TATCH™

SLEEP
MADE TO MEASURE

A Multi Center, Single Arm, Quantitative Study Assessing Performance of TatchSleep Pro as a Tool to Aid in Sleep Apnea Diagnosis

Protocol Number: TCH-110
Version 1.1
26-Apr-2021

Sponsor:
Tatch, Inc.
234 5th Avenue
New York, NY 10001

Not for Distribution – Do Not Copy

This study protocol contains confidential information and was developed by Tatch, Inc., the Principal Investigator and his/her designee. The protocol is for use by the Principal Investigator and his/her designated representatives participating in this investigational trial. This protocol may not be copied or made available for review by an unauthorized person or firm without the prior written authorization of Tatch®, Inc.

Sponsor Protocol Approval

I have read this protocol and approve the design of this study:

Amir Reuveny, Tatch, Inc. PhD, CEO	Date

Investigator Protocol Approval

I agree to the terms of this study protocol. I will conduct the study according to the procedures specified herein, and according to principles of Good Clinical Practice and local regulations and requirements.

Institution/Clinic: _____

Principal Investigator:

Print Name: _____

Signature: _____

Date (dd/mm/yyyy): _____

Table of Contents

1. Protocol Synopsis

Name of Sponsor: Tatch, Inc.	
Protocol Number:	TCH-110
Protocol Tittle:	A Multi Center, Single Arm, Quantitative Study Assessing Performance of TatchSleep Pro as a Tool to Aid in Sleep Apnea Diagnosis
Investigational Device:	TatchSleep Pro
Study Centers:	Approximately 3
Study Objectives:	Primary Objectives: • Demonstrate clinical agreement between TatchSleep Pro and PSG signals by comparing the Apnea Hypopnea Index (AHI) values derived from a clinical reading of each set of signals. Secondary Objectives: • Compare TatchSleep Pro and PSG signals across different positions and in the presence of motion. • Evaluate the reliability of TatchSleep Pro signals across readers.
Endpoints:	Primary Effectiveness Endpoints: • Agreement between the AHI as determined by TatchSleep Pro and PSG signals as measured by the Pearson correlation. • Bland-Altman 95% limits of agreement for TatchSleep Pro and PSG AHI Secondary Effectiveness Endpoints: • Deming regression parameters estimated by weighted regression of TatchSleep Pro AHI on PSG AHI. • Estimation of the inter-rater reliability for TatchSleep Pro AHI. • Estimation of the agreement between diagnoses of mild, moderate and severe sleep apnea based on TatchSleep Pro and PSG AHI.

	• Estimation of the Bland-Altman 95% limits of agreement of TatchSleep Pro and PSG AHI by position (supine v. non-supine). Primary Safety Endpoints: • Incidence of Adverse Events (AEs) and Serious Adverse Events (SAEs) related to the device throughout the study period.
Study Design:	This is a multi-center, single-arm, quantitative study evaluating the effectiveness of the TatchSleep Pro wireless sensors as a tool to aid in sleep apnea diagnosis as compared to an overnight PSG evaluation. Investigators will identify approximately 50 eligible patients who have been recommended to receive an overnight PSG for the detection/evaluation of sleep apnea. After informed consent is obtained, a brief sleep-related medical history will be collected including relevant demographics. Females of childbearing potential will be asked to undergo a urine dipstick pregnancy test to determine their eligibility for inclusion in the study. Patients will undergo their PSG test while simultaneously wearing 2 TatchSleep Pro patches and an FDA-cleared pulse oximeter compatible with and connected to the TatchSleep Pro system for a single night at the clinic. The same make and model of pulse oximeter will be used for all subjects. Patients will be observed overnight by trained sleep technicians who will setup the TatchSleep Pro device and collect the sleep data via the companion smartphone application. A follow-up communication will be made with patients within 5 days after the sleep study to assess any adverse events. Following the data collection, sleep data from PSG and TatchSleep Pro will be scored by an independent qualified sleep technologist (the primary reader) to yield an analysis of the accuracy of TatchSleep Pro compared with the PSG signals. At least one and up to two additional readers (secondary readers) will score only the TatchSleep Pro data to obtain an estimate of inter-rater reliability.
Study Device:	TatchSleep Pro paired with the same make and model of compatible FDA cleared pulse oximeter for all subjects
Eligibility Criteria:	Inclusion Criteria: 1. Be at least 21 years of age.

	2. Have a referral to the study site from a physician to complete an overnight polysomnogram test for sleep apnea detection or follow-up. 3. Be willing and able to wear two TatchSleep Pro patches and an FDA-cleared pulse oximeter in conjunction with a polysomnogram, for a single night. 4. Be able and voluntarily willing to sign a written informed consent form prior to the initiation of any study procedures. Adult patients unable to provide written informed consent on their own behalf will not be eligible for the study. Exclusion Criteria: 1. Women who are pregnant, trying to get pregnant or who have a positive urine pregnancy test on the day of the study. 2. Women who are breast-feeding 3. Significant cardiorespiratory disease 4. Potential respiratory muscle weakness due to neuromuscular condition 5. Awake hypoventilation or suspicion of sleep related hypoventilation 6. Chronic opioid medication use 7. History of stroke 8. History of severe insomnia 9. Any known health condition that, in the opinion of the Investigator, would exclude the patient from participating in the study.
Number of Patients:	Approximately 50
Data Elements:	The following data elements will be collected: • Height, weight, age, gender, skin tone (according to the Fitzpatrick scale), presence or lack of body hair under TatchSleep Pro patches. • TatchSleep Pro data (including patient movement, sleep position, pulse oximetry, and respiration) • PSG data (including sleep stages, total sleep time, sleep position, pulse oximetry, heart rate, and respiration). • Adverse events
Statistical Methods:	Accuracy of the TatchSleep Pro device will be demonstrated by comparing the Pearson correlation of TatchSleep Pro and PSG AHI to a performance goal. The performance goal is based on a meta-analysis of FDA-cleared similar devices. Fisher's transformation and one-sided Z-test will be used to test the hypotheses with a significance level of 0.025. The upper and lower 95% Bland-Altman limits of agreement will be calculated and statistically compared using a Wald test to performance goals based on a meta-analysis of FDA-cleared similar devices.

