University of Pennsylvania Research Study Summary for Potential Subjects

Protocol Title: Study on the Use of Broadband Sounds (Pink Noise) to Mitigate Sleep Disruption due to Aircraft Noise

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You are being invited to participate in a research study. Your participation is voluntary and you should only participate if you completely understand what the study requires and what the risks of participation are. You should ask the study team any questions you have related to participating before agreeing to join the study. If you have any questions about your rights as a human research participant at any time before, during or after participation, please contact the Institutional Review Board (IRB) at (215) 898-2614 for assistance.

The research study is being conducted to investigate the effects of various aviation noises on sleep under controlled laboratory conditions. The study also aims to investigate whether some of the sleep disturbing effects can be mitigated by introducing broadband sounds, including pink noise, into the bedroom or by wearing earplugs, and whether we can identify changes in blood markers associated with sleep, noise, physiology and cognition. Broadband sounds are noises that are distributed across a large range of frequencies, resulting in a mix of low, mid, and high-pitched sounds occurring simultaneously. Pink noise is a particular type of broadband noise, similar to white noise, that combines a combination of sounds that spans all octaves to create a constant, static-like sound that can help block other more disruptive noises.

You are being asked to join this study because of your expressed interest and availability. In addition, you are within the desired age range (21-50 years) and free of psychological or psychiatric conditions that preclude participation.

If you agree to join the study, your participation may last for up to 4 weeks, and include:

- 2 days of screening (4 hours each) roughly 1 to 3 weeks prior to the in-lab phase;
- a 7 to 21-day at-home phase of actigraphy and sleep logs;
- a 7-night period of staying in the laboratory overnight:
    - During this period, you will (1) arrive to the lab each night around 6pm; (2) complete a Cognition test battery and Driving Simulation Task in the evening; (3) have an 8-hour sleep opportunity from 11pm–7am; (4) have a morning blood sample drawn; and (5) complete a Cognition test battery and Driving Simulation Task in the morning; and (6) depart between 9-10am.
    - During the sleep periods, you will wear an EEG device on your head with 6 electrodes that adhere to your face and head. Also, you will wear an EKG device with 2 electrodes on the chest and ribcage. These will monitor your sleep and heart rate.
    - On nights #2-7, you will be exposed to different noise conditions each night, and on one of the nights, you will be required to wear ear plugs.
    - You will be continuously monitored via audio/video recordings except in the restrooms.
    - You will be provided snacks in the evening and a light breakfast in the morning. You will have the opportunity to shower in the morning before departure.

There is no direct benefit to you from being in the study. The most common risks of participation are slight discomfort, skin irritation or pressure marks from sensitivity to wearing the Prodigy EEG head unit and the Faros heart rate monitor; skin irritation or discomfort at the site of the morning blood draw; and symptoms associated with non-restful sleep (e.g. fatigue, irritability, etc.) due to potential sleep disruption by the noise

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interventions. Due to the potential for our noise exposures to affect sleep and impair recuperation to some degree, you should not operate heavy machinery during the study.

Please note that there are other factors to consider before agreeing to participate such as additional procedures, use of your personal information, and other possible risks not discussed here. If you are interested in participating, a member of the study team will review the full information with you. You are free to decline or stop participation at any time during or after the initial consenting process. You will be compensated for your time and effort.

UNIVERSITY OF PENNSYLVANIA
RESEARCH SUBJECT
INFORMED CONSENT AND HIPAA AUTHORIZATION FORM

Protocol Title:	Study on the use of broadband sounds to mitigate sleep disruption due to aircraft noise (Broadband Noise and Sleep)
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Research Study Summary for Potential Subjects

You are being asked to take part in a research study. This is not a form of treatment or therapy. It is not supposed to detect a disease or find something wrong. Your participation is voluntary which means you can choose whether or not to participate. If you decide to participate or not to participate there will be no loss of benefits to which you are otherwise entitled. Before you make a decision you will need to know the purpose of the study, the possible risks and benefits of being in the study and what you will have to do if you decide to participate. The research team is going to talk with you about the study and give you this consent document to

read. You do not have to make a decision now; you can take the consent document home and share it with friends, family doctor and family.

If you do not understand what you are reading, do not sign it. Please ask the researcher to explain anything you do not understand, including any language contained in this form. If you decide to participate, you will be asked to sign this form and a copy will be given to you. Keep this form; in it you will find contact information and answers to questions about the study. You may ask to have this form read to you.

Why am I being asked to volunteer?

You are being asked to join this study because of your expressed interest and availability. In addition, you are within the desired age range (21-50 years old) and are free of psychological or psychiatric conditions that preclude participation.

What is the purpose of this research study?

