

Study Procedures with Associated Risks (SPAR)

Procedures are to be included in Section 5 of the consent template; the associated risks are to be included in Section 6 of the consent template.

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INPATIENT UNIT PROCEDURES

Biopsies

Fat biopsy: about 30 minutes Fast for 10 hours before the test

This procedure is used to sample fat cells from underneath the abdominal skin after cleansing the skin with iodine and using a local anesthetic. After cleansing the area, the doctor or Nurse Practitioner will make a small incision in the skin and introduce a needle under the skin to remove fat cells. About 1 gram (less than half a teaspoon size) of fat will be removed. After the biopsy is completed, the skin will be held closed with a sterile adhesive bandage; an antibiotic ointment will be applied.

Risks: Fat Biopsy: Mild to severe pain, soreness, and bruising, and a small scar are common risks. There is a small risk of a hematoma (collection of blood in the tissue) or infection at the biopsy site. Sterile technique will be used to minimize these risks and the biopsy site will be monitored closely.

Fat biopsy by Mercedes “mini liposuction technique”: about 30 minutes Fast for 10 hours before the test

This procedure is used to sample fat cells in your fat tissue from underneath the abdominal skin after cleansing the skin with iodine and using a local anesthetic. After cleansing the area, the doctor, Nurse Practitioner or Physician Assistant will make a small incision in the skin and introduce a needle under the skin to remove the fat pieces. The needle is connected to a large syringe that is used for suctioning the fat

pieces from the area. The needle will be moved back in forth to break up the fat tissue and be collected in the large syringe. About 1 gram (less than half a teaspoon size) of fat will be removed. After the biopsy is completed, the skin will be held closed with a sterile adhesive bandage; an antibiotic ointment will be applied.

Risks: Fat Biopsy “mini liposuction technique”: Mild to severe pain, soreness, and bruising, and a small scar are common risks. There is a small risk of a hematoma (collection of blood in the tissue) or infection at the biopsy site. Sterile technique will be used to minimize these risks and the biopsy site will be monitored closely. There is a possibility, if the thigh area is biopsied, that there may be a “dent” in the skin from removing fat from that area.

Muscle Biopsy: about 30 minutes Fast for 10 hours before the test

This procedure is used to sample muscle cells from underneath the skin of the leg. After cleaning the skin with iodine and using a local anesthetic, the doctor or nurse practitioner will make a small incision in the skin and introduce a needle under the skin to remove muscle cells. About 200-750 milligrams (less than a teaspoon size) of muscle will be removed. After the biopsy is completed, the skin will be held closed with a sterile adhesive bandage and an antibiotic ointment will be applied.

Risks: Muscle Biopsy: Mild to severe pain, soreness, bruising, and a small scar are common risks. There is a small risk of a hematoma (collection of blood in the tissue) or infection at the biopsy site. There is a slight risk that a superficial nerve may be cut; the nerve may heal, or it may result in a permanent loss of sensation in the skin at the biopsy site.

DLW with a prescribed diet:

Doubly Labeled Water (DLW):

This test measures your total energy expenditure over a 14 day period through the collection of urine samples. Total energy expenditure is used to calculate adherence to your diet. Prior to each DLW dose, you will be asked to provide a urine sample. You will then drink a glass of water that is enriched with two atoms which are called stable isotopes (non-radioactive). The rest of the day, you will be asked to provide periodic urine samples. Measures of the 2 atoms in your urine will tell us how many calories you are burning.

Risks: DLW: The extra neutron in the doubly labeled water is not radioactive and has no risk. Children and pregnant women have been given this “special” water.

DLW without a prescribed diet:

Doubly Labeled Water (DLW):

This test measures your total energy expenditure over a 14 day period through the collection of urine samples. Prior to each DLW dose, you will be asked to provide a

urine sample. You will then drink a glass of water that is enriched with two atoms which are called stable isotopes (non-radioactive). The rest of the day, you will be asked to provide periodic urine samples. Measures of the 2 atoms in your urine will tell us how many calories you are burning.

Risks: DLW: The extra neutron in the doubly labeled water is not radioactive and has no risk. Children and pregnant women have been given this “special” water.

Urine Collection: 24 hours

You will be given a plastic bottle and instructions on collecting all of your urine for a 24 hour period. There will be a paper on which you will record the date and time of your first and last collection. The urine should be returned to PBRC within 24 hours of collection and should be kept in a cool area.

Risks: There are no known risks of collecting urine into a container.