	Deming regression will also be presented. The inter-rater reliability of TatchSleep Pro AHIs will be calculated.

2. Background and Rationale

Obstructive sleep apnea (OSA) is characterized by reduced breathing and breathing cessation during sleep. It is a highly prevalent condition that affects an estimated 14% of adult men and 5% of adult women aged 30 to 70 [1]. OSA is associated with more than 30 chronic conditions, such as increased risk of cardiovascular complications, and daytime fatigue and sleepiness. While the clinical gold standard for the diagnosis of OSA is polysomnography, these in-laboratory tests are expensive, time consuming, and labor intensive.

In recent years there is a growing use of home sleep tests (HSTs) as a more convenient and cost-effective alternative to diagnose sleep disorders. Nevertheless, HSTs currently on the market contain several complex wires and tubes that may make it difficult for patients to use on their own. In addition, patients report that they can be intrusive and uncomfortable. These factors lead to unreliable data collection and ineffective diagnosis of OSA [2].

TatchSleep Pro is a system comprised of flexible, thin, and wireless adhesive patches, coupled with an FDA-cleared compatible pulse oximeter, for the detection of sleep apnea. The wearable sensors detect various physiological parameters related to sleep quality, including respiration, SpO2, and sleep position, and transmits data wirelessly to a smartphone app in real time. The data recorded by the patches is relayed to remote secure storage, from where it is downloaded to a local PC. The study output file is prepared by Tatch staff for review by a qualified sleep scorer.

The TatchSleep Pro device was bench-tested against industry standard polysomnography devices to compare the different sensors. Using its proprietary technology, TatchSleep Pro showed excellent accuracy and sensitivity in measuring respiration and sleep position. Previous feasibility testing was conducted on approximately 30 patients to evaluate the user experience and effectiveness in using the patch technology.

As a low-cost and user-friendly home sleep testing system, TatchSleep Pro has the potential to improve the detection of OSA while reducing the burden on patients and providers caused by complicated and invasive sleep kits.

In the current study, TatchSleep Pro will be evaluated as a tool to assist physicians in determining the overall Apnea Hypopnea Index (AHI) of a patient. Tatch, Inc. has partnered with the multiple clinical sites for this study.

3. Study Objectives

3.1 Primary Objective

- Demonstrate clinical agreement between TatchSleep Pro and PSG signals by comparing the Apnea Hypopnea Index (AHI) values derived from a clinical reading of each set of signals.

3.2 Secondary Objectives

- Compare TatchSleep Pro and PSG signals across different positions and in the presence of motion.
- Evaluate the reliability of TatchSleep Pro signals across readers.

4. Study Endpoints

To support the study's objectives, the following endpoints will be calculated:

Primary Effectiveness Endpoints:

- Agreement between the AHI as determined by TatchSleep Pro and PSG signals as measured by the Pearson correlation.
- Bland-Altman 95% limits of agreement for TatchSleep Pro and PSG AHI

Secondary Effectiveness Endpoints:

- Deming regression parameters estimated by weighted regression of TatchSleep Pro AHI on PSG AHI.
- Estimation of the inter-rater reliability for TatchSleep Pro AHI.
- Estimation of the agreement between diagnoses of mild, moderate and severe sleep apnea based on TatchSleep Pro and PSG AHI.
- Estimation of the Bland-Altman 95% limits of agreement of TatchSleep Pro and PSG AHI by position (supine v. non-supine).

Primary Safety Endpoint

- Incidence of adverse events and serious adverse events (SAEs) related to the device throughout the study period.

5. Study Overview

This is a multi-center, single-arm, quantitative study evaluating the effectiveness of the TatchSleep Pro wireless sensors as a tool to aid in sleep apnea diagnosis as compared to an overnight PSG evaluation. This study is intended to evaluate the performance of the TatchSleep Pro against PSG for the target population.

Investigators will identify approximately 50 eligible patients who have been recommended to receive an overnight PSG for the detection/evaluation of sleep apnea. After informed consent is obtained, a brief medical history will be collected including relevant demographics. Females of childbearing potential will be asked to undergo a urine dipstick pregnancy test to determine eligibility for study participation.

Patients will undergo their PSG test while simultaneously wearing 2 TatchSleep Pro patches and a paired FDA-cleared compatible pulse oximeter for a single night at the clinic. The same make and model of pulse oximeter will be used for all subjects. Patients will be observed overnight by trained sleep technicians who will setup the TatchSleep Pro device and will record the sleep data via the companion smartphone application.

A follow-up phone communication will be made with patients within 5 days after the sleep study to assess any adverse events.

TABLE 1: SCHEDULE OF ASSESSMENTS

Procedure or Assessment	Study visit			
	(Day -7 to Day 1) - Screening	Day 1 - Night	Day 2 - Morning	Day 3-7 follow-up
Informed Consent	X			
Eligibility Assessment	X			
Urine Pregnancy Test		X		
Polysomnogram (PSG)		X		
Administer TatchSleep Pro		X		
Adverse Event Assessment		X	X	
Follow-up Communication				X

6. Study Population

Approximately 50 participants at least 18 years of age will be enrolled in this study. These patients will be identified by a clinician to complete an overnight PSG test for sleep apnea detection or follow-up.

6.1 Inclusion Criteria

Eligible participants must meet all of the following criteria:

1. Be at least 21 years of age.
2. Have a referral to the study site from a physician to complete an overnight PSG test for sleep apnea detection or follow-up.
3. Be willing and able to wear two TatchSleep Pro patches and an FDA-cleared pulse oximeter in conjunction with a PSG, for a single night.
4. Be able and voluntarily willing to sign a written informed consent form prior to the initiation of any study procedures. Adult patients unable to provide written informed consent on their own behalf will not be eligible for the study.

