc.

D. Study Endpoints

Primary Effectiveness Endpoint:

- Proportion of patients with HDSS of 1 or 2 at 4-week follow-up by treatment group.

Secondary Effectiveness Endpoints:

- Proportion of patients with improvement of at least 2 grades from baseline to 4-weeks in HDSS by treatment group
- Proportion of subjects with at least 50% improvement in GSP from baseline 4-weeks in N-SWEAT treated group only.
- Mean improvement in QoL scale Bother by treatment group
- Mean improvement in QoL scale Impact by treatment group

E. Subject Accountability

All subjects were followed up through the 2-week phone call. One sham subject missed the 4-week visit and 3 subjects exited the study prior to the 4-week visit; two subjects moved and one was lost to follow-up.

Parameter	**N-SWEAT Treated Subjects** N=53	**Sham Subjects** N=57
Enrolled in Randomized Cohort	53	57
ITT Population	53	57
Completed 24-hour phone call (± 12 hours)	53	57
Missed Visit	0	0
Visit window open or not yet opened	0	0
Cumulative number exited study prior to visit	0	0
Completed 48 – 72-hour visit (± 1 day)	53	57
Missed Visit	0	0
Visit window open or not yet opened	0	0
Cumulative number exited study prior to visit	0	0
Completed 2-week phone call (± 2 days)	53	57
Missed Visit	0	0

Visit window open or not yet opened	0	0
Cumulative number exited study prior to visit	0	0
Completed 4-week visit (± 3 days)	50	55
Missed Visit	1	1
Visit window open or not yet opened	0	0
Cumulative number exited study prior to visit	2	1

F. Data Analysis

Hyperhydrosis was assessed using the following tools:

- Hyperhidrosis Disease Severity Scale (HDSS) score

1	My underarm sweating is never noticeable and never interferes with my daily activities
2	My underarm sweating is tolerable but sometimes interferes with my daily activities
3	My underarm sweating is barely tolerable and frequently interferes with my daily activities
4	My underarm sweating is intolerable and always interferes with my daily activities

- Gravimetric sweat production (GSP)
- Quality of Life (QoL) surveys for Bother and Impact

BOTHER: **During the past week how bothered were you by your underarm sweating?**	☐ Not at all bothered ☐ A little bothered ☐ Moderately bothered ☐ Very Bothered ☐ Extremely Bothered
IMPACT: **During the past week how often did your underarm sweating impact your daily activities?**	☐ Not at all ☐ A little bit ☐ A moderately amount ☐ A great deal ☐ An extreme amount

G. Schedule of Assessments

Screening/Enrollment	Medical history, HDSS, GSP, physical exam
Treatment day	Pre-treatment GSP, treatment
24-hour phone call	Safety monitoring
48-72 hour visit	Safety monitoring, HDSS, QoL
2-week phone call	Safety monitoring, HDSS, QoL
4-week visit	Physical exam, GSP, HDSS, QoL, safety monitoring
6-week, 8-week, 10-week, 12-week visits	Safety monitoring, HDSS, QoL

H. Safety definitions and reporting requirements:

All AEs and ADEs were to be recorded by the investigator on the case report forms (CRFs) provided and reported to the IRB according to IRB requirements and to the sponsor in accordance with the Investigational Plan and applicable FDA regulations. The sites were instructed to report all AEs considered moderate or severe and all local skin reactions to Candesant within 5 working days of the identification of the AE. Descriptive and photographic data were to be recorded for all AEs regardless of severity or device-relatedness. All observed local skin reactions will also be recorded.

An independent Data Safety Monitoring Board (DSMB) comprised of 3-5 clinical physicians with expertise in dermatology reviewed adverse events o findings indicate an unacceptable or unknown safety risk.

Adverse event monitoring and evaluation was performed in accordance with ISO 14155. Both the investigator and the sponsor will and in compliance with all local medical device reporting requirements. A serious adverse event (SAE) is defined according to ISO 14155:2003 as any adverse event that:

- Led to a death
- Led to a serious deterioration in the health of the subject that
- Resulted in a life-threatening illness or injury
- Resulted in a permanent impairment of a body structure or a body function
- Required in-patient hospitalization or prolongation of existing hospitalization
- Resulted in medical or surgical intervention to prevent permanent impairment to body structure or a body function

AEs or complications meeting the definition for SAE or UADE were required to be reported by the investigators to the IRB and to Candesant Biomedical within 24 hours. Serious AEs and UADEs were documented on the Serious Adverse Event Form.

