

**DE NOVO CLASSIFICATION REQUEST FOR
REZA BAND[®] UPPER ESOPHAGEAL SPHINCTER (UES) ASSIST DEVICE**

REGULATORY INFORMATION

FDA identifies this generic type of device as:

External Upper Esophageal Sphincter (UES) Compression Device: An external upper esophageal sphincter (UES) compression device is a prescription device used to apply external pressure on the cricoid cartilage for the purpose of reducing the symptoms of laryngopharyngeal reflux (LPR) disease.

NEW REGULATION NUMBER: 874.5900

CLASSIFICATION: CLASS II

PRODUCT CODE: PKA

BACKGROUND

DEVICE NAME: REZA BAND[®] UPPER ESOPHAGEAL SPHINCTER (UES) ASSIST DEVICE

SUBMISSION NUMBER: DEN130046

DATE OF DE NOVO: NOVEMBER 27, 2013

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REQUESTER'S RECOMMENDED CLASSIFICATION: CLASS I, MODIFIED TO CLASS II

INDICATIONS FOR USE

The Reza Band[®] UES Assist Device is indicated for patients 18 years and older to reduce the symptoms of laryngopharyngeal reflux (LPR) disease by reducing the regurgitation of stomach contents from passing through the upper esophageal sphincter. The device is worn by the patient when sleeping.

LIMITATIONS

Prescription Use only: Federal (USA) law restricts this device to sale by or on the order of a physician.

Limitations on device use are included in the Instructions for Use as Warnings and Precautions.

Warnings

- The safety and effectiveness has not been demonstrated for the following conditions:
 - Patient with implants or implant parts that reside in the area where the Reza Band is applied.
 - Patient with an implanted pacemaker, implanted cardioverter defibrillator (ICD), vagus nerve stimulator, or other such similar devices implanted in the neck.
 - Patient diagnosed with glaucoma.
 - Patient had a malignancy of the neck, including neck surgery.
 - Patients that may have an altered mental status including due to the use of sedative drugs or narcotics.
 - Patients with carotid artery disease, thyroid disease, a history of cerebrovascular disease, or any disorder of connective tissues (e.g., Marfan's Syndrome or Ehlers-Danlos Syndrome).
- The Reza Band is packaged and designed for single patient use only.
- The Pressure Sensor is packaged and designed for a one-time use only.

Precautions

- The Reza Band, the External Manometer or the Pressure Sensor should only be used by health care providers trained to prescribe and apply the device.
- The safety of the Reza Band for use during pregnancy, in breastfeeding females or in patients under 18 years of age has not been established.
- The safety of the Reza Band[®] UES Assist Device in patients currently receiving treatment with continuous positive airway pressure (CPAP) has not been established.
- If the patient feels unusual pain, skin irritation or the worsening of symptoms, they should discontinue the use of the Reza Band and contact their health care provider.
- If the Reza Band does not stay in place, the patient should stop using the Reza Band and contact their health care provider. The patient may need to be re-fitted for the Reza Band.
- The External Manometer is not designed for liquid immersion. The External Manometer should be cleaned with a damp cloth using warm water or pre-saturated isopropyl alcohol wipes.

DEVICE DESCRIPTION

Reza Band[®] UES Assist Device

The Reza Band[®] UES Assist Device (Reza Band) (Figure 1) is a non-invasive, non-sterile device worn by the patient and is designed to provide a set pressure (20-30 mm Hg) on the cricoid cartilage, which increases the luminal pressure within the upper esophageal sphincter (UES). The patient wears the Reza Band after being fit by the physician (Figure 2).



Figure 1: Reza Band[®] UES Assist Device



Figure 2: Fitting the Reza Band[®] UES Assist Device to the Patient

The Reza Band has 5 main components:

- Frame – Is semi-flexible so that it can apply the prescribed pressure as determined by the physician, is comfortable for the patient, and allows limited pressure adjustments by the patient. The Cushion is attached to the Frame. The magnet in the Frame attaches to the Clasp.
- Cushion – Positioned over the cricoid cartilage and designed to conform to the anatomical structures when being worn.
- Comfort Band – Holds the Reza Band in place.
- Clasp – Attaches to the Reza Band Frame by the use of a magnet. This allows for the patient to easily and quickly take the device on and off during routine use and in emergency situations if needed.
- Comfort Dial – Allows the patient a limited adjustment to the applied pressure.