6.2 Exclusion Criteria

Participants in the study must not meet any of the following criteria:

1. Women who are pregnant, trying to get pregnant or who have a positive urine pregnancy test on the day of the study.
2. Women who are breast-feeding.
3. Significant cardiorespiratory disease
4. Potential respiratory muscle weakness due to neuromuscular condition
5. Awake hypoventilation or suspicion of sleep related hypoventilation
6. Chronic opioid medication use
7. History of stroke
8. History of severe insomnia
9. Any known health condition that, in the opinion of the Investigator, would exclude the patient from participating in the study.

7. Patient Recruitment

Approximately 50 patients will be enrolled across 3 clinical sites. Potential patients who have been recommended to receive an overnight PSG for the detection/evaluation of sleep will be approached by key study personnel to discuss the study. Some of those patients might be referrals from fellow clinical sites or other healthcare providers that may or may not be aware of the study.

8. Study Procedures and Assessments

8.1 Eligibility Assessment and Informed Consent

An informed consent form (ICF) must be signed by prospective patients prior to initiating any study-specific procedures.

The Investigator or designee will confirm that the patient meets all inclusion and no exclusion criteria.

The patient must sign a written ICF prior to the initiation of any study procedures. The enrolled subject will be given a signed copy of the ICF to take home. Adult subjects unable to provide written informed consent on their own behalf will not be eligible for the study.

The ICF and any other written information provided to the patients will be revised whenever important new information becomes available that may be relevant to the patient's consent, or if there is an amendment to the protocol which necessitates a change to the content of the patient's informed consent. Any written ICF and written information must receive approval by the IRB in advance of use. Only the most up to date IRB-approved ICF must be used to consent new patients.

8.2 Urine Pregnancy Test

Females of childbearing potential will be asked to undergo a urine dipstick pregnancy test on Day 1 in order to rule out pregnancy prior to starting the study.

8.3 Complete Patient Case Report Form (CRF)

CRFs will be provided for the recording of data. The Investigator or designee will record data from all observations and assessments specified in the protocol, including demographics, physical attributes and adverse events on the CRFs provided by the Sponsor.

8.4 Polysomnography

Patients will be hooked up to a PSG on Day 1 (Night) according to the standard of care at the clinical site. This will record brain waves, blood oxygen level, heart rate and breathing, as well as eye and leg movements.

8.5 TatchSleep Pro Administration

The TatchSleep Pro will be connected to the patient by the investigator or designee according to the instructions in the provided User Manual. The investigator or designee will follow the instructions in the pre-loaded smartphone app to place the patches on the patient's chest and abdomen, as well as the pulse oximeter on the patient's finger. Once the sensors are set up and the participant is ready for bed, the investigator or designee will start the data collection using the app.

Details about TatchSleep Pro management can be found in Protocol Section 11.

8.6 Follow-up Communication

A follow-up communication (email or phone call) will be made with patients within 5 days after the sleep study to check in on how they are doing and follow-up on any adverse events. If after three documented attempts the patient could not be reached for feedback, the patient will be considered as "lost to follow-up".

8.7 Onsite PSG Study Scoring and Export

After the completion of data collection from patients, de-identified PSG signals will be exported from the PSG at the clinical site including, at a minimum, manual position annotations and sleep staging scored according to the standard of care by a sleep technologist at the study site. Raw PSG sleep data (including, at a minimum, respiratory effort, respiratory pressure, respiratory flow and oxygen saturation signals) will be extracted and presented to qualified readers as described below.

9. Study Scoring

Once study enrollment and all sleep tests are complete, and all exported PSG data (with position annotations and sleep staging) has been received by the Sponsor, the primary reader will score all sleep study recordings made simultaneously with TatchSleep Pro and the PSG device from all sites. The primary reader will be blinded to the device used to collect the data under review as well as any information which may allow them to link the two studies from each patient. The AHI will be calculated for each study, and the set of AHIs derived from TatchSleep Pro data will be compared with those derived from PSG data using Pearson correlation to demonstrate accuracy (see Protocol Section 11 for more details). At least one and up to two additional readers (secondary readers) will each score all sleep study recordings made using the TatchSleep Pro device at all sites. The AHIs derived from these scorings will be used to calculate the inter-rater reliability for the TatchSleep Pro device signals.

9.1 Scoring Population

Studies of subjects whose TatchSleep Pro recording does not encompass the sleep period indicated by PSG will not be scored [3]. Studies from all other participants who are enrolled, meet all the inclusion criteria and none of the exclusion criteria, and whose PSG study has >4 hours of sleep duration will be scored [3].

9.2 Reasons for Data Exclusion

Time periods marked by the reader as "Movement" or "Artifact" (collectively referred to as "invalid") in a study will not contribute to the total sleep time for the purpose of calculating AHI for that study (per guidelines in the American Academy of Sleep Medicine (AASM) Manual for the Scoring of Sleep and Associated Events section IX: Home Sleep Apnea Testing Rules for Adults). Percentage of "invalid" time will be reported for each study.

9.3 Blinding

All studies will be presented on the same viewing and scoring platform. The readers will be blinded to patient identification and the data collection device for each study. Specifically:

- All data presented to the reader will be fully anonymized and will not include any information which could allow the reader to link a subject's two data sets. All Protected Health Information (PHI), ID numbers, and study meta-data such as time

and date will be removed.
- The reader will review patient studies in a predetermined randomized order such that sequential readings of data from the same patient will be avoided.
- All studies will be reviewed using the same analysis software, and using identical, system-agnostic signal labeling (eg, "Flow" will be used to label both the TatchSleep Pro TATCH-SUM-FLOW and the PSG Airflow waveforms).

9.4 Scoring Procedure

Readers will be asked to score studies using the provided viewing software as they normally would in a clinical setting and in accordance with the AASM Manual for the Scoring of Sleep and Associated Events. Hypopneas will be scored using the recommended rule 1A criterion as laid out in the AASM (v2.6), Chapter VIII Respiratory Rules Part 1: Rules for Adults, Section D: Scoring of Hypopneas.

