

- **Protocol (Human subjects protection from risk)**

- Intra-arterial catheter and blood sampling for XX scan: Radial arterial catheterization is needed for repeated arterial blood samples to construct tracer input curves for XX imaging. Insertion of the arterial line may be associated with mild-moderate pain, hematoma, inflammation, bleeding, or bruising at the puncture site. If this occurs, signs and symptoms will dissipate over time, usually 24-72 hours after the event. Certain individuals may feel lightheaded during arterial catheter placement. In rare instances, blocking of the artery, tearing of the artery, arterial leakage, poor healing, or infection at the catheter insertion site may occur. In a review of the literature between 1978-2001, Sheer found that among 19,617 radial artery catheterizations, temporary and benign occlusion occurred in 19.7% of patients (Scheer et al reported<sup>1</sup>). Thrombosis persisted as a major complication in just 0.09% of cases. Septic complications occurred in 0.13% of cases. In studies conducted at Columbia University/NYSPI we found that of 1,132 arterial lines in 924 subjects there was 1 instance of symptomatic thrombotic occlusion (0.09%), documented by Doppler ultrasound in a depressed female. There was no associated ischemic damage, and the condition resolved over a period of weeks without intervention. In this study, there had never been a serious, adverse event related to an arterial line. In some cases, hematomas have formed after removal of the arterial line, but in all cases of hematoma formation, this has occurred during the period immediately following the removal of the line and after the routine several minutes of pressure applied by the clinician removing the line. In all these cases, pressure was immediately reapplied, and the hematoma stabilized after release of the pressure. No incidents or adverse events related to arterial line placement occurred in any of the subjects after leaving the Columbia University/NYSPI PET suite. In the proposed study, arterial catheters will remain in place for no more than 6 hours. The risks of radial artery cannulation are minimized by having the procedure performed by an experienced clinician. Moreover, the clinician, or respiratory therapist will do no more than 3 arterial punctures, including the successful insertion of the catheter. This will occur after numbing the participant's wrist, potentially with a local anesthetic (like Novocain or lidocaine). Before each attempt, the subject will be assessed for pain/discomfort and asked if they are amenable to another attempt. At any time, they can decline to proceed. An Allen test will be performed to assess the vascular patency of the hand before cannulation of the radial artery. In the case that the arterial line must be placed another time due to rescheduling of the scan, the subject will be reminded of the risks associated with the procedure. In the event of an emergency at the time of cannulation, 911 will be called, and the subject will be sent to the Emergency Department for evaluation and treatment. Bleeding is prevented by local pressure applied for a minimum of 15 minutes after catheter removal. Subjects will have their hand and finger blood supply examined after arterial cannulation and again following catheter removal. Subjects will be provided with instructions and advised to call 911 if they encounter pain, discoloration, numbness, tingling, coolness, hematoma, inflammation, or any

other unusual symptoms in the wrist or hand, or fever, chills, or drainage from the vascular puncture sites, following the procedure. The volume of blood collected during this study will be approximately XX tablespoons (XXmL) at most, for the XX scan. This is not expected to have any serious negative effects on a study participant. The blood draws during PET scanning sessions will be obtained from the already inserted catheter, to minimize discomfort.

- Protocol Safety Monitoring Plan
  - During XX PET scans when arterial blood is acquired, a clinician monitors the arterial line and the participant. For imaging studies without arterial lines, trained staff and the study coordinator are always available. As stated above, the participant's health is ensured before the study is complete. Aside from the PET scans (as they involve either an arterial line or IVs for PET tracer injection) and the blood draws for screening/evaluation, all other procedures are non-invasive. If an incidental finding is discovered and the participant agreed to be informed on the study consent form, the principal investigator or study clinician will contact the participant to inform them of the incidental finding. They will then be referred to a medical doctor for follow-up.

**Consent (Risks/Discomforts Section):**

- Placement of the radial arterial catheter (small plastic tube) may be done under the numbing effects of lidocaine including topical agents applied first to minimize the discomfort of the needle stick needed for the lidocaine. An experienced physician will place the arterial catheter in your forearm. No more than three attempts for arterial punctures will occur, including the successful insertion of the catheter. At any time, you can decide not to continue. Arterial catheter placement may cause discomfort, bleeding, pain, infection (rare), redness or bruising at the puncture sites, or radial nerve injury (numbness in fingers which may persist).
- The placement of a catheter in your artery may cause pain. If three attempts for the arterial puncture are needed, please note that repeated efforts to place the catheter may result in later discomfort (after the anesthesia wears off) and can sometimes result in bruising at the puncture site and, on rare occasions, a blood clot, nerve injury or infection may develop.

There is a very small chance of complications resulting from the placement of the catheter, including bleeding, infection, or blood clot. If you have the catheter placed in your artery, there is a remote possibility of temporary or permanent injury of the blood supply to your hand. A consequence of this procedure can result in inadequate blood flow to the fingers or hand which can result in emergency surgery to the hand to re-establish blood flow. These complications are rare and usually occur in medically ill patients who have catheters in their wrists for several days. In contrast, the catheter will remain in your arm for about 6 hours – or less on the PET scan day. Less serious but more frequent side effects of the arterial catheter occur. Some people have pain or soreness in the wrist the next day or that evening. This is not permanent, and it can be treated with Tylenol. You should also be aware that repeated placements of catheters in veins or arteries can increase the risk of discomfort or complications. In the case that this arterial catheter must be placed another time due to rescheduling of the scan, we will remind you of the risks associated with the procedure, and we will only proceed with your consent.

<sup>1</sup> Scheer, B. V., Perel, A. & Pfeiffer, U. J. Clinical review: Complications and risk factors of peripheral arterial catheters used for haemodynamic monitoring in anaesthesia and intensive care medicine. *Critical Care* 6, 199-204 (2002).