The purpose of this study is to investigate the effects of various aviation noises on sleep under controlled laboratory conditions. The study also aims to investigate whether some of the sleep disturbing effects can be mitigated by introducing broadband sounds, and in particular, pink noise, into the bedroom or by wearing earplugs, and whether we can identify changes in blood markers associated with sleep, noise, physiology and cognition.

How long will I be in the study and how many other people will be in the study?

The study will be conducted over a period of approximately 4 weeks, including 2 days of screening 1-3 weeks prior to the in-lab phase (each session lasting about 4 hours), a 7- to 21-day at-home phase, and a 7-night period of staying in the laboratory overnight (during which you will leave during the day to resume your normal activities). Up to 3 other participants may be in the laboratory with you at all times (with individual sleeping rooms); however, if a participant withdraws or is withdrawn from the protocol, the study will continue with the remaining participants. We aim to recruit a total of 24 people as final participants to undergo the 7-night in-laboratory protocol.

What am I being asked to do?

You will first be asked to complete two screening sessions (4 hours each) to determine your eligibility for this study. The actual in-laboratory phase of the study will be conducted over a 7-night period during which you will arrive at the hospital each night for an 8-hour sleep period and leave the next morning to resume your normal activities.

Screening session #1: You will first attend an initial 4-hour screening session for a confidential medical check which will include a blood draw (approximately 3 tablespoons), a urinalysis (approximately 1 ounce), a heart checkup (ECG), a standard hearing test, and a series of questionnaires regarding your health and medical history, in order to determine your eligibility to participate in the study.

- In order to ensure that you are healthy and to determine your eligibility for the study, blood and urine samples will be drawn in the Center for Human Phenomic Science (CHPS), which is located in the Perelman Center for Advanced Medicine (PCAM). These samples will be used for determining the presence of HIV antibodies and other active infections, such as the cold or flu virus (from blood), and current use of stimulant or hypnotic (sleep promoting) drugs (from urine). We require an objective measure that you are free of these drugs using blood and urine samples. You will be asked to fast prior to the blood draw. This means that you should not eat or drink anything except prescription drugs and water for at least 10 hours before the visit. People that menstruate will also have a pregnancy test

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performed via the urine sample, as those that are currently pregnant are unable to participate in the study.

- You will receive confidential results regarding your HIV antibody test. If you have a positive test, you will be offered counseling about HIV infection from a physician on our research team. Additionally, you will be referred to a physician and your positive test result will be reported to the PA Department of Health as required by law.
- You will have a physical examination, which will include a heart check-up (ECG), vital signs, height and weight at the Center for Human Phenomic Science (CHPS).
- Also, during the initial screening session, you will be asked to complete a series of questionnaires about your usual attitudes, moods, and psychosocial wellbeing.
- You will receive an actiwatch (activity tracker worn on your wrist like a watch), a Pulse Oximeter (a small device that is worn on the fingertip to measure your pulse and oxygen level), and a sleep log with brief questions to be answered each evening and morning. This log can be filled out online using any mobile device or computer with an internet connection, or if preferred, we will provide you with a paper booklet option.
- You will be told if it was determined that you are ineligible to participate in the study based on the screening. You will, however, be compensated for your time up to that point of the screening process. See compensation section for rates for the screening period.

Screening session #2: If you meet all of the initial screening eligibility criteria for the study, you will be scheduled for a second 4-hour screening session.
During the second screening session, you will complete the following:

- An additional blood and/or urine sample may be collected, if necessary.
- Review of actiwatch, Pulse Oximeter and sleep log data with a staff member;
- Initial training related to the Cognition test battery and driving simulator;
- You will be scheduled for the 7-night in-laboratory phase of the study;
- You will continue to wear the actiwatch and complete the sleep log;
- 48 to 72 hours before your first night in the laboratory, you will need to get a PCR test from a Penn Medicine outpatient facility to confirm that you do not have an active Coronavirus infection. This test will be done with no cost to you.

7- to 21-day at-home phase:

- As described above, you will receive an actiwatch, a Pulse Oximeter and a sleep log during Screening Session #1. If you continue to be eligible for the study, you will wear the actiwatch and fill-out the sleep log from the time they are handed out to you during Screening Session #1 until your first day of the In-Laboratory Phase (see below).

In-Laboratory Phase:

- The 7-night in-laboratory phase of the study will be carried out in the Chronobiology Isolation Lab (CIL) in the Hospital of the University of Pennsylvania, where you will be investigated with up to three other participants (separate bedrooms). All bedding, linens and pillows are provided. We ask that you do not bring additional blankets or sheets into the hospital. However, you may bring up to two pillows and pillowcases.
- You will not be allowed to have any visitors, and you will not be able to make or receive any telephone calls (except in case of an emergency). You will not be able to wear a regular watch or fit bit, use your cell phone, make/receive phone calls, texts, or e-mails, or perform any work on a personal laptop or handheld device. You may bring your cellphone to the laboratory, but they will be placed in a secured lockbox overnight.