The same data channels will be presented to the reader in the same order and with the same labelling for every study, including:

- Abdominal respiratory effort, labelled "ABD" from either the PSG system or the TatchSleep Pro patches, as applicable
- Thorax respiratory effort, labelled "THX" from either the PSG system or the TatchSleep Pro patches as applicable
- Position channel, labelled "Position" from either the PSG system or the TatchSleep Pro patches, as applicable
- Air flow (PSG) or Tatch-Sum-Flow (TatchSleep Pro) as applicable, labelled "Flow"
- Nasal pressure (PSG) or Tatch-Sum-Pressure (TatchSleep Pro) as applicable, labelled "Pressure"
- Pulse oximetry-derived blood oxygen saturation (SpO2), labelled "SpO2" from either the PSG system or the TatchSleep Pro compatible pulse oximeter as applicable

On any of the respiratory signals, the reader will be able to mark:

- Apnea
- Hypopnea

On the SpO2 signal, the reader will be able to mark:

- Relative desaturation

Additionally, the reader may mark any signal with the following signal quality indicators:

- Artifact
- Movement

9.5 AHI Calculation

The AHI will be calculated for each study following scoring. The PSG total sleep time (with device-specific total artifact time subtracted) will be used as the AHI denominator.

10. Reader Selection

Sleep technologists of any age, sex, race, ethnicity, or institutional affiliation who are qualified to read PSG night tests may participate as study readers. The selected readers must meet the following criteria:

- Be Registered Polysomnographic Technologist (RPSGT) or Registered Sleep Technologist (RST) certified
- Currently participant in the American Academy of Sleep Medicine Inter-Scorer Reliability (AASM ISR) program
- Be experienced in reading PSG night tests using at least one commercially available analysis software package
- Have provided a current curriculum vitae (CV)
- Have provided a signed Readers' Agreement

The qualified and confirmed readers will complete a training program on the analysis software to be used for the study, as well as on the study protocol prior to their participation in this study.

11. TatchSleep Pro Materials and Management

11.1 TatchSleep Pro Description

TatchSleep Pro is a system comprised of wearable and wireless sensors designed to collect physiological parameters related to sleep disorders in patients. The system has two sensor patches and makes use of a compatible FDA-cleared pulse oximeter. Each patch consists of a wearable sensor and a bottom layer of double coat medical-grade adhesive. This adhesive is safe for patient use and enables the patch to stay affixed to the body (thorax and abdomen) throughout the night. The sensor also connects directly to a battery which is hidden within the patch. During the study, patients will be asked to wear all three sensors (one patch on the abdomen, one patch on the thorax and the pulse oximeter on a finger). Data from the patches and pulse oximeter are transmitted wirelessly throughout the night to a secure cloud server via the companion mobile application for clinicians to upload to a sleep analysis platform.

11.2 Shipping, Storage and Accountability

TatchSleep Pro sensors will be sent in packages to the clinical site by a tracked postal service prior to the enrollment of the patients. Each shipment will include up to 10 patient kits, depending on the site projected enrollment rate. Each TatchSleep Pro kit will contain 2 patches, a pulse oximeter, and a User Manual. Smartphones will be provided to the clinical site with the TatchSleep Pro companion application pre-loaded. Study staff will be trained on the use and functionalities of TatchSleep Pro and the companion application prior to enrollment.

TatchSleep Pro kits will be stored at room temperature at the clinical site in a secured, limited access location, under the supervision of the Investigator or designee.
The Investigator or designee will be responsible for taking an inventory of each shipment of TatchSleep Pro kits received and comparing it with the accompanying shipping invoice to confirm accuracy of the shipment and its contents. All used and unused TatchSleep Pro wearable sensors will be retained at the site. After full device accountability and reconciliation, the Investigator will return the used and unused kits to the Sponsor or its designee. Disposition and use of all TatchSleep Pro sensors should be documented, including any that are lost or damaged.

11.3 TatchSleep Pro Associated Risks

Per the FDA guidelines "Significant Risk and Nonsignificant Risk Medical Device Studies" [4] and based on 21 CFR 812.3(m), TatchSleep Pro qualifies as a Non-Significant Risk device since TatchSleep Pro:

- **Is not** intended as an implant and **does not** present a potential for serious risk to the health, safety, or welfare of a subject;
- **Is not** purported or represented to be for use supporting or sustaining human life and **does not** present a potential for serious risk to the health, safety, or welfare of a subject;
- **Is not** for a use of substantial importance in diagnosing, curing, mitigating, or treating disease, or otherwise preventing impairment of human health and **does not** present a potential for serious risk to the health, safety, or welfare of a subject; or
- **Does not** otherwise present a potential for serious risk to the health, safety, or welfare of a subject.

Although there is minimal risk in using the TatchSleep Pro technology, patients may experience some slight discomfort wearing the TatchSleep Pro patches or the compatible pulse oximeter throughout the night. It is possible that patients with sensitive skin may experience mild skin irritation due to the patch adhesive. A similar skin irritation risk exists in the PSG test. Patients will be clearly instructed that they are allowed to remove the TatchSleep Pro patches, pulse oximeter, or the adhesive from the PSG study if they experience skin irritation or significant discomfort at any point. A previous analysis showed no adverse events amongst a cohort of 19 patients undergoing full night tests wearing the TatchSleep Pro patches.

There is also a risk that the technology will not function as anticipated causing partial recording of the study night which might make data unusable. It will be explained to the participants that these technologies are still evolving, and they may experience glitches or malfunctions during the study.

12. Adverse Events

12.1 Adverse Event Definition

An adverse event (AE) is any symptom, sign, illness or experience that develops or worsens in severity during the course of the study. Intercurrent illnesses or injuries should be regarded as adverse events. Abnormal results of diagnostic procedures are considered to be adverse events if the abnormality:

- results in study withdrawal
- is associated with a serious adverse event
- is associated with clinical signs or symptoms
- leads to additional treatment or to further diagnostic tests
- is considered by the investigator to be of clinical significance

An adverse device effect (ADE) is any reported AE that is considered device-related.

12.2 Severity

Adverse events will be classified by the investigator as mild, moderate, severe, life threatening, or fatal.

When the severity of the AE increases over time, the change in severity will be recorded in the source documents as a new AE and the original AE will stop when the new AE starts. The Principal Investigator or the delegated person must record all AEs that occur during the study from the time of TatchSleep Pro placement until study completion or Early Termination, regardless of their relationship to study device or procedure.