Reza Band[®] Pressure Sensor and the Reza Band[®] External Manometer

The Reza Band[®] External Manometer (External Manometer) is a hand-held device and is connected to the Reza Band[®] Pressure Sensor (Pressure Sensor). It is used by the treating physician, is powered by a AAA battery and displays the pressure being applied to the cricoid cartilage region by the Reza Band in millimeters of Mercury (mm Hg) as the Reza Band[®] is being fitted (Figure 3).

The Pressure Sensor connected to the External Manometer is regulated as a miniature pressure transducer (21 CFR Part 890.1615) which is Class I exempt. The Pressure Sensor and the

External Manometer were assessed to ensure that the Reza Band[®] was accurately applying the specified pressure.

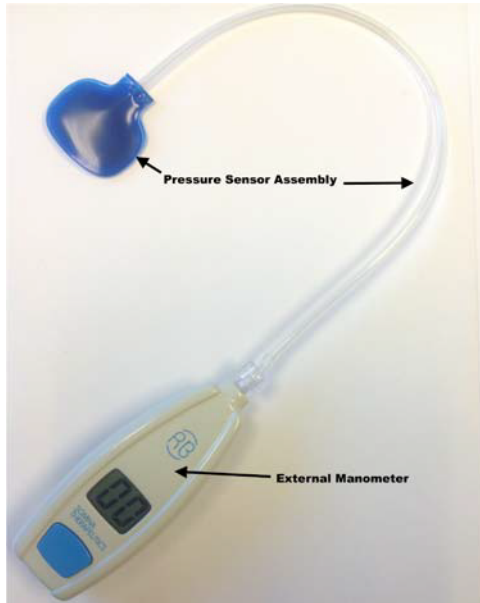


Figure 3: Reza Band[®] Pressure Sensor Connected to the Reza Band[®] External Manometer

- External Manometer – Contains the “On” button and displays the pressure being applied by the Reza Band in mmHg.
- Pressure Sensor – A non-sterile, one-time-use component that is connected to the External Manometer with a luer lock connector. It is positioned between the Reza Band and the patient, at the time of the fitting by the physician. When the Pressure Sensor is compressed during the fitting of the Reza Band, air is forced down the tubing to an internal pressure sensor. This, in turn, provides the input for the display.

SUMMARY OF NONCLINICAL/BENCH STUDIES

Non-clinical/bench studies conducted on the Reza Band[®] UES Assist Device to demonstrate a reasonable assurance of safety and effectiveness of the device are summarized in the sections below.

BIOCOMPATIBILITY/MATERIALS

The Reza Band contacts the patient’s intact skin surfaces. The Reza Band is categorized as a permanent contact device as the device is intended to be used more than 30 days. In accordance with ISO 10993-1: Biological Evaluation of Medical Devices, Part 1: Evaluation and Testing within a Risk Management Process, the following biocompatibility testing was conducted on the Reza Band. The biocompatibility assessment was deemed adequate.

Table 1: Reza Band[®] UES Assist Device Biocompatibility Testing

Test	Purpose	Results
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Cytotoxicity Evaluation – Fluid Extract/L929 Mouse Fibroblast	To assess the biological activity of L-929 mouse fibroblast cells (grown in culture) after exposure to extracts prepared from the completed Reza Band device	Non-cytotoxic
Primary Skin Irritation with 0.9% NaCl & Cottonseed Oil Extracts	To assess the irritating potential of extracts of the Reza Band to produce dermal irritation	Negligible
Dermal Sensitization Maximization with 0.9% NaCl & Cottonseed Oil	To estimate the potential for sensitization of the Reza Band extract using the guinea pig as the animal model	Non-Sensitizer

SHELF LIFE/STERILITY

Reza Band® UES Assist Device is provided non-sterile. The Reza Band and External Manometer components are reusable and intended to be used for up to 6 months. The Pressure Sensor component is for single use. The sponsor provided reprocessing instructions (i.e., cleaning with mild soap and warm water) for the Reza Band and External Manometer for the patient and health care facility users, respectively. The information provided is adequate.

PERFORMANCE TESTING – BENCH

The sponsor conducted finite element analysis (FEA) of the structural behavior to support the design of the Reza Band UES Assist Device. Bench testing was also conducted to demonstrate the mechanical performance of the Reza Band for the intended conditions of use, and compatibility of use with the External Manometer, and Pressure Sensor. The functionality of the devices was tested over a simulated 6-month shelf life period. All bench testing was conducted on the final, finished devices that met established specifications. Table 2 summarizes each of the bench tests.