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- You will be provided with snacks in the evening and a light breakfast in the morning. You will have to refrain from consuming alcohol (any time of the day) and caffeine (after 3 pm only). You are not allowed to take naps at any time. If you exercise outside the laboratory, try to exercise with the same intensity and duration each day.
- Throughout the in-laboratory phase, we will ask you to follow a schedule to complete tasks and surveys, and trained staff members will be present to guide you and monitor your activities.
- You will be expected to complete various computerized tasks and surveys. In between the performance testing, you will be free to engage in leisurely activities (i.e., reading books or magazines, completing puzzle books, writing, conversing with other participants, watching television), but you must stay in the laboratory.
- During the 7 nights spent in the laboratory, you will be monitored via audio recordings and video cameras. In order to maintain your privacy, your activity will not be monitored in the restroom area.
- Sleep Conditions: For every night of the 7-night in-laboratory period, you will get an 8-hour sleep opportunity in which your bedtime will be ~11 pm and you will get up at ~7 am. The first adaptation night will have no noise interventions. On nights #2 through #7, you will receive a noise condition that has been randomly assigned to your group. Noise conditions consist of intermittent or continuous aviation and/or pink noise that will be played back via loudspeakers. After waking at 7 am, you will complete morning testing and questionnaires. You will then have time to eat a light breakfast, shower and get ready before leaving the lab between 9-10 am.
- Sleep Monitoring: On each night of your in-lab stays, you will be asked to wear a device that looks like a headband called the Cerebra Prodigy system. In addition to the head unit that requires two electrodes on the forehead to measure your brain waves (electroencephalogram; EEG), you will wear an additional four EEG electrodes that adhere behind your left ear, above your left browbone, on the right side of your chin and along the right cheekbone. This device is used to record brain activity during sleep (so-called polysomnography; PSG). It will also record sound pressure levels to help synchronize PSG and sound data.
- Physiologic Monitoring: We will monitor your heart using a continuous heart rate monitor that you will wear during the overnight stay and that will be removed when you depart in the morning. This device uses two electrodes placed by the collarbone and the ribcage. While you may naturally wake up before 7 am, we will ask you to continue lying in bed and wearing the heart rate monitor, EEG head unit and ear plugs until 7 am when the staff instructs you to remove them. You will also continue to wear your wrist actiwatch both during the night in-lab and during your daily activities during the day.
- Hearing Test: You will undergo a standard hearing test each night and each morning to detect changes in hearing ability that may affect your ability to register the noise interventions.
- Blood Draws: Each morning a hospital phlebotomist may draw approximately 2.5mL of blood from your arm, for a total of less than one teaspoon per day and about two tablespoons total over the course of the seven mornings spent in the laboratory. These blood samples will be labeled using your de-identified study ID number and not include any personal identifiable information beyond sex, age, BMI and date/time of collection. These samples will be sent to the Federal Aviation Administration Civil Aerospace Medical Institute (FAA CAMI) for later RNA analysis, which may involve genetic sequencing to measure levels of RNA. Your body makes more or less RNA molecules to adjust processes like metabolism and protein production. We are trying to find out whether there are changes in the types and amount of RNA produced by your cells in association with sleep, noise, health and performance.
- Daily Tasks: During the 7-night in-laboratory phase, you will complete a neurocognitive test battery called **Cognition** each night and morning. The computer will administer the tasks and questions to you. These tests measure cognitive ability and performance, including memory, tracking, and reaction time. Also, you will be asked to make a number of different ratings about your feelings, mood, and attitudes.

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- **Cognition** is a brief, comprehensive computerized neuroimaging-based test battery for spaceflight that is validated for astronauts. It will measure performance levels on 10 neuropsychological tests that cover a range of cognitive domains (including memory, emotion recognition, and risk decision making). You will complete this test on a daily basis, both in the evening before bed and the morning before you depart for the day.
- You will also be required to complete a computerized **driving simulator** task twice a day (once in the evening before bed and once in the morning before you depart). You are not required to have a valid driver's license for this study, and those without a license will still be asked to complete the driving simulation task, with the understanding that they may be less familiar with driving procedures.
- In addition, you will complete some surveys twice daily (once in the evening before bed and once in the morning before you depart) during the 7-night in-lab portion of the study (roughly 30 minutes total), including the following questionnaires:
    1. Positive and Negative Affect Schedule (PANAS) as a measure of affect.
    2. Profile of Mood States Short Form (POMS-SF) as a measure of mood states.
    3. Beck Depression Inventory (BDI-II) as a measure of depression.
    4. Beck Anxiety Inventory (BAI) as a measure of anxiety.
    5. Karolinska Sleepiness Scale (KSS) as a measure of sleepiness.
    6. Visual Analog Scale (VAS) as a measure of mental fatigue, tiredness, physical exhaustion, level of stress, sleep quality, and sleepiness.