IV Procedure (Intravenous Procedure): Fast for 10 hours before the test

An IV line will be placed in your arm vein for blood draw purposes and will remain there throughout the testing. Blood will be drawn at specific times. **During your IV procedure, a small amount of your own blood (less than 1 teaspoon) will immediately be returned into your vein through the IV after each specimen is collected.**

Risks: IV Procedure: There is a possibility of pain, bruising, or infection at the site of the needle insertion for the IV line. Trained personnel minimize this risk.

OGTT (Oral Glucose Tolerance Test): 3 ½ hours Fast for 10 hours before the test

An IV line will be placed in your arm vein for blood draw purposes and will remain there throughout the testing. A blood sample will be drawn, and then you will drink a sugar solution consisting of 75 grams of glucose. Blood will be drawn at specific times after you consume the drink. Each blood sample will be about 1 tablespoon. (6 tablespoons total for the test). **During your IV procedure, a small amount of your own blood (less than 1 teaspoon) will immediately be returned into your vein through the IV after each specimen is collected.**

Risks: OGTT: There is a possibility of pain, bruising, or infection at the site of the needle insertion for the IV line. Trained personnel minimize this risk. The drink may make cause nausea, vomiting, abdominal bloating, or a headache.

Euglycemic IV clamp: Fast for 10 hours before the test

This procedure measures how the body responds to insulin. Insulin is normally produced by your body during meals and helps your body use sugar. There will be 2 IV lines, one in your arm and one in your hand on the opposite side. Small amounts of glucose and insulin will be infused into your arm. Your blood sugar level will be checked every 5-10 minutes from the IV in your hand to determine how much

glucose you should have to keep your blood sugar at a normal level. Your hand will be placed inside a warming box to increase skin temperature to about 105 degrees Fahrenheit. The temperature will be warm, but not uncomfortable. **During your IV procedure, a small amount of your own blood (less than 1 teaspoon) will immediately be returned into your vein through the IV after each specimen is collected**

For 30-45 minutes at the beginning and end of the test, we will place a clear plastic hood, through which fresh air flows, over your head to measure how many calories your body burns. Your urine will be collected throughout the test.

Risks: Euglycemic Clamp: There is a possibility of pain, bruising, or infection at the site of the needle insertion for the IV line. Trained personnel minimize this risk. There is a small risk of developing low blood sugar. If this happens it can make you feel hungry and your heart may beat faster. If not treated, low blood sugar can cause coma, seizures, and even death. Precautions are taken to avoid low blood sugar: A doctor will be present on site and a registered nurse will be available at all times during the clamp. Your blood sugar will be measured every 5-10 minutes, and dextrose (a sugar) will be administered intravenously as needed to prevent a drop in blood sugar levels. **If your blood sugar drops to a level considered unsafe, the procedure will be stopped immediately and dextrose will be given through the IV line.**

FSIGTT (Insulin sensitivity and secretion): about 4 hrs. Fast for 10 hours before the test

This test measures how well your body produces insulin in response to a sugar challenge. Insulin is normally produced in your body during meals and helps your body use sugar. There will be 2 IV lines, one line inserted into a vein in each of your arms. After collecting a baseline sample of your blood we will inject a solution containing sugar into one of the IV lines. We will then monitor your blood sugar and insulin levels by drawing blood from the other IV for 20 minutes. After 20 minutes we will inject insulin into the IV line and we continue to monitor your blood sugar and insulin levels for another 3 hours. No more than 4 ounces of blood are drawn. This is approximately $\frac{1}{4}$ of the amount taken during a blood donation in a blood bank. You will be given a meal immediately following this test. **During your IV procedure, a small amount of your own blood (less than 1 teaspoon) will immediately be returned into your vein through the IV after each specimen is collected**

Risks: There is a possibility of pain, bruising, or infection at the site of the needle insertion for the IV line. Trained personnel minimize this risk. You may also experience an increase in blood sugar (hyperglycemia) or low blood sugar (hypoglycemia).

Typical signs of increased blood sugar (hyperglycemia) include:

- Feeling very thirsty, dry mouth, loss of appetite, stomach pains, nausea or vomiting, blurred vision, difficulty breathing, weakness, sleepiness, a fruity smell on the breath, warm, dry, or flushed skin

Typical signs of low blood sugar (hypoglycemia) include:

- Hunger, sweating, shakiness, nausea or vomiting, mental confusion, drowsiness

If you experience these symptoms, consuming a sugar solution or eating should relieve them. Coma and seizure are serious consequences of hypoglycemia and occur rarely.