Table 2. Reza Band® UES Assist Device Bench Testing

Test	Purpose	Method	Results
Reza Band Neck Ring Lifetime Test	To demonstrate that the Reza Band retains its intended functionality over its intended 6-month use period	(b)(4)	All the established acceptance criteria were met.

		functionality, in accordance with established specifications.	
Reza Band Mechanical Test	To demonstrate the mechanical integrity of three key components of the Reza Band for their intended use: tensile strength of the Comfort Band; functionality and attachment of the frame pusher after exposure to pull testing; and attachment of the Comfort Band attachment portions of the frame body after pull testing	Comfort Band Evaluation: The Comfort Band was (b)(4) the length was (b)(4) testing	The length of the Comfort Band was not significantly different after being pulled by the (b)(4) when comparing the length before and after the testing.
		Frame Pusher Evaluation: The Frame Pusher was (b)(4) the Comfort Dial actuation.	The Frame Pusher did not exhibit any damage or failures and the Comfort Dial continued to function as intended (b)(4) was applied to the Frame Pusher.
		Frame Body Evaluation: The Frame Body was applied (b)(4) visually examined for evidence of breakage, damage or deformation.	The Frame Body did not fail and there was no damage noted, after being subjected (b)(4) of force.
Reza Band Accelerated Aging Shelf Life Testing	To demonstrate that the Reza Band retains its intended functionality over a simulated 6-month shelf life (storage) period	Devices were subjected to (b)(4) and evaluated for continued functionality and conformance with specifications.	With the exception of the observations regarding the Frame Body magnets following exposure to accelerated aging conditions (b)(4) acceptance criteria were met. A rationale (b)(4)
Reza Band, External Manometer and Pressure Sensor Shipping Test	To demonstrate that the packaged Reza Band, External Manometer, and Pressure Sensor withstand damage from,	Devices were subjected to simulated shipping conditions including temperature, humidity conditions, compression, vibration, shock, and repeat vibration in accordance with the (b)(4)	The Reza Band, External Manometer and Pressure Sensor demonstrated continued functionality and conformance with specifications.

	and retain their intended functionality after, simulated shipping conditions	(b)(4)	
External Manometer Pressure Measurement Accuracy Testing	To demonstrate that the pressure measurement accuracy of the External Manometer meets design specifications	Known pressures (b)(4) were measured by the External Manometer.	The pressure measurement accuracy of the External Manometer is within (b)(4) mmHg as specified over the (b)(4).
External Manometer Life Test	To demonstrate that the External Manometer is capable of maintaining functionality over its intended 600-use life time	Pressure measurement accuracy was evaluated at baseline (b)(4) with pressure accuracy assessed at from (b)(4) mmHg.	All established acceptance criteria were met following (b)(4) (in excess of the 600-use requirement)

SUMMARY OF CLINICAL INFORMATION

The following is a summary of two clinical studies performed by the sponsor to support a reasonable assurance of safety and effectiveness for the Reza Band® UES Assist Device.

Study #1: Multi-Center, Non-Randomized, Prospective Study of the Reza Band® Upper Esophageal Sphincter (UES) Assist Device for the Treatment of Esophagopharyngeal Reflux

The sponsor conducted a non-randomized, prospective, open label study of 95 patients treated at 5 investigational sites with the Reza Band. The study enrolled subjects that had been clinically diagnosed with laryngopharyngeal reflux (LPR) (i.e., chronic cough, choking, aspiration, chronic post nasal drip, globus, sore throat, throat clearing) and who met the inclusion and exclusion criteria.

The inclusion criteria were:

- 18 years of age or older
- The patient must be willing and able to provide informed consent.
- Understands the clinical study requirements and is able to comply with follow-up schedule.
- Clinically diagnosed with esophagopharyngeal reflux with extra-esophageal symptoms (i.e., chronic cough, choking, aspiration, chronic post nasal drip, globus, sore throat, throat clearing) for 6 months or longer.
- Reflux Symptom Index (RSI) >13

The exclusion criteria were:

- Currently being treated with another investigational medical device and/or drug
- Currently receiving treatment for sleep apnea with continuous positive airway pressure (CPAP)
- The patient is female and is of child bearing potential and is not using an acceptable method of birth control, or is pregnant or breast feeding.
- Previous head or neck surgery or radiation
- Carotid artery disease, thyroid disease, or history of cerebral vascular disease
- Suspected esophageal cancer
- Nasopharyngeal cancer
- Has either a pacemaker or implanted cardioverter defibrillator (ICD)
- Previously undergone Nissen Fundoplication

The study population consisted of 30.5% males and 69.5% females, (81.1% Caucasian, 8.4% Hispanic, 4.2% African-American, 1.1% Asian, 1.1% other subjects, and 4.2% not reported), with a mean age of 48.8 years, a mean body weight of 160.0 pounds, and a mean Body Mass Index (BMI) of 25.5.

The objective of the study was to assess the safety and effectiveness of the Reza Band when worn by subjects that had been clinically diagnosed with LPR (i.e., chronic cough, choking, aspiration, chronic post nasal drip, globus, sore throat, throat clearing). The subjects applied the Reza Band at bedtime and took it off upon waking.

The safety of the Reza Band was evaluated by assessing the incidence, type, duration and severity of adverse events observed in all patients.

The primary effectiveness endpoint was the percent reduction in the Reflux Symptom Index (RSI) from Baseline to Visit 3 (Week 4). The RSI is a validated nine-item, patient-administered outcome questionnaire designed to document the symptoms and severity of LPR. Patients were instructed to rate how the nine symptoms affected them on a scale of 0 (no problem) to 5 (severe problem), with a maximum total score of 45. Effectiveness was also assessed by the evaluation of patient and physician satisfaction, patient response to the RSI, the SF-36[®] Health Survey, the Functional Outcomes of Sleep Questionnaire and patient diaries.

Safety Results:

The adverse events that were reported during the study were generally mild, short in duration and the majority of those events were not related to the device. Those events that were reported as related to the device were also generally mild and short in duration. Device-related adverse events did not result in reduced outcomes as assessed by the change of the RSI score from baseline to Visit 3 (Week 4), as they were consistent with the overall population. There were no deaths or unexpected adverse events in the study. Six of ninety five (6/95) subjects discontinued use of the device due to reported symptoms of discomfort, and/or difficulty sleeping with the device in place, and therefore did not complete the study (categorized under Reza Band Problem in table below).

Table 3 below summarizes the incidence of adverse events in all subjects (including the 6 who did not complete the study) along with the reported relationship of the adverse event to the device.

Table 3. Adverse events relationship to device through 1 month follow-up (N = 95)

	Definitely (n/%)	Possibly	Probably Not	Definitely Not
Dysphagia	0 (0.0%)	0 (0.0%)	1 (1.1%)	0 (0.0%)
Odynophagia	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Pain	5 (5.3%)	2 (2.1%)	1 (1.1%)	0 (0.0%)
Globus	1 (1.1%)	0 (0.0%)	1 (1.1%)	5 (5.3%)
Laryngospasm	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (1.1%)
Regurgitation	0 (0.0%)	0 (0.0%)	1 (1.1%)	2 (2.1%)
Choking	5 (5.3%)	2 (2.1%)	1 (1.1%)	2 (2.1%)
Nausea	1 (1.1%)	0 (0.0%)	2 (2.1%)	0 (0.0%)
Dyspepsia	0 (0.0%)	1 (1.1%)	1 (1.1%)	1 (1.1%)
Hoarseness	0 (0.0%)	2 (2.1%)	3 (3.2%)	3 (3.2%)
Cough	0 (0.0%)	2 (2.1%)	2 (2.1%)	7 (7.4%)
Difficulty Breathing	0 (0.0%)	1 (1.1%)	3 (3.2%)	5 (5.3%)
Unable to Belch	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Unable to Vomit	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Skin Reaction	5 (5.3%)	1 (1.1%)	2 (2.1%)	1 (1.1%)
Reza Band Problem	14 (14.7%)	0 (0.0%)	0 (0.0%)	1 (1.1%)
External Manometer Problem	1 (1.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Effectiveness Results:

The Primary Effectiveness endpoint was defined as the percent change in the RSI from Baseline (Visit 1) to End of Study (4 weeks). Table 4 below provides the percent change in the RSI from the baseline for Visit 2 (2 weeks) and Visit 3 (4 weeks) for the 89 of 95 (93.7%) subjects that wore the Reza Band[®] for at least 2 weeks and provided one post-baseline RSI assessment. The six (6) subjects that discontinued use of device were excluded from the analysis as they did not return for Visit 2 (2 week) or Visit 3 (4 week). A worst-case sensitivity analysis demonstrated that the exclusion of the 6 subjects who did not return has no impact on the treatment effect or the outcome of the study.

The change in the RSI from baseline to each post treatment visit, as well as any post-treatment visit, were found to be statistically improved for both Visit 2 and Visit 3 (p<0.0001).

Table 4. Reflux Symptom Index (RSI) percent change in RSI from Visit 1 (N = 89)

Time Point	Statistic	RSI	% Change from Visit 1 - Baseline
Visit 1	n	89	N/A
	Mean	26.0	
	Standard Deviation	6.8	
	Median	25.0	
	Minimum	14.0	
	Maximum	42.0	
Visit 2	n	86	86
	Mean	14.6	-43.8
	Standard Deviation	9.2	31.1
	Median	12.5	-50.0
	Minimum	0.0	-100.0
	Maximum	41.0	35.7
	p-Value (1)		<0.0001
	p-Value (2)		<0.0001
Visit 3	n	86	86
	Mean	12.0	-54.3
	Standard Deviation	8.6	-27.1
	Median	10.5	-57.8
	Minimum	0.0	-100.0
	Maximum	42.0	7.7
	p-Value (1)		<0.0001
	p-Value (2)		<0.0001
Last Post-Baseline Visit	n	89	89
	Mean	12.1	-54.2
	Standard Deviation	8.6	27.5
	Median	10.0	-57.9
	Minimum	0.0	-100.0
	Maximum	42.0	7.7
	p-Value (1)		<0.0001
	p-Value (2)		<0.0001

(1) p-Value based on paired t-test to test hypothesis of no mean percent change.

(2) p-value based on one-sided one sample t-test to test hypothesis of mean change >25%.

All study subjects had an RSI score of greater than 13 at baseline. In the literature, an RSI score of greater than 13 suggests the presence of LPR¹. In this study, 54 out of 89 subjects (60.7%) reported that their RSI score was below 13 at the last post baseline visit.

¹ Belafsky PC, Postma GN, Koufman JA. Validity and reliability of the reflux symptom index (RSI). J Voice. 2002 Jun;16(2):274-7.

Of the 95 subjects that were enrolled in the study, 79 (83.2%) reported taking acid reducing medications with 16 subjects (16.8%) not taking acid reducing medications. Seventy-five of the 89 subjects (84.3%) that completed the study reported taking acid reducing medications at the time of enrollment. Of these 75 subjects, 61 (81.3%) continued taking acid reducing medication during the study and 14 (18.7%) discontinued taking acid reducing medications during the study.

The analysis in Table 5 below shows that the percent change in RSI score from baseline is no different whether acid reducing medications were used during the study. The study was not intended to show nor did the analysis of the data show that the Reza Band[®] provides a significant reduction in use of acid reducing medication.

Table 5. RSI scores subjects taking acid reducing medications at enrollment (N = 79) compared to subjects not taking acid reducing medications at enrollment (N = 16)

	Enrollment		2 Week		4 Week		4 Week % Change	
	Meds	No Meds	Meds	No Meds	Meds	No Meds	Meds	No Meds
Mean	25.8	26.2	14.1	16.6	11.7	12.8	55.7%	51.7%
Std Dev	6.6	7.7	9.1	9.3	8.5	10.1	27.6%	29.8%
Median	25	27	12	15	9.5	11.5	59.4%	56.2%

Study #2: Safety of an Intentionally Displaced Reza Band[®] Upper Esophageal Sphincter (UES) Assist Device

Objective

The safety of the Reza Band[®] UES Assist Device was evaluated when worn as intended over the cricoid cartilage, as well as when intentionally displaced laterally over each side of the neck, based on changes in heart rate, blood pressure, cardiac rhythm and intraocular pressure (IOP), as compared to when the Reza Band was not being worn. The intentional lateral displacement was studied to evaluate potential safety issues that might occur if the device was unintentionally displaced at night during sleep.

Methods

Twenty (20) subjects who met the inclusion and exclusion criteria were enrolled in the study, and were representative of the intended Reza Band patient population. The inclusion and exclusion criteria were similar with those specified in the pivotal clinical study (Study #1), but in this study patients with a history of glaucoma were excluded. The study population consisted of 60% males and 40% females (95% Caucasian and 5% African-American subjects), with a mean age of 46.3 years, and a mean Body Mass Index (BMI) of 28.7.

Measurements of heart rate, blood pressure, cardiac rhythm and IOP were taken at baseline, immediately after the Reza Band was placed on the neck in each of the specified scenarios (cricoid, right displacement and left displacement), 5 minutes after placement (except for IOP) and again 15 minutes after placement. The Reza Band was removed and 3 minutes later, IOP was again measured in each placement scenario.

After the fitting of the Reza Band, the Comfort Dial was fully actuated until the Comfort Dial came to the stop, to achieve the maximum pressure. The maximum pressure with the Comfort Dial fully actuated was also measured with the Reza Band displaced laterally over the vascular structures on both sides of the neck.

Results

The results showed that there was no effect on heart rate, blood pressure, cardiac rhythm or IOP, when the Reza Band was worn as intended as well as when the Reza Band was intentionally

displaced laterally, as compared to the baseline. No adverse events were reported during this study.

Analyses of Variance (One Way) were conducted on heart rate, blood pressure and intraocular pressure to determine whether there was any effect of the Reza Band being placed as intended or laterally displaced, when compared to not wearing the Reza Band. There was no significant difference for any of the measurements at any point in time, when compared to the baseline values.

Additionally, electrocardiograms (ECGs) were evaluated to determine whether there was any impact on cardiac rhythm when the Reza Band was placed as intended, or intentionally displaced over the jugular and carotid vasculature. It was determined that there was no change in the ECGs for any of the subjects at any time during the study, when compared to the baseline ECG.

The following summary table (Table 6) shows that when the Reza Band is set to apply its maximal pressure with the Comfort Dial fully actuated, and then displaced laterally, the pressure being applied to the left and right sides of the neck by the Reza Band is significantly reduced (mean of 59.2% (13.3 mm Hg), when displaced laterally to the left and a mean of 55.2% (14.6 mm Hg), when displaced laterally to the right), as compared to the applied pressure over the cricoid (20.9 mm Hg). This further reduces the risk of increased pressure to the sensitive structures of the neck.

Table 6. Comparison of Reza Band Applied Pressure at Cricoid and Laterally Displaced

Variable	Cricoid Pressure (Comfort Dial OFF) (mmHg)	Cricoid Pressure (Comfort Dial MAXIMUM) (mmHg)	Displaced to Left (Comfort Dial MAXIMUM) (mmHg)	Displaced to Right (Comfort Dial MAXIMUM) (mmHg)
Mean	20.9	32.6	13.3	14.6
Standard Deviation	1.4	3.3	4.9	4.0
Median	20	34	12	15
Range	20-24	26-39	7-22	6-22

Conclusion

In the event that the Reza Band is unintentionally displaced laterally during sleep, the likelihood of impacting sensitive structures of the neck is low. There was no effect on heart rate, blood pressure, cardiac rhythm, or intraocular pressure, either when the Reza Band is placed as intended over the cricoid cartilage, or when it is laterally displaced over the jugular and carotid vasculature. Based on the results of this study, the Reza Band is safe, when worn as intended and if it were to be unintentionally displaced laterally.

LABELING:

The sponsor provided labeling information which includes Physician Instructions for Use, Patient Information Handbook, and package labels for the Reza Band, External Manometer, and Pressure Sensor.

The labeling is sufficient and satisfies the requirements of 21 CFR 801.109 Prescription devices. The patient labeling also follows the principles identified in FDA’s guidance entitled “Medical Device Patient Labeling” (April 2001).

RISKS TO HEALTH:

Table 7 below identifies the risks to health that may be associated with use of External UES Compression Device type and the measures necessary to mitigate these risks.

Table 7: Identified Risks to Health and Mitigation Methods

Identified Risk	Mitigation Method
Adverse tissue reaction	- Biocompatibility assessment
Risk of over-compression	- Clinical study - Labeling - Technical specifications
Device misuse/ incorrect fitting/ malfunctions	- Technical specifications - Clinical study - Labeling - Performance testing (mechanical integrity and shelf life testing)

SPECIAL CONTROLS:

In combination with the general controls of the FD&C Act, the External UES Compression Device is subject to the following special controls:

1. The patient contacting components must be demonstrated to be biocompatible.
2. Non-clinical performance testing must demonstrate that the device performs as intended under anticipated conditions of use. The following performance characteristics must be demonstrated:
 - (A) Mechanical integrity testing (e.g., tensile strength testing, fatigue testing)
 - (B) Shelf life testing
3. The technical specifications must include pressure measurement accuracy to characterize device performance.
4. Clinical performance testing must document any adverse events observed during clinical use, and demonstrate that the device performs as intended under anticipated conditions of use.
5. Labeling must include the following:
 - (A) Appropriate warnings and precautions.
 - (B) A detailed summary of the clinical testing pertinent to use of the device including a detailed summary of the device-related complications or adverse events.