The Principal Investigator will evaluate the severity of AEs and determine their relationship to the study device or procedures. Any action or procedure followed by the patient or clinical staff to alleviate the AE will be documented regardless of who recommended such action or procedure. The clinical course of each event will be followed until resolution, stabilization, or clinically significant improvement that requires no further follow-ups in the opinion of the Investigator.

12.3 Serious Adverse Events (SAE) and Unanticipated Adverse Device Effect (UADE)

A serious adverse event (SAE) may or may not be considered related to the device and may be described as follows:

- Death due to any cause
- Life-threatening condition
- Persistent or significant disability/incapacity
- Any event resulting in hospitalization or prolonged hospitalization
- Congenital abnormality
- Is considered an important medical event by the Investigator or Sponsor

A UADE is any serious adverse effect on health or safety, or any life-threatening problem or death caused by, or associated with, a device, if that effect, problem, or death was not previously identified in nature, severity, or degree of incidence in the investigational plan or application (including a supplementary plan or application), or any other unanticipated

serious problem associated with a device that relates to the rights, safety, or welfare of subjects.

12.4 Event Reporting

All AEs will be recorded on the CRF by the Investigator or designee regardless of their relationship to the study device. SAEs and ADEs should be reported to the Sponsor within 24 hours of knowledge of the event using the SAE/ADE Report Form provided by the Sponsor. UADEs must be reported by the clinical investigator to the sponsor and the reviewing IRB, no event later than 10 working days after the investigator first learns of the event. Sponsors must immediately conduct an evaluation of a UADE and must report the results of the evaluation to FDA, all reviewing IRBs, and participating investigators within 10 working days after the sponsor first receives notice of the effect.

13. Early Termination

Study patients may decide to withdraw from the research study without any penalty and for any reason. Study patients may be considered withdrawn if they state an intention to withdraw or fail to participate. Although patients are not required to provide a reason for withdrawal, they will be asked by research staff about their decision. The Investigator also reserves the right to remove a study participant from the study at any time for any reason (e.g. non-compliance with study requirements, safety reasons).

Study patients may also withdraw permission for the use and disclosure of any of their protected information for research but must do so in writing to the Principal Investigator.

14. Data Analysis

14.1 General Considerations

Summary statistics for continuous variables will include the mean, standard deviation, median, and range. Categorical variables will be presented as counts and percentages. All confidence intervals provided will be calculated at the 95% confidence level, unless otherwise noted. All null hypotheses will be tested against two-sided alternatives at the 5% significance level, unless otherwise noted. Any other details not included in this protocol will be included in the Statistical Analysis Plan.

14.2 Analysis Population

Subjects with less than 4 hours of valid oximetry and flow data in either the PSG or TatchSleep Pro recording (taking "movement" and "artifact" annotations into account following scoring – see protocol sections 8.4 and 8.5) will not be included in the analysis population [3]. All other participants who are enrolled, meet all the inclusion criteria and none of the exclusion criteria, and whose sleep studies have >4 hours of recorded and valid data from both systems will be included in the Analysis Population [3].

14.3 Safety Population

All participants who meet all of the inclusion criteria and none of the exclusion criteria and participated in the sleep study will be included in the Safety Population.

14.4 Demographics

Demographic and baseline characteristics (age, sex, BMI, skin tone and presence of body hair) will be tabulated. The flowing table shows the measurement units/scale and approximate expected ranges for these characteristics:

Characteristic	Units or Scale	Expected Range
Sex	--	Male, Female
Age	Years	21-75
BMI	kg / m^2	23-40
Skin Tone	Fitzpatrick Scale	II - VI
Body Hair	--	No visible hair, moderate hair (≤10 follicles/cm^2), heavy hair (>10 follicles/cm^2)

14.5 Primary Outcome Evaluation

The first co-primary performance objective is to demonstrate that the correlation between PSG and TATCH AHI is greater than the performance goal (PG) using a significance level of 0.025.
The hypotheses to be tested are:
$H_0: \rho \leq PG$ versus $H_a: \rho > PG$

where ρ is the Pearson correlation between PSG and TatchSleep Pro AHI and PG is the performance goal. The performance goal is set to be 0.862, the lower 95% confidence limit for the correlation of RDI and AHI between PSG and Peripheral Arterial Tonometry (PAT) as calculated in a meta-analysis of 12 studies [5]. Fisher's transformation and one-sided Z-test will be used to test the hypotheses with a significance level of 0.025.

The second co-primary performance objective is to demonstrate that the 95% limits of agreement between PSG and TATCH AHI within the performance goals (PG_L and PG_U) using a significance level of 0.05.
The hypotheses to be tested are:

$$H_{01}: UL \geq PG_U \quad \text{vs.} \quad H_{a1}: UL < PG_U$$
$$H_{02}: LL \leq PG_L \quad \text{vs.} \quad H_{a2}: LL > PG_L$$

where UL and LL are the upper and lower 95% limits of agreement between PSG and TATCH

AHI. The performance goals PG_U and PG_L are set to be the upper and lower limits, respectively, of the 95% confidence interval in a meta-analysis of 7 FDA approved devices (28.4 and -30.6). The full meta-analysis is detailed in Appendix 1. A Wald Z-test will be used to test the hypotheses with a significance level of 0.05. All three null hypotheses need to be rejected in order for the trial to be successful.

14.6 Secondary Outcomes Evaluation

- A weighted Deming regression of TatchSleep Pro AHI on PSG AHI will be run. 95% confidence intervals for the slope and intercept will be obtained.
- The inter-rater reliability, measured as the intra-class correlation (ICC) of AHI readings and its 95% confidence interval will be calculated.
- Agreement between TatchSleep Pro and PSG apnea classification (mild, moderate, and severe, according to the American Academy of Sleep Medicine definition) will be calculated.
- Bland-Altman plots and estimation of the 95% limits of agreement between TatchSleep Pro and PSG AHI for each position (supine vs. non-supine).

14.7 Primary Safety Evaluation

The primary safety endpoints are the incidence of AEs and SAEs related to the device throughout the study period.

14.8 Sample Size

The correlation of PSG and TATCH AHI data on 19 subjects previously rated by a single rater was estimated to be 0.98. We calculated the probability of rejecting the null hypothesis when the true correlation is 0.98 using the Pearson's Correlation Tests Procedure of NCSS Power Analysis Statistical Software, Version 20 (PASS 20, [6]). A sample size of 46 subjects yields a power of 99.99%.

The ICC of PSG and TATCH AHI data on 19 subjects was 0.95, we use this as an estimate for the sample size calculation. A sample of 46 subjects yields a 95% margin of error for the ICC of 5%, assuming a true ICC value of 0.95, using the Confidence Intervals for Intraclass Correlation Procedure of NCSS Power Analysis Statistical Software, Version 20 (PASS 20, [6]).

The upper and lower limits of agreement of PSG and TATCH AHI data on 19 subjects previously rated by a single rater was estimated to be 10.6 and -3.2, with a standard deviation of 3.5. Because the standard deviation increases with increasing AHI, and the previous AHI range was 0 to 30 events/hour, we conservatively assumed a standard deviation of 7.0 events/hour, yielding a standard deviation for the LOA of $\sqrt{3}\sigma = 12.1$, as described in Bland-

Altman. We calculated the power to reject the null hypothesis using the One Sample T-Tests Procedure of NCSS Power Analysis Statistical Software, Version 20 (PASS 20, [6]). A sample size of 46 subjects yields an 99.9% probability of rejecting the null hypothesis for both the upper and lower LOAs.

A total sample size of 46 subjects yields sufficient power for the primary objective and allows for sufficient precision in estimating the inter-rater reliability, which is a secondary objective; approximately 50 subjects will be enrolled to allow for a 5-8% drop-out rate.

15. Study Administration

15.1 GCP Statement

This study is to be performed in accordance with the protocol, the Declaration of Helsinki, the International Conference on Harmonisation (ICH), Guideline for Good Clinical Practice (GCP), and all applicable local regulatory requirements.

15.2 Informed Consent

The Sponsor will provide a sample patient ICF for modification, as appropriate, by the Investigator. The ICF must include all elements required by ICH and GCP and must adhere to the IRB requirements and the ethical principles that have their origin in the Declaration of Helsinki.

The informed consent process will take place up to 7 days prior to the patient's scheduled overnight PSG. The Investigator or designee will conduct the informed consent process and only patients willing to sign and personally date the ICF agreeing to participate in the study will be enrolled. A copy of the signed and dated ICF will be provided to the patient, while the signed original ICF will be part of the Investigator site files, per local requirements.

The ICF will be revised whenever new information or a protocol amendment becomes available that may be relevant to the patient's consent. All ICF versions must be submitted and approved by the IRB in advance of use. Approved ICFs should be forwarded to the Sponsor. When a new ICF is approved by the IRB all subjects enrolled in the study at the time of the approval will be re-consented. Only the most up to date IRB-approved ICF must be used to consent new patients.

15.3 Institutional Review Board

The final study protocol, including the final version of the ICF, must be approved in writing by an IRB. The Principal Investigator must submit written approval from the IRB to the Sponsor before he or she can enroll any patient into the study.

The Principal Investigator is responsible for informing the IRB of any amendment to the protocol. In addition, the IRB must approve all advertising used to recruit patients for the study and all Sleep Questionnaires. The protocol must be re-approved by the IRB annually or as required by the IRB, regulations, and guidelines.

15.4 Sponsor Monitoring

Before the first patient at each site signs consent to participate in the study, a representative of the Sponsor will visit the study site to:

- Determine the adequacy of the facilities
- Discuss with the Investigator(s) (and other personnel involved with the study) their responsibilities with regard to the protocol and the responsibilities of the Sponsor
- Confirm that the Investigator(s) (and other personnel involved with the study) have not invoked sanctions or demonstrated any scientific misconduct or fraud

During the conduct of the study, a representative of the Sponsor will have regular contact with the clinical trial sites, and monitor (in-person or remote) the clinical sites to:

- Provide information and support the Investigators
- Confirm that the facilities remain acceptable
- Confirm that the study team is adhering to the protocol, data are being accurately recorded, and the device is being properly maintained and accountability records are current
- Perform source data verification with access to all original clinical records for each patient

15.5 Documentation and Intended Use of Data

Tatch will receive only de-identified data from the study site. All study data from the CRFs will be kept at the study site in a secured location. During the course of the study and during the analysis phase all data will be kept secured with Tatch, Inc. Findings and process related information, including study design and analysis will appear in a final report issued to the Sponsor and will not include any identifiable information on individual participants. The analysis may be submitted to relevant regulatory bodies to support submissions for regulatory clearance. The analysis may be published in a white paper available to the general public and a peer reviewed publication and will include only de-identified, aggregated level data.

15.6 Record Retention

All correspondence related to this clinical study should be kept in appropriate study files. Records of patients, source documents, device inventory, IRB, and Sponsor correspondence pertaining to this study must be kept on file. All records should be retained for a period of time equivalent to the design and expected life of the device, but in no case

less than 2 years after the date on which the investigation is terminated or completed, or the date that the records are no longer required for purposes of a marketing submission. There may be other circumstances for which the Sponsor is required to maintain study records and, therefore, the Sponsor should be contacted prior to removing or relocating study records for any reason.

16. References

1. Peppard, Paul E., et al. "Increased prevalence of sleep-disordered breathing in adults." *American journal of epidemiology* 177.9 (2013): 1006-1014.
2. De Cruz, Sharon, Michael R. Littner, and Michelle R. Zeidler. "Home Sleep Testing for the Diagnosis of Obstructive Sleep Apnea—Indications and Limitations." *Seminars in respiratory and critical care medicine*. Vol. 35. No. 05. Thieme Medical Publishers, 2014.
3. Kapur, Vishesh K., *et al*, " Clinical Practice Guideline for Diagnostic Testing for Adult Obstructive Sleep Apnea: An American Academy of Sleep Medicine Clinical Practice Guideline", *J Clin Sleep Med*, 2017, 13(3): 479-504.
4. https://www.fda.gov/regulatory-information/search-fda-guidance-documents/significant-risk-and-nonsignificant-risk-medical-device-studies
5. Yalamanchali S, *et al*, “Diagnosis of obstructive sleep apnea by peripheral arterial tonometry: meta-analysis”, JAMA Otolaryngology – Head & Neck Surgery, 2013, 139(12): 1343-1350
6. PASS 2020 Power Analysis and Sample Size Software (2020). NCSS, LLC. Kaysville, Utah, USA, ncss.com/software/pass.

Appendix 1 – Bland-Altman LOA Meta-Analysis

A meta-analysis was undertaken in support of developing a performance goal for the primary effectiveness endpoint of the Bland-Altman 95% limits of agreement (LOA). A total of 7 studies of 7 different FDA approved devices were chosen that used manual scoring of AHI in concurrent laboratory studies. A summary of the 7 devices used in the meta-analysis is provided in Table 1.

Table 1: Summary of Predicate HST Studies

Publication	Device	Reference	N	Lower 95% LOA	Upper 95% LOA	SD
Westbrook et al., 2005	ARES	Figure 6	187	-30.5	26.7	14.3
Massie et al., 2018	NightOwl	Figure 3	101	-38.9	39.6	20.0
Weiman et al., 2013	WatchPAT200	Figure 2	28	-13.6	19.5	8.4
Erman et al., 2007	ApneaLink	Figure 3	59	-21.3	18.0	10.0
Xu et al., 2017	Nox-T3$_{home}$	Figure 1A	77	-26.6	17.4	11.0
Santos-Silva et al. 2009	Stardust	Figure 3D	80	-24.9	22.8	12.2
Nilius et al. 2017	Alice	Figure 3A	85	-13.5	10.3	5.9

A random effects model was utilized to generate an estimate of the average lower and upper LOA across the 7 studies. The random effects estimate was calculated using the Metafor [1] (Meta-Analysis Package for R) package. Restricted maximum likelihood was used to estimate the mean success rate and the variability among studies. The mean lower LOA and confidence intervals for each of the 7 studies, as well as the random effects (RE) summary results are presented in Figure 1; results for the upper LOA are presented in Figure 2. The random-effects model estimates a weighted least squares mean upper limit of 21.8 with a 95% confidence interval of 15.1 to 28.4; the random-effects model estimates a weighted least squares mean lower limit of -24.0 with a 95% confidence interval of -30.6 to -17.4. From this analysis, it is reasonable to use 28.4 for the upper limit performance goal and -30.6 as the lower limit performance goal for the LOA primary effectiveness endpoint analysis in our study.

Figure 1: Lower 95% LOAs for each study and 95% confidence intervals.