Microdialysis: About 4 hours (Fast for 10 hours before the test)

This test shows how much fat is broken down and released from the fat cells in your abdomen. A local anesthetic will be used to numb an area of your abdomen. A small plastic probe will be inserted into the fat tissue just beneath the skin of your belly, near the bellybutton. The probe is connected to a small pump (similar to an insulin pump used by diabetics) that will flush a sterile solution (isoproterenol) through the probe. The probe has a membrane allowing substances produced in your fat tissue to mix with the fluid in the probe which we will collect for analysis.

Risks: Microdialysis: As with any injection technique there may be minimal discomfort with the insertion and removal of the microdialysis probe. There may also be some bleeding or bruising at the site of insertion, and there is a remote risk of infection. However, every possible care is taken to minimize pain and infection. The probes are sterile and will be inserted by a physician, nurse practitioner, or registered nurse using a local anesthetic and aseptic technique. The small amount of isoproterenol inserted into the fat cell is not known to cause any risk.

Lumbar Puncture: The procedure may require an overnight fast.

This procedure is used to collect spinal fluid for testing of proteins that serve as markers for disease. The nursing staff will assist in positioning the patient and the patient will be asked to arch their back. After cleansing an area of the lower back with a cleansing solution, the physician will inject a numbing medication at the procedure site. When the skin is numb, a small needle will be inserted between the bones of the spine. The physician will then collect spinal fluid to send for testing. Up to 4 tsp. of fluid will be removed. The procedure will take approximately 20-30 minutes. Following the procedure, the patient will be asked to lie flat for 4 hours and instructed to avoid strenuous activity for the next 48 hours.

Risks: Lumbar Puncture: Pressure, mild pain, swelling, and infection at the insertion site. A mild headache and discomfort at the insertion site can last up to two days. If the headache is severe and prolonged, a blood patch may be required to stop the leak of spinal fluid.

OTHER PROCEDURES

IDEEA™: 30 minutes to place on the body and calibrate

The **Intelligent Device for Energy Expenditure and Activity (IDEEA™)** consists of five sensors that are placed on the body: one on each foot, one on each leg, and one in the center of the chest. The sensors are connected with small flexible wires to a small recorder (the recorder weighs about 1 pound 2 ounces), which will be clipped to an article of clothing. The IDEEA™ records bodily movement and provides an estimate of the amount of calories your body burns throughout the day. You cannot get the IDEEA™ wet, and you must remove it before showering/bathing (you must place it back on your body after showering/bathing, and this takes approximately three to five minutes).

Risks: IDEEA™: The sensors that are placed on the body to monitor activity are held in place with athletic tape that may cause mild irritation of the skin.

Ambulatory Blood Pressure Monitor (ABPM): This procedure records your blood pressure and heart rate. You will wear a device the size of a small camera connected to a blood pressure cuff on your arm for a period of seven days. The cuff of this device inflates automatically every 30 minutes during the day and every 60 minutes during the night. Upon inflation, the device will make a quiet noise and will cause pressure on your arm. At the end of the seven days, you will return to the clinic or Inpatient Unit at Pennington to have the monitor removed. Depending upon the amount of data collected, you may be asked to wear the monitor for additional days.

Risks: Ambulatory Blood Pressure Monitor (ABPM): There are no known risks associated with the blood pressure monitor. You may experience some discomfort having the cuff inflate every 30-60 minutes around the clock.

Bioelectrical Impedance Analysis (BIA) Measurements (about 10 minutes):

You will be asked to change into a gown and to remove all footwear and socks/stockings. Once changed and barefoot, you will be asked to stand on a scale (similar to a large gym scale), and you may be asked to hold on to hand electrodes on each side of the scale. You will be asked to step off of the scale once the measurement is complete (less than one minute).

Risks:

There is no known risk associated the BIA measurement.

BodPod (about 30 minutes):

This test will estimate the amount of fat mass and fat free mass in your body. You will be required to change into a swimsuit and swimcap that we will provide for this procedure. You can either bring and wear your own swimsuit, or PBRC will provide one for you. You will step onto a scale for a quick weight measurement. Next, you will sit inside of the system like you are sitting in a chair. The door of the system will be closed, but you will have a window so that you can see outside of the system while the measurements are completed. The test will be completed in about 15 minutes.

Risks:

There is no known risk associated with the BodPod measurement. There is a large window so you can easily view outside of the BodPod during the measurement; however, this measurement may be uncomfortable if you are claustrophobic.

PeaPod (about 10 minutes):

Your baby's body fat will be measured in a special incubator called a PEAPOD. Your baby will be undressed during this procedure and will wear a special soft lycra hat. The temperature inside the PEAPOD is about 88°F which is comfortable for an undressed baby. Your baby will be placed on a flat tray that slides into a clear plastic chamber while measurements are completed. You will be able to see your baby during the test through the clear top. This measurement will take approximately two minutes.

Risks:

There is no known risk associated with the PEAPOD measurement.

METABOLIC CORE PROCEDURES

Highlighted text below is optional respective to individual study protocol. The small chamber is 11' x 12'.

Metabolic Chamber: 23 hour stay: Fast for at least 10 hours before the test

The chamber is a room about 12' x 14' with 1 windows, a bed, a desk and chair, a TV/DVD player, a laptop with internet access, Wi-Fi, a telephone, toilet facilities, motion sensors and a camera. The chamber may have a treadmill or a stationary bike if exercise is required while in the chamber. You will be able to contact the staff at any time. You will be served 3 meals and a snack while you are there and you must eat all of the food provided. The sophisticated ventilation system allows your oxygen/carbon dioxide exchange to be measured, thereby showing the number of calories you are burning. While in the chamber, you will collect all your urine during that time.

Risks: Metabolic Chamber: You may experience some level of claustrophobia or discomfort from staying in the chamber and being continuously monitored by a camera. However you will not be locked in and will be able to open the door in case of an emergency. The camera has been installed for your own safety and no one is allowed access to the monitor except chamber personnel.

Core Temperature: Your internal body (core) temperature will be monitored by a small silicone coated radio capsule, about the size of a multi-vitamin, that you will swallow with water. This capsule will constantly send a radio signal to a recorder worn on your belt to record your core temperature for 24 hours. The capsule normally remains in the body for 24-72 hours and will be passed as you move your bowels.

Risks: Core Temp pill: There is no known risk associated with the pill. An individual should not have a MRI for 2 weeks following ingestion of the pill.

RMR (Resting Metabolic Rate): 1 hour (Fast for 10 hours before the test)

After you rest for 30 minutes, a clear plastic hood will be placed over your head and chest area. The hood is ventilated with fresh air. Your oxygen intake and carbon dioxide out-put will be measured for 30-45 minutes to determine how many calories you burn during the time you are being tested.

Risks: RMR: There is no known risk in having a RMR (resting metabolic rate). If you are claustrophobic, it may be uncomfortable to have the plastic hood over your upper body.

Infrared Imaging: ~45 minutes

Using a special camera that forms images based on surface temperature, this test measures how much heat your body produces when you are exposed to cold. For the test, you will remove all clothing above the waist. For thirty minutes, you will sit quietly in a private room to allow your skin surface temperature to reach the temperature of the room. You will then sit facing a camera, and multiple images will be recorded. Then, you will face away from the camera, and your back will be imaged for 30 seconds. Next, you will place your feet in a bucket of ice water (5 inches deep), and a recording of your back will be taken for an additional two minutes. Finally, you will remove your feet from the ice water, quickly turn around to face the camera, and multiple images will be immediately recorded. The entire procedure takes approximately 45 minutes.

Risks: Infrared Imaging: For healthy subjects, there is no known risk associated with dipping the feet into 5 inches of ice water; however, this may be uncomfortable to most people. There is a chance of experiencing lightheadedness and weakness during this procedure.

IMAGING PROCEDURES

Within 72 hours prior to performance of any study procedure that presents potential risk to a fetus, a serum or urine pregnancy test will be performed and negative results confirmed. This includes but is not limited to DXA scans, x-rays, MR scans, PET scans, and CT scans (PBRC SOP 827)

CT Scan (Computed Tomography): ~ 20 minutes

Computed Tomography (CT) scans are made with a special x-ray machine that acquires pictures (also called “slices”). These scans are performed to measure the body fat around your internal organs, the body fat located underneath your skin, and the fat found in your liver. Scans may also be completed on your thigh and/or calf to measure the fat in these regions. For this procedure, you will change into a gown. During the procedure, you will lie on your back on the scanner table with your arms resting comfortably above your head. You will be asked to hold your breath for about 18 seconds. During this time, the machine will acquire eight pictures. The

procedure takes approximately five minutes. This scan is for research purposes only and not for diagnostic treatment.

Risks: CT Scan: The amount of radiation used for this procedure is small. The radiation dose for a CT scan is less than 3.72mSV, which is equivalent to the radiation you are naturally exposed to in the environment throughout 15 months. Scans will not be performed on any subject who is pregnant. A pregnancy test will be performed within 72 hours before the scan on females of child-bearing-potential.

Lifetime radiation exposure: