UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

CONSENT TO BE A RESEARCH SUBJECT

Study Title: Accuracy of non-invasive measurement of hemoglobin concentration

This is a medical research study. One of your study doctors, John Feiner, MD, Philip Bickler, MD, Mark Rollins, MD, Jeffrey Sall, MD, Helge Eilers, MD, Jennifer Lucero, MD, Andrew Schober, MD, or Michael Lipnick, MD and colleagues in the Department of Anesthesia will explain this study to you.

Medical research studies include only people who choose to take part. Take your time to make your decision about participating. You may discuss this decision with your family and friends and with your health care team. If you have any questions, you may ask your study doctor.

You are being asked to participate in this study because you are healthy, between 18 and 35 years of age and willing to participate in the study in San Francisco.

Why is this study being done?

The purpose of this study is to determine if new medical devices can detect the level of hemoglobin (the red pigment in the blood that carries oxygen) in the human body. The devices shine light through the skin, similar to a pulse oximeter, or measure the electrical properties of tissues, such as a calf muscle.

How many people will take part in this study?

About 300 volunteer subjects will participate in this study in total.

What will happen if I take part in this study?

If you agree to participate, and after signing this consent form, you will have the following "screening" exams and tests to find out if you can complete the study.

- **Medical History and Physical Exam:** A doctor will perform a brief medical history and physical examination to determine whether you are healthy and eligible to participate. The medical history will include questions to determine if you are healthy enough for blood donation and for participation in the study. Questions will include your medical and surgical history, medications you currently take, history of any substance abuse, and any allergies that you have.

- **Physical Exam:** The physical exam will include listening to your heart and lungs and examining your airway and your hands and arms. The circulation will be tested in you hands by pressing over the arteries briefly and releasing them (an "Allen's" test).
- **Laboratory Tests:** If you are female, you will have a urine test for pregnancy. If you are pregnant, you cannot participate in this study. However, this test does not absolutely prove that someone is not pregnant. If you think that you could be pregnant, you should not participate in this study. In the study you will undergo hemodilution by a standard clinical technique described below, which is sometimes used for patients undergoing surgery in an effort to decrease the required number of transfusions.

During the main part of this study:

If the screening exams and tests show that you can continue to be in the study, and you choose to take part, then you will have the following done:

- **Study location:** All study procedures will be done at the Medical Center at the University of California, San Francisco.
- On the day of the experiment, you will spend between 4 and 8 hours doing the test procedures (the time required depends on the number of units of blood removed and re-infused). One to 4 pints of blood are withdrawn and are replaced with other fluid. This blood donation procedure is called hemodilution, which is defined as the replacement of blood with an equal amount of fluid. The blood that has been removed will be returned after processing to separate the red blood cells from the plasma. The plasma will be returned first, followed later by the red blood cells. One pint of the blood that was removed may not be returned to you, similar to a blood donation at a blood bank.
- Pulse oximeters and hemoglobin measurement devices will be attached to your fingers, forehead and or calf. Electrocardiogram pads will be placed on the skin of your chest. For some studies, sensors for an FDA approved cerebral perfusion monitoring device (Ornim "c-Flow™" monitor) will also be placed on the forehead to use as a reference device. These sensors work similarly to pulse oximeters and

hemoglobin measurement devices by shining light through the tissue, as well as incorporating ultrasound technology.

- You will have catheters (small plastic tubes) placed in veins in both arms and an artery of one of your wrists. Before inserting the catheter into your wrist artery, we will check blood flow in your hand by occluding the wrist artery by finger pressure while you make a fist. One to 4 pints of blood *(the amount will depend on your weight and starting hemoglobin concentration***)** will be withdrawn while 5% Human Albumin, a solution of a common blood plasma protein, will be returned through a vein to keep the total amount of fluid in your body at a normal level. All but one of the units of blood that is withdrawn will be processed so that your red blood cells from those units can be returned. The plasma will not be returned to you during the transfusion.
- Up to 40 small blood samples will be taken during the study to measure oxygen carbon dioxide, calcium, and other tests (the blood will be taken from the catheter placed in my artery). The total amount of blood taken for these tests is about 3 ounces.
- You may be asked to breathe, via a mouthpiece, an air mixture containing reduced amounts of oxygen, as would occur at high altitude. This will be done for just a few minutes.

How long will I be in the study?

Participation in the study will involve between 4 and 8 hours, on a single day.

What side effects or risks can I expect from being in the study?

1. You will be monitored closely by a physician and by various medical instruments (including blood pressure, ECG [electrical heart tracing], and blood gases *[measurements of the acidity, level of oxygen and carbon dioxide in the arterial blood].* The heart, hemoglobin and oxygen measuring instruments will rest on top of your skin with adhesive stickers. If any problems are detected, the procedure will be stopped immediately and you will be given your blood back. The physicians may at their discretion remove you from the study if they feel it is in your best interests. A physician will be present at all times. You will be called 24 to 72 hours after the study to

see whether you are feeling well. If your breathing changes during the study it might feel strange or uncomfortable. You may become anxious. If you are uncomfortable or wish to stop participating in the study you will be given back your red cells. While you are getting back your blood you will be offered extra oxygen to breathe through soft tubes that sit under your nostrils.