I. Safety Results

A total of 16 N-SWEAT treated subjects had 22 AEs reported, most of which (17/22) were AEs at the treatment site. Five sham treated subjects also experienced 9 AEs that were similarly predominantly at the treatment site (7/9). There were no serious adverse events (SAEs) and no adverse events were considered severe.

All adverse events reported in the study included 14 mild and 8 moderate events for N-SWEAT treated subjects and 7 mild and 1 moderate AEs for sham treated subjects.

A total of 24 of the reported AEs for all subjects (N-SWEAT and sham treated) were local skin reactions including subjects reporting one or more of the following after treatment: erythema (5), erosion (6), edema (2), burning/ stinging (5), bromhidrosis

(2), pain (3), crusts (1), vesicles (1), ulcer (1), scaling (1), papule (1), discoloration (1), reaction to adhesive (3), and Compensatory sweating (1). There were 3 non-axillary AEs, all for the same subject, including light headedness, dry eyes and a rash on the hands. The two subjects with bromhidrosis (1 active and 1 sham) completed the study with the AEs ongoing, potentially reflecting the study condition that subjects not use deodorant during follow-up. One subject ended the study with ongoing compensatory sweating.

Adverse Event Description				
	N-SWEAT Treated + Roll-in		**Sham**	
	# of AEs	**% (##/##) of Subjects**	**# of AEs**	**% (##/##) of Subjects**
AE at the Treatment site (local skin reaction)	17	22.2% (14/63)	7	7.0% (4/57)
Procedure associated (not treated site local skin reaction)	2	3.2% (2/63)	2	3.5% (2/57)
Non-Axillary AE	3	1.6% (1/63)	0	0.0% (0/57)
TOTAL	22	25.4% (16/63)	9	8.8% (5/57)

J. Primary endpoints

Per the Statistical Analysis Plan, the Full Analysis Set (FAS) was the pre-specified population for efficacy analysis in the Sahara Study. Despite the fact that the primary endpoint showed more treated subjects reporting an HDSS-1 or 2 at 4-weeks compared to the sham controls, the difference in this FAS population was not statistically significant. However, the same analysis showed statistical significance (p=0.0332) in the Per Protocol (PP) population. These data are consistent with concurrent medications impacting assessment of HDSS by study subjects. By removing subjects taking medications that impact sweating, the PP analysis demonstrated that the impact on sweating for subjects in the study was isolated to the effects of the of the N-SWEAT patch.

Proportion of Subjects with HDSS 1 or 2 at 4 weeks	**Proportion of Subjects with HDSS 1 or 2 at 4 weeks % (#/#)**		**p-value**
	N-SWEAT Treated	**Sham**	
FAS	58.8% (30/51)	52.7% (29/55)	0.3851
PP	63.6% (28/44)	44.2% (19/43)	0.0332

K. Secondary endpoints

The following secondary endpoints were assessed:

Gravimetric Sweat Production (GSP): 56% of N-SWEAT-treated subjects showed a ≥50% reduction in GSP in the FAS population (60.5% in the PP population).

Study Group	Change in GSP from Baseline to 4W Mean (95% CI)	
	FAS	PP
N-SWEAT Treated	-53.1 (-69.9, -36.4)	-57.3 (-75.7, -38.9)
Sham	-18.8 (-34.8, -2.9)	-18.2 (-36.5, 0.2)

HDSS reduction by 2 points: The proportion of N-SWEAT treated subjects with HDSS reduction of at least 2 points was 41.2% in the FAS population and 43.2% in the PP population. Reduction in HDSS was greater in the active arm than the sham arm. to outcomes in the sham group, in which 2-point improvement was observed in 21.8% in the FAS population and 16.3% in the PP population.

		N-SWEAT	Sham
Proportion of subjects with improvement of at least 2 grades in HDSS	FAS	41.2%	21.8%
	PP	43.2%	16.3%

Mean Improvement in Quality of Life (QoL) scale Bother and Impact:

Secondary Endpoint at 4 weeks in Priority Order	Analysis Population	Estimate (95% CI)	
		N-SWEAT Treated	Sham
Mean Improvement in QoL scale Bother	FAS	-1.39 (-1.74, -1.05)	-0.86 (-1.19, -0.53)
	PP	-1.52 (-1.88, -1.16)	-0.61 (-0.98, -0.25)
Mean Improvement in QoL scale Impact	FAS	-1.34 (-1.67, -1.01)	-0.83 (-1.15, -0.52)
	PP	-1.44 (-1.77, -1.10)	-0.57 (-0.91, -0.23)

pH SUB-STUDY

The purpose of the pH sub-study study was to collect pH measurements to assess residual NaOH on the skin after treatment with the N-SWEAT Patch. The study took place with 25 subjects (13 N-SWEAT group vs. 12 sham control) at 5 study sites. Skin pH was measured in both axillae. Measurements are taken using a Hanna H199181 skin pH meter prior to treatment with the N-SWEAT Patch (or sham) and after the completion of the post-treatment cleaning. Results from

this study showed that patients treated with an N-SWEAT patch had a post procedure mean pH of 7.9 and a median pH of 8.1, below the pH 11 acceptance criterion.

Pediatric Extrapolation

In this De Novo request, existing clinical data were not leveraged to support the use of the device in a pediatric patient population.

LABELING

The non-sterile N-SWEAT Patch is packaged in an impermeable, argon filled, foil pouch.

The N-Sweat Patch labeling is sufficient and meets the labeling requirements for a prescription device. It contains the indications for use, prescription only symbol, device description, contraindications, general warnings and precautions, summary of clinical data, instructions for use including disposal instructions, potential adverse events, storage conditions, and symbols and markings. Furthermore, the packaging includes a shelf life for the device. The labeling meets the requirements of 21 CFR 801.109 for prescription devices.

RISKS TO HEALTH

The table below identifies the risks to health that may be associated with the use of a skin patch for treatment of hyperhidrosis and the measures necessary to mitigate these risks.

Risks to Health	Mitigation Measures
Adverse tissue reaction	Biocompatibility evaluation Labeling
Device failure/malfunction leading to tissue damage	Non-clinical performance testing Shelf-life testing Package integrity testing Labeling
Adverse tissue effects as a result of the chemical reaction	Thermal safety testing Clinical performance testing Labeling
Failure to identify correct population and condition leading to injury or to diminished effectiveness.	Labeling
Compensatory hyperhidrosis or bromhidrosis	Labeling

SPECIAL CONTROLS

In combination with general controls of the Food Drug & Cosmetic Act, a skin patch for treatment of hyperhidrosis is subject to the following special controls:

(1) Clinical performance testing must demonstrate that the device performs as intended under anticipated conditions of use and evaluate:

(i) Reduction in hyperhidrosis using a validated measure;
(ii) All adverse events; and
(iii) Impact of residual chemical on the skin.

(2) Non-clinical performance testing must demonstrate that the device performs as intended under anticipated conditions of use. The following performance characteristics must be tested:
(i) Thermal reactivity of the active device component(s);
(ii) The total energy and energy flux (energy per unit area) of the device that is available to induce heating based on calorimetry; and
(iii) Characterization of the distribution and homogeneity of the chemical(s) on and within the device.

(3) The patient-contacting components of the device must be demonstrated to be biocompatible.

(4) Performance testing must support the shelf life of the device by demonstrating device functionality and package integrity over the labeled shelf life.

(5) Labeling must bear all information required for safe and effective use of the device.

(6) Patient and physician labeling must include:
(i) A summary of the clinical performance testing conducted with the device;
(ii) A listing of known and potential risks including local adverse events, systemic effects, and adverse changes in perspiration; and
(iii) Information about the known duration of effect.

(7) Physician labeling must also include:
(i) Instructions for safe disposal of all chemically-reactive components of the device that can cause injury or environmental hazard; and
(ii) A shelf life.

BENEFIT RISK DETERMINATION

DISCUSSION OF BENEFIT

Effectiveness (sweat reduction) was monitored by assessing HDSS and GSP values. The primary endpoint was based on post-treatment HDSS scores of 1 or 2 at 4-weeks in the active vs. sham control groups. Secondary endpoints were the 4-week assessment of: the Quality of Life (QoL) measures of Bother and Impact; the improvement of HDSS by 2 points; and the reduction in GSP by ≥50%.

The treatment was overall well tolerated, with no serious adverse events. The presence of deep creases in the axilla, striae, thickened/macerated or wet epidermis, or prominent perifollicular papule increased the risk of an adverse skin reaction. In total, 22% (14/63) of N-SWEAT treated subjects experienced a Device-Related event. All adverse events were considered Mild to Moderate and resolved without sequalae. Most were local skin reactions and included pain/stinging, redness, small skin abrasions, swelling, or ulceration. A single instance of compensatory hyperhidrosis was reported.

Effectiveness was demonstrated by a reduction in sweat in participants treated with the active device compared to participants treated with the sham device. For the primary endpoint, 64% active vs. 44% sham (p=0.0332) achieved HDSS 1 or 2 at 4-weeks after treatment with the active patch vs. the sham patch.

Secondary endpoint analysis demonstrated greater 2-point improvement in HDSS in the active vs. sham groups at 43.2% vs. 16.3%. A reduction in GSP of ≥50% was demonstrated in 60.5%, meeting the endpoint of ≥50% responder rate. The mean change in GSP was -57.3 and -18.2 mg/5min for the active and sham subjects respectively. Impact on quality of life (QoL) secondary endpoints demonstrated reduction in Bother (-1.52 active vs. -0.61 sham) and Impact (-1.44 active vs. -0.57 sham).

The pivotal study demonstrated reduction in hyperhidrosis as measured by reduction in gravimetric sweat production and improved HDSS scores. Improvements were greater in the active arm than in the sham arm. Quality of Life (QoL) measures indicate improvement in perceived Bother and Impact. The effectiveness measures are comparable to those reported for current treatments for primary axillary hyperhidrosis.

Limitations of the study include restriction of the effectiveness analysis to the PP population due to potential confounding effects of medications. This limitation can be mitigated by a special control that requires labeling to identify patient populations and conditions that are appropriate or not appropriate for treatment with the device.

DISCUSSION OF RISK

Adverse events included erythema/discoloration, edema, burn/erosion, discomfort/pain, vesicles, crust/scaling, reaction to adhesive compensatory hyperhidrosis, and bromhidrosis. The rate of burns is estimated to be 8%. The observed adverse event rate, severity, and duration are lower than those reported for other treatment approaches for primary axillary hyperhidrosis. The risk of local adverse events can be mitigated by a special controls that requires labeling to include a description of the known and potential adverse events and guidance for selection of patients, conditions, and risk factors for the adverse events.

The local contact site risks associated with the reaction of metallic sodium and its byproduct NaOH can be mitigated in a clinical setting by controlling the nature of the application site (dry, intact skin), the application time (no more than 3 minutes) and post treatment cleaning of residues from the treated area.

The risk is acceptable for the medical indication of primary axillary hyperhidrosis and

PATIENT PERSPECTIVES

This submission included specific information on patient perspectives for this device to include self-reported Hyperhidrosis Disease Severity Scale (HDSS) score, which is accepted as a

measure of the severity of the impact of hyperhidrosis on daily living. The HDSS score was the primary endpoint. In addition, the study assessed the degree to which hyperhidrosis affected Quality of Life (QoL) on a Likert-like 5-point scale for Bother and Impact. Participant responses demonstrated reduction in Bother score (-1.52 active vs. -0.61 sham) and Impact score (-1.44 active vs. -0.57 sham.

BENEFIT-RISK CONCLUSION

In conclusion, given the available information above, for the following indication statement:

> *The N-SWEAT Patch is indicated for treatment of primary axillary hyperhidrosis in adults.*

The probable benefits outweigh the probable risks for the N-SWEAT Patch. The device provides benefits and the risks can be mitigated by the use of general controls and the identified special controls.

CONCLUSION

The De Novo request for the N-SWEAT Patch is granted and the device is classified as follows:

Product Code: QVX
Device Type: Skin patch for treatment of hyperhidrosis
Regulation Number: 21 CFR 878.4425
Class: II