What are the possible risks or discomforts?

1. There is a chance that your sleep will be disrupted by the noise interventions. As a consequence, you may feel less rested the next morning which can cause symptoms such as fatigue, sleepiness, difficulties concentrating, or irritability. Based on similar previous studies, we do not expect major daytime symptoms due to sleep disruption. We will monitor your alertness with a cognitive test in the morning and alert you if we notice a relevant performance impairment. **You should not operate heavy machinery during the study if you experience any symptoms of non-restful sleep**. We will pay for transportation to take you to and from your home or to and from your work if needed.
2. While in the study, you will be required to perform mental performance tests and simulators. These tests can become difficult to perform under certain conditions or when you are sleepy and may, therefore, cause you some distress. Should you feel that you are unable to perform these tasks during the course of the study, you are free to withdraw your consent to participate in this experiment and then sleep in the laboratory, if needed.
3. You may experience some discomfort associated with the collection of the blood samples, including possible bruising of the arm, dizziness, fainting, and a small risk of infection.
4. Measuring heart activity involves minor risks. The Faros device used to record your electrocardiogram (ECG) is electrically isolated and conforms to hospital standards for electrical safety.
5. Wearing of the Cerebra Prodigy device on the head may cause slight discomfort
6. The ECG-electrodes attached to your chest and the EEG electrodes attached to your head may cause some minor discomfort and/or skin irritation. If skin irritation occurs, there is a potential risk of changes in skin pigmentation where the ECG electrodes were worn, which results in a darker or lighter skin color. These rare changes in skin pigmentation typically resolve over time. To decrease the likelihood of skin irritation, we will slightly change the position of the electrodes from night to night. We also have alternate ECG electrodes from a different manufacturer available should your skin react to our standard ECG electrodes. Additionally, we will offer you to apply a cream to the site where the electrodes were worn to reduce skin irritation.

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7. You will be asked to wear foam earplugs to bed on one night of the study. The earplugs may cause minor discomfort due to the pressure, but should not cause pain.
8. There is minimal risk associated with video and audio recording during the study. There is a possible risk of a loss of confidentiality in very rare circumstances. As the data collection and analysis for this study will continue, the recordings (with no personal identification) will be kept in a secure location. Access to these recordings will be restricted to the Principal Investigator, his staff, the University of Pennsylvania IRB, and as required by law.
9. As a volunteer subject in this research study, you are not considered a patient at the Hospital of the University of Pennsylvania. During the 7 nights in the laboratory for this study, you will be staying overnight in a clinical research facility. In the unlikely event that you should require emergency hospital treatment during your stay in our research facility, located within the Hospital of the University of Pennsylvania, there will be a resident emergency physician on call who may be summoned for part of your medical care.
10. The investigators reserve the right to terminate your participation in the study at any time if they feel it is necessary for your welfare or for research purposes.
11. It is possible that during the course of the research study, the research staff may notice an unexpected finding(s). Should this occur, the finding(s) will be considered by the appropriate personnel and the PI will inform you if necessary. These possible finding(s) may or may not be significant and may lead to anxiety about your condition and to further work-up by your physician.

Risks of Genetic Sequencing

This research includes genetic sequencing. Even without your name or other identifiers, your genetic information is unique to you. The researchers believe the chance that someone will identify you is very small, but the risk may change in the future as people come up with new ways of tracing information.

There can be a risk in knowing genetic information. New health information about inherited traits that might affect you or your blood relatives could be found during a research study. Even though your genes are unique, you share some of the same genes with your blood relatives. Although we are not able to know all of the risks from taking part in research on inherited traits, we believe that the risks to you and your family are very low, because your samples will be coded and only a portion of your genes will be sequenced.

Very rarely health or genetic information could be misused by employers, insurance companies, and others. For example, it could make it harder for you to get or keep a job or insurance, or life insurance companies may charge a higher rate based on this information. We believe the chance these things will happen is very small, but we cannot make guarantees.

A federal law (Genetic Information Non-Discrimination Act, GINA) helps reduce the risk from health insurance or employment discrimination. The law does not include other types of misuse by life insurance or long term care insurance. If you want to learn more about GINA, you can find information about it on the internet or ask the study staff.

What if new information becomes available about the study?

During the course of this study, we may find more information that could be important to you. This includes information that, once learned, might cause you to change your mind about being in the study. We will notify you as soon as possible if such information becomes available.

What are the possible benefits of the study?

There is no benefit to you; however, your participation could help us understand how aviation noise can disrupt sleep and to better understand how we may mitigate this disruption using pink noise and/or earplugs. In the future, it is possible that findings from this study lead to developing viable alternatives to maintain sleep health in people who are adversely affected by aviation noise, as expensive soundproofing measures are typically only granted to those living within a certain radius of the airport, and not typically offered to all those outside the immediate area who may still be suffering sleep disturbances.

What other choices do I have if I do not participate?

Your alternative to being in the study is not to be in the study.

Will I be paid for being in this study?

If you complete the entire study, we will pay you approximately $1210 via a physical Greenphire ClinCard plus reimbursement for transportation costs. The total amount may vary depending on how much of each study component you complete. If you decide to withdraw from the study before the study is over or are otherwise unable to finish the study (for instance, if you are unable to return to the lab the following evening or if you must leave the lab while the study is in progress due to reasons such as illness, family/work obligations or other personal matters), you will be compensated for your participation up to the point you chose to withdraw or were unable to continue. The amounts you will receive for completing each section of the study are as follows:

- $40 for two screening visits (at $20 each);
- $105 for up to 21 days of actigraphy and completed sleep logs ($5/day);
- $20 for taking a pre-study COVID PCR test;
- $875 for the 7-night in-lab phase ($125 for each night spent in the lab);
- $70 for blood draws ($10/draw, performed each morning of the in-lab stay);
- An additional $100 at the end of the study for your time and effort.

In the event that we have five fully qualified participants for one study run, we may see if you were willing to serve as a backup subject. You would still arrive to the lab on Night 1 and be available to participate for the full 7-night study if any of the four primary subjects is unable to participate. You would be compensated $100 for your time and effort, regardless of whether you end up being needed as a primary subject.

If you are **NOT** needed for the 7-night study (i.e. the four primary subjects have negative COVID test results, show up on Night 1 and are able to participate), you will receive the $100 back-up compensation and have transportation costs reimbursed to return home that evening.

If you **ARE** needed, you will still receive $100 for your willingness to be flexible, and will then continue the study as a primary subject earning the standard subject compensation of $875 ($125/night for 7 nights) in addition to the back-up compensation of $100.

The $100 back-up compensation is in addition to what you would have already earned for screenings, at-home actigraphy and sleep logs, and COVID testing. Also, if you are still available and eligible in the future, we would guarantee you a spot as a primary subject in a subsequent study run, where you would receive full standard subject compensation of $875 for the 7-night study ($125/night for 7 nights), as well as any necessary repeated screening compensation.

In addition, you will be compensated for transportation to and from your home and work if needed for screening sessions and the overnight stays.

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Please note that if you receive more than $600 compensation in one year for participation in research studies at the University of Pennsylvania, you must provide an Individual Tax Identification Number or Social Security Number for tax purposes.

Will I have to pay for anything?

There are no costs associated with participating in the study. Transportation to and from the research office and parking for screening sessions will be compensated. Participation in the study will be compensated as detailed above.

What happens if I am injured from being in the study?

We will offer you the care needed to treat injuries directly resulting from taking part in this research. We may bill your insurance company or other third parties, if appropriate, for the costs of the care you get for the injury, but you may also be responsible for some of them.

There are no plans for the University of Pennsylvania to pay you or give you other compensation for the injury. If you feel this injury was caused by medical error on the part of the study doctors or others involved in the study, you have the legal right to seek payment, even though you are in a study. You do not give up your legal rights by signing this form.

If you think you have been injured as a result of taking part in this research study, tell the person in charge of the research study as soon as possible. The researcher's name and phone number are listed in the consent form.

When is the Study over? Can I leave the Study before it ends?

The study is expected to end after all participants have completed all visits and all the information has been collected. The study may be stopped without your consent for the following reasons:

- The Principal Investigator feels it is best for your safety and/or health-you will be informed of the reasons why;
- You have not followed the study instructions;
- The Principal Investigator, the sponsor or the Office of Regulatory Affairs at the University of Pennsylvania can stop the study anytime.

You have the right to drop out of the research study at any time during your participation. There is no penalty or loss of benefits to which you are otherwise entitled if you decide to do so.

If you no longer wish to be in the research study, please contact Michele Carlin at 215-898-9665 and simply inform her that you would no longer like to participate.

Once you are in the 7-night in-laboratory phase of the study, you may decide to withdraw from the study at any time by communicating your desire to a study team member. If you elect to withdraw your consent, the study coordinator, PI and physician of record will be notified immediately and will make direct contact with you (via phone or in person). In addition, you may be withdrawn from the study at any time if the PI or physician of record determines that it is not in your best interest to continue. If necessary, the physician of record will speak directly with you to provide additional services or information. In the event you withdraw/are withdrawn from the study, the rest of the research participants will continue with the study protocol.

How will my personal information be protected during the study?

We will do our best to make sure that the personal information obtained during the course of this research study will be kept private. However, we cannot guarantee total privacy. Your personal information may be given out

if required by law. If information from this study is published or presented at scientific meetings, your name and other personal information will not be used.

Protected health information (PHI) is any information in the medical record or designated record set that can be used to identify an individual and that was created, used, or disclosed in the course of providing a health care service such as diagnosis or treatment. HIPAA regulations allow researchers to access and use PHI when necessary to conduct research. PHI includes identifying information such as name; address; dates (except years) including birthdates or date of admission or discharge; telephone or fax number; email address; identifying numbers such as social security number, medical record number, account number, or license; and biometric identifiers such as fingerprints or full-face photos. For more information on the specific PHI we will collect and who will have access to that information, please refer to the following '**Electronic Medical Records and Release of Study Related Information**' section.

If you test positive for HIV, by law we have to report the infection to the City of Philadelphia Health Department/PA Department of Health. We would report your name, gender, racial/ethnic background, and the month and year you were born. This is to keep track of how many people in the U.S. have an HIV infection. It is also to make sure that states get enough money from the federal government to support the medical care of people living with HIV. The Health Department does not share the names of HIV infected people with anyone else. It removes all personal identifiers, such as your name, before giving information on the number of HIV infections to the federal government.

The Institutional Review Board (IRB) at the University of Pennsylvania is responsible for protecting the rights and welfare of research volunteers like you; and therefore, the IRB has access to study information. Any documents you sign, where you can be identified by name will be kept in a locked cabinet in the research office located in Blockley Hall, University of Pennsylvania Perelman School of Medicine. These documents will be kept confidential. Confidentiality will be maintained by giving you a study code and all your study information will relate to this number. However, identifiers might be removed from your identifiable private information or identifiable biospecimens and that, after removal, could be used for future research studies or distributed to another investigator for future studies without additional informed consent.

Blood samples and research information collected in this study will be shared with FAA CAMI and its research partners for additional analyses. Any data and samples provided to the FAA will only be associated with your de-identified study code, age and sex, BMI and possibly date/time of collection, but not your name or other private identifiable information.

You will be audio-recorded and videotaped throughout the study. There are no cameras in the restrooms, but they are located in all other spaces of the Chronobiology Isolation Lab (CIL). You will be made aware of the recording devices that will be on for the entirety of the study. By signing this consent form, you will be acknowledging that you have been informed of and agree to the presence and use of the devices in the study. You will not be asked questions in a public setting. The surveys and questionnaires will take place online through the use of a personal tablet or laptop provided by the study. These can be done in the privacy of your sleeping quarters and are completed in the morning and evening. This combined Informed Consent form and HIPAA Authorization will be completed prior to the study stating that you were informed about your personal protections.

You will be able to sign your consent form after an individual meeting where you will be able to ask any questions you may have to a member of the research team. There is no time limit to this session, which will be held in a private room.

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Certificate of Confidentiality

This research is covered by a Certificate of Confidentiality from the National Institutes of Health. This means that the researchers cannot release or use information, documents, or samples that may identify you in any action or suit unless you say it is okay. They also cannot provide them as evidence unless you have agreed. This protection includes federal, state, or local civil, criminal, administrative, legislative, or other proceedings. An example would be a court subpoena.

There are some important things that you need to know. The Certificate DOES NOT stop reporting that federal, state or local laws require. Some examples are laws that require reporting of child or elder abuse, some communicable diseases, and threats to harm yourself or others. The Certificate CANNOT BE USED to stop a sponsoring United States federal or state government agency from checking records or evaluating programs. The Certificate DOES NOT stop disclosures required by the federal Food and Drug Administration (FDA). The Certificate also DOES NOT prevent your information from being used for other research if allowed by federal regulations.

Researchers may release information about you when you say it is okay. For example, you may give them permission to release information to insurers, medical providers or any other persons not connected with the research. The Certificate of Confidentiality does not stop you from willingly releasing information about your involvement in this research. It also does not prevent you from having access to your own information.

Will information about this study be available to the public?

A description of this clinical trial will be available on www.ClinicalTrials.gov, as required by U.S. Law. This website will not include information that can identify you. At most, the website will include a summary of the results. You can search this website at any time.

What may happen to my information and samples collected on this study?

Collection of Identifiable Specimens

Your data may be used to create products, including some that may be sold and/or make money for others. If this happens, there are no plans to tell you, or to pay you, or to give any compensation to you or your family. Whole transcriptome sequencing (WTS) may be conducted on your samples. Whole transcriptome sequencing involves analyzing the sequence information for actively expressed portions of your genome, and thus can generate a subset of the information from whole genome sequencing.

Future Use of Data and/or Specimens

Although data will be de-identified to the extent feasible and reasonable for research, the fingerprint inherent in genetic information cannot be entirely removed. Blood samples may undergo analyses to generate genetic information, such as whole transcriptome sequencing (a subset of data from whole genome sequencing). Raw and processed data including genetic sequence information may be archived in online repositories such as the National Center for Biotechnology Information resource dbGAP (a restricted-access database for genetic results) or Dryad Digital Repository (one of many repositories that can house non-genetic information such as cognitive results). Although reasonable precautions will be taken to prevent unauthorized dissemination, this type of data and data sharing may generate risks to privacy. Use of broad consent as intended for this study allowing for collection/storage and unspecified future use of data and specimens, can result in future use of samples/data in ways not anticipated at the time of collection.

Your information and samples will be de-identified prior to storage for future use. De-identified means that all identifiers that can be have been removed. The information and samples could be stored and shared for future research in this de-identified fashion. The information and samples may be shared with other researchers within

Penn, the FAA, or other research institutions, as well as pharmaceutical, device, or biotechnology companies. This can be done without again seeking your consent in the future, as permitted by law. The future use of your information and samples only applies to the information and samples collected on this study.

Electronic Medical Records and Release of Study Related Information

What is an Electronic Medical Record?
An Electronic Medical Record (EMR) is an electronic version of your medical chart within a health system. An EMR is simply a computerized version of a paper medical record.

If you have never received care within Penn Medicine and are participating in a University of Pennsylvania research study that uses Penn Medicine healthcare related services, an EMR will be created for you for the purpose of maintaining any information produced from your participation. The creation of this EMR is a requirement of your participation in this study. In order to create your EMR, the study team will need to obtain basic information about you that would be similar to the information you would provide the first time you visit a hospital or medical facility (i.e. your name, the name of your primary doctor, the type of insurance you have). If you have been a patient at Penn Medicine in the past, information from your research participation will be added to your existing medical record.

What may be placed in the EMR?
Information related to your participation in the research (e.g., laboratory tests, notes from your physician, imaging studies, and clinical procedures, etc.) will be placed in your EMR maintained by Penn Medicine.

Once placed in your EMR your information may be accessible to appropriate Penn Medicine workforce members that are not part of the research team. Information within your EMR may also be shared with others who are determined by Penn Medicine to be appropriate to have access to your EMR (e.g. Health Insurance Company, disability provider, etc.).

Please note that study data collected outside of the screening session (i.e., sleep and other physiological data, survey data, cognitive test data and results for whole transcriptome sequencing of your blood) will not be placed in the EMR.

Penn Medicine also participates in automated information sharing through Health Information Exchanges (HIEs). HIEs securely share parts of your electronic health record, including research information, with other healthcare organizations involved in your care. This information is shared to improve the quality, safety and efficiency of your healthcare. To request that your health information not be shared through HIEs, please call 215-662-4484.

Will I, as a participant, have access to research related information within the EMR?
The 21st Century Cures Act requires healthcare institutions to allow patients increased access to their electronic medical record. As part of your participation in this research, you will have access to research related information within your EMR through Penn Medicine's patient portal – called MyPennMedicine (MPM).

Will I receive the results of research testing that may be relevant to my health?

No. Although genetic information may be relevant for health, relevance may not be known until years after your participation is complete. Additionally, genetic information generated during this study will be identified by your subject code and not associated with other identifiable information, inhibiting the ability to know which findings are applicable to you.

What information about me may be collected, used or shared with others?

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The following personal health information (PHI) will be collected, used for research, and may be disclosed during your involvement with this research study:

- Name, address, telephone number, date of birth;
- Personal and family medical history;
- Psychiatric history;
- Current and past medications and therapies;
- Social Security Number;
- Medical Record number;
- Information from a health history and physical examination that generally also includes blood pressure reading, heart rate, breathing rate and temperature; and
- Results of screening tests and CHPS nursing notes.

As a reminder of study appointments, some subjects prefer to have a contact via email. While email serves many purposes, email accounts are considered identifiable information and therefore the study staff is requesting permission to contact you via your email account. You have the right to not receive any study-related information via email.

Do you agree to receive emails to the email account of your choice with regards to study related items (i.e. appointment reminders, check-in's, etc.)?

____ Yes ____ No

Why is my information being used?

Your information is used by the research team to contact you during the study. Your information and results of tests and procedures are used to:

- Do the research;
- Oversee the research;
- To see if the research was done right.

Where may my information be stored?

Information related to your participation in clinical research will be contained in a clinical trial management system (CTMS). A clinical trial management system (CTMS) is used to register your information as a participant in a study. This allows for your research data to be entered and stored for the purposes of study operational and financial applications and other activities required as part of the conduct of the research. Once placed in the CTMS your information may be accessible to other authorized personnel at Penn Medicine that support research operations. Your information may be held in other research databases.

Who may use and share information about me?

The following individuals may use or share your information for this research study:

- Dr. Mathias Basner, the Principal Investigator for the study and his study team;
- The University of Pennsylvania Institutional Review Boards (the committees charged with overseeing research on human subjects) and University of Pennsylvania Office of Regulatory Affairs;
- The University of Pennsylvania Office of Human Research (the office which monitors research studies);
- Authorized members of the University of Pennsylvania and the University of Pennsylvania Health System and Penn Medicine workforce who may need to access your information in the performance of

their duties (for example: to provide treatment, to ensure integrity of the research, accounting or billing matters, etc.).

Who, outside of the Penn Medicine, might receive my information?

As part of the study, the Principal Investigator, the study team and others listed above, may disclose your personal health information, including the results of the research study procedures.

Individuals or organizations responsible for administering the study:

- University of Pennsylvania

Regulatory and safety oversight organizations:

- The Office of Human Research Protections
- FAA (funding agency)
    - This includes its research collaborators including the FAA Functional Genomics Team, who will have access to de-identified data including PSG and neurobehavioral test performance data, and to blood samples for genetic processing. Note that this will be limited to basic demographics such as age, BMI, or time of day that the biospecimen collection or test bout occurred. The FAA Functional Genomics Team will NOT see uniquely identifying information such as name, medical record number, address or SSN.

Other academic or industry partners who may collaborate on this project:
If samples or data collected through this project are shared with collaborators outside of Penn, direct identifiers such as your name or medical record number will not be shared. Other regulatory agencies, quality assurance and/or quality control auditors, and/or their designated representatives in the United States and other countries.

Once your personal health information is disclosed to others outside the Penn Medicine, it may no longer be covered by federal privacy protection regulations. The Principal Investigator or study staff will inform you if there are any additions to the list above during your active participation in the trial. Any additions will be subject to University of Pennsylvania procedures developed to protect your privacy.

How long may the Penn Medicine use or disclose my personal health information?

Your authorization for use of your personal health information for this specific study does not expire, and the information and samples collected from this study may be used for analyses not anticipated at this time. By agreeing to participate in this study, you grant permission for Penn Medicine, the FAA, and its collaborators to re-use or re-disclose de-identified information collected in this study for a purpose other than this study. For example, the genetic results obtained from the de-identified blood samples may be used for other future applications. The University of Pennsylvania's Institutional Review Board will ensure that appropriate privacy safeguards are in place as permitted by law.

Can I change my mind about giving permission for use of my information?

Yes. You may withdraw or take away your permission to use and disclose your health information at any time. You can do this by sending a written notice to the investigator for this study. If you withdraw your permission, you will not be able to stay in this study.

If you withdraw your permission, we may not be able to identify which samples and information belong to you, and therefore may not be able to remove your information and samples from the stored collections. Such information and samples may continue to be used for certain purposes, such as to comply with the law or maintain the reliability of the study.

IRB Approval From 02/15/2023 to 12/04/2023

What if I decide not to give permission to use and give out my health information?

Then you will not be able to participate in this research study.

Who can I call with questions, complaints or if I'm concerned about my rights as a research subject?

If you have questions, concerns or complaints regarding your participation in this research study or if you have any questions about your rights as a research subject, you should speak with the Principal Investigator listed on page one of this form. If a member of the research team cannot be reached or you want to talk to someone other than those working on the study, you may contact the Office of Regulatory Affairs with any question, concerns or complaints at the University of Pennsylvania by calling 215-898-2614.

When you sign this form, you are agreeing to take part in this research study. This means that you have read the consent form, your questions have been answered, and you have decided to volunteer. Your signature also means that you are permitting the University of Pennsylvania to use your personal health information collected about you for research purposes within our institution. You are also allowing the University of Pennsylvania to disclose that personal health information to outside organizations or people involved with the operations of this study.

A copy of this consent form will be given to you.

_____	_____	
Name of Subject (Please Print)	Signature of Subject	Date

_____	_____	
Name of Person Obtaining Consent (Please Print)	Signature	Date

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