2. Placement of a catheter in the artery of the wrist may cause blockage of the artery and which may result in not enough oxygen getting to the hand. This occurs in less than 0.2% of seriously ill patients with an arterial catheter, and the risk is much smaller in healthy subjects. If a blockage occurs, it may require an operation to reopen the artery in the wrist. Extremely rarely (too rare an incidence to give a percentage), this operation does not improve blood-flow to the hand, which may lead to loss of one or more fingers or the entire hand. You will not be allowed to participate if the circulation to my hand is abnormal to begin with. The catheter used is the safest available, and will be removed less than 6 hours after placement, which also decreases the risk of problems.
3. Placement of the arterial and venous catheters may cause some discomfort. Your skin will by numbed with a small amount of lidocaine, a local anesthetic, to minimize the discomfort. A small bruise and dull ache lasting several days is expected after removal of the catheter in the artery of the wrist. A small bruise lasting several days is also common following removal of the venous catheters. One subject participating in a prior study had an ache in their wrist where the arterial catheter was. This person was given more numbing lotion on their wrist and felt better.
4. Drawing blood samples may cause some discomfort, although they will be drawn through the artery catheter (small plastic tube) in your wrist. There is a slight (much less than 1%) risk of infection at the catheter site, but great care will be taken to draw the samples in a sterile way.
5. You may feel light-headed or dizzy during the blood removal and hemodilution. The researchers have performed the hemodilution procedure approximately 100 times in the last ten years. In the last several years, out of 20 procedures on ten subjects, after removal of two units of blood, one subject felt lightheaded. The feeling lasted less than 2 minutes. In all studies performed the only serious event that occurred was when one subject fainted before the removal of any blood. This was unrelated to a study

procedure. If you have a history of fainting you should not participate in this study. If one of the pints of blood that we remove is not returned to you, this may cause light-headedness or dizziness afterwards. This would be similar to the effect of donating a pint of blood in a blood bank.

6. Some subjects have reported a headache several hours after completing the study. This has resolved with rest and Tylenol or ibuprofen.
7. Human Albumin 5% administration has no known risks associated with it other than very rare mild hypersensitivity. This rare (less than 1%) incidence of hypersensitivity can lead to headache or runny nose.
8. Administration of the your own plasma can transiently lower blood ionized calcium levels. This can avoided with slow administration, and treatment with intravenous calcium chloride. Subjects with history of low calcium may be at risk for more significant symptoms of symptoms of hypocalcaemia. These can include perioral tingling, tremors in the limbs, or feeling faint or nauseous. If you have a known active history of hypocalcaemia you should not do this study.
9. Breathing air with reduced amounts of oxygen may make you feel dizzy, short of breath, or develop a headache.
10. Confidentiality: Participation in a research study will involve a loss of privacy. The researchers will keep information about me as confidential as possible, but complete confidentiality cannot be guaranteed. Your name will not be used in any printed reports about this study.

Are there benefits to taking part in the study?

There is no direct benefit to you for participating in this study. Society will benefit from the development of accurate means of measuring the amount of hemoglobin in the blood non-invasively.

What other choices do I have if I do not take part in the study?

You may choose not to participate in the study. If you decide not to be in this study you will not lose any of your regular benefits, and you can still receive medical care from UCSF.

Will my medical information be kept private?

We will do our best to be sure that the personal information in your medical record is 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 personal information will not be used.

What are the costs of taking part in this study?

You will not be charged for any costs of the study, including laboratory tests done for the purposes of the study.

Will I be paid for taking part in the study?

Reimbursement will be as follows: no payment for informational visit and screening tests; $250 if 1 or 2 units of blood are removed, $300 if 3 units of blood are removed and $350 if 4 units of blood are removed. You will be paid by check after you complete participation in the study. In order to receive your check, you will have to provide your social security number and home address. If you are unable to complete the study due to a failure to place an IV or A-line, you will receive $25.

What happens if I am injured because I took part I the study?

It is important that you tell your study doctors (Bickler or Feiner) if you feel that you have been injured because of taking part in the study. You can tell the doctor in person or call him at 415 476-1411.

Treatment and compensation for injury:

If you are injured as a result of being in this study, treatment will be available. The costs of such treatment may be paid by the University of California, depending on a number of factors. The university does not normally provide any other form of compensation for injury. For further information you may call the office of the Committee on Human Research at (415) 476-1814.

What are my rights if I take part in the study?

Taking part in this study is your choice. You may choose either to take part or not to take part in this study. If you decide to take part in the study you may leave the study at any time. No matter what decision you make, there will be no penalty to you and you will not lose any of your regular benefits. Leaving the study will not affect your medical care. You can still get your medical care from our institution.

We will tell you about new information or changes in the study that may affect your

health or your willingness to continue in the study.

In the case of injury from this study, you do not lose any of your legal rights to seek payment by signing this form.

Who can answer my questions about the study?

You can talk to your study doctor about any questions or concerns about this study. If you have any other questions about the study, you may call Dr. Feiner at 476-8624 or Dr. Bickler at 476-1411. **For questions about your rights while taking part in this study, you may call the office of the Committee on Human Research at UCSF at 415 476-1814.**

CONSENT

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You have been given copies of this consent form and the Experimental Subject's Bill of Rights to keep.

_____ Please initial here to indicate you have reviewed the Experimental Subject's Bill of Rights.

_____ This study has multiple sponsors. The sponsor for this study date has been provided to you. Please initial to acknowledge.

PARTICIPATION IN RESEARCH IS VOLUNTARY. You have the right to decline to participate or to withdraw at any point in this study without penalty or loss of benefits to which you are otherwise entitled.

If you wish to participate in this study, you should sign below.

_____

Participant (Print name)

_____

Participant's Signature for Consent Date (mm-dd-yyyy) Time (hh:mm)

_____

Person Obtaining Consent (Print name)

Person Obtaining Consent Signature **Date (mm-dd-yyyy)** **Time (hh:mm)**