- (C) Detailed instructions on how to fit the device to the patient.
- (D) Instructions for reprocessing of any reusable components.

6. Patient labeling must be provided and must include:

- (A) Relevant warnings, precautions, and adverse effects/complications.
- (B) Information on how to correctly wear the device.
- (C) The potential risks and benefits associated with the use of the device.
- (D) Alternative treatments.
- (E) Reprocessing instructions.

BENEFIT/RISK DETERMINATION

The observed risks of the device are based on data collected in the clinical studies described above. There were no device-related serious adverse events. Device movement was the most common adverse event. Device-related, non-serious adverse events also include patient discomfort including feeling hot with the device in place. Some patients reported disliking the sensation of the device around their neck. However, given that this device is externally worn, non-surgical, and prescribed by a physician, there is a high likelihood that patients would typically experience only non-serious adverse events. Duration of most adverse events would only last as long as the device is worn. Most adverse events would be reversible by removal of the device.

The observed benefits of the device are also based on data collected in clinical studies as described above. The benefit of the device is patient satisfaction. From the patient satisfaction survey at least 75% of the subjects reported satisfaction (extremely satisfied, 16.5%; very satisfied, 38.9%; satisfied, 20.0%). As this study was an open-label, single arm study, it is difficult to characterize the device's actual treatment effect. In post-hoc analysis, the patient demographics and characteristics were evaluated against outcomes. The analyses revealed that there was no difference among those sub-groups. Although this study was not statistically powered to assess benefit across the subpopulations, the study revealed that all patient sub-groups did well, and therefore, the results appear to be applicable to the overall intended population. However, the current data only support the device's benefit while the device is worn at night. Once the device is removed, then it no longer provides the external pressure to the UES (i.e., there is likely no residual effect).

Additional factors that were considered in determining probable risks and benefits for the Reza Band UES Assist Device include:

- The sponsor conducted additional studies using their prototype (early version) device to demonstrate the reduction in LPR by extra-esophageal pH, impedance, and direct endoscopic videography to support preliminary effectiveness of this device.
- In the survey conducted by the sponsor as part of the pivotal study, the following satisfaction scores were noted: 16.5% of the subjects were extremely satisfied, 38.9% were very satisfied, 20.0% were satisfied, and 9.4% were somewhat satisfied; 5.9% of the subjects were dissatisfied, 8.2% were very dissatisfied, and 1.2% were extremely dissatisfied.

- Considering that the device can be customized, removable, and non-implantable, the patients would tolerate even a smaller benefit given the low potential for risks.
- LPR is a chronic disease/condition. The disease is usually managed by strict adherence to behavioral life style modification, and/or oral medication (PPI twice a day for a minimum of 6 months). If LPR becomes life-threatening, surgical therapy of fundoplication (either open or laparoscopic) is indicated.
- Proper application of the Reza Band to the neck and detailed instructions for the physician as well as for the patients help to mitigate the risks. The physician instruction includes clear indications, warnings and precautions, and an appropriate discussion of the use of this device for patients given condition. The patient instruction includes appropriate use of the device, clear instructions to identify the potential risks and an understanding to report to their respective physician if the device is not functioning properly or intolerable.
- The quickest intervention is for the patient to remove the device if it is causing any difficulty or adverse effects.

In conclusion, given the available information above, the data support that the probable benefits outweigh the probable risks for the Reza Band Upper Esophageal Sphincter Assist Device for reducing the symptoms of LPR in patients 18 years of age and older. The device provides measurable benefit and the risks can be mitigated by the use of general and the identified special controls.

CONCLUSION

The *de novo* for the Reza Band Upper Esophageal Sphincter Assist Device is granted and the device is classified under the following:

Product Code: PKA

Device Type: External Upper Esophageal Sphincter Compression Device

Class: II

Regulation: 21 CFR 874.5900