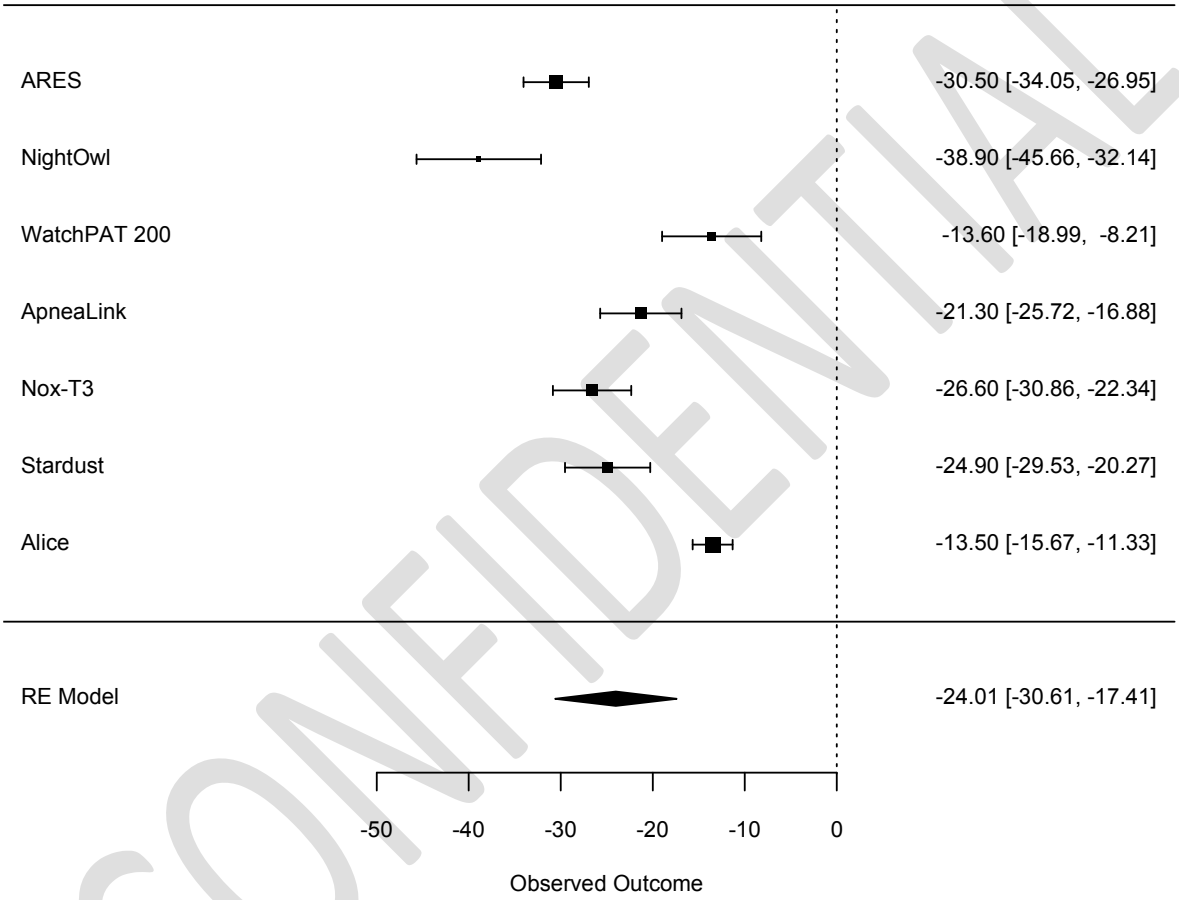
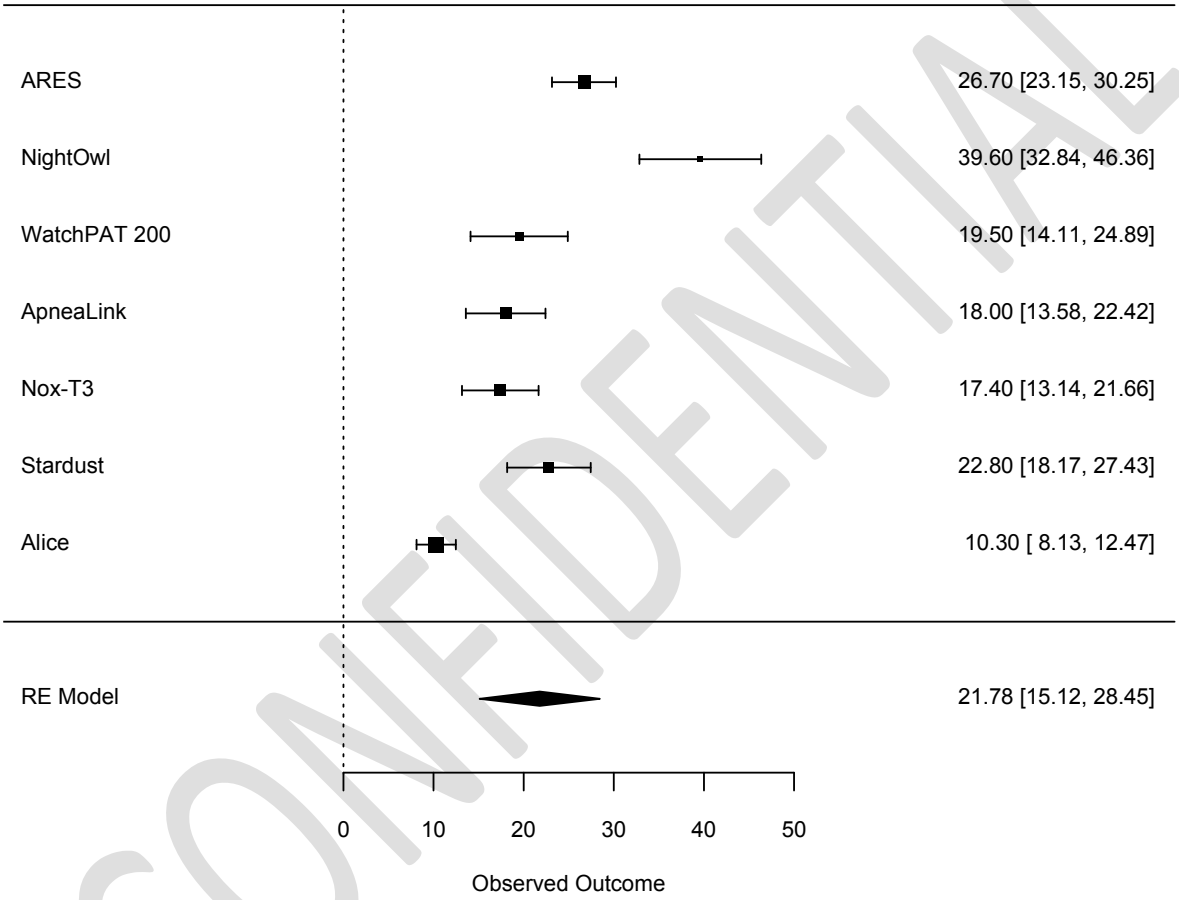


Figure 2: Upper 95% LOAs for each study and 95% confidence intervals.



References:

1. Viechtbauer, W. (2010). Conducting meta-analyses in R with the metaphor package. *Journal of Statistical Software*, 36(3), 1-48. http://www.jstatsoft.org/v36/i03/.
2. Westbrook PR, Levendowski DJ, Cvetinovic M, Zavora T, Velimirovic V, Henninger D, Nicholson D. Description and validation of the apnea risk evaluation system: a novel method to diagnose sleep apnea-hypopnea in the home. Chest. 2005 Oct;128(4):2166-75. doi: 10.1378/chest.128.4.2166. PMID: 16236870.
3. Massie F, Mendes de Almeida D, Dreesen P, Thijs I, Vranken J, Klerkx S. An evaluation of the NightOwl home sleep apnea testing system. J Clin Sleep Med. 2018 14(10): 1791-1796.
4. Weimin L, Rongguang W, Dongyan H, Xiaoli L, Wei J, Shiming Y. Assessment of a portable monitoring device WatchPAT 200 in the diagnosis of obstructive sleep apnea. Eur Arch Otorhinolaryngol. 2013 270:3099-3105.
5. Erman MK, Stewart D, Einhorn D, Gordon N, Casal E. Validation of the ApneaLink for the screening of sleep apnea: a novel and simple single-channel recording device. J Clin Sleep Med. 2007 Jun 15;3(4):387-92. PMID: 17694728; PMCID: PMC1978315.
6. Xu L, Han F, Keenan BT, Kneeland-Szanto E, Yan H, Dong X, Chang Y, Zhao L, Zhang X, Li J, Pack AI, Kuna ST. Validation of the Nox-T3 Portable Monitor for Diagnosis of Obstructive Sleep Apnea in Chinese Adults. J Clin Sleep Med. 2017 May 15;13(5):675-683. doi: 10.5664/jcsm.6582. PMID: 28356181; PMCID: PMC5406954.
7. Santos-Silva R, Sartori E, Truksinas V, Truksinas E, Alonso F, Tufik S, Bittencourt L. Validation of a portable monitoring system for the diagnosis of obstructive sleep apnea syndrome. SLEEP 2009: 32(5): 629-636.
8. Nilius G, Domanski U, Schroeder M, Franke K-J, Hogrebe A, Margarit L, Stoica M, d'Ortho M-P. A randomized controlled trial to validate the Alice PDX ambulatory device. Nature and Science of Sleep 2017 9: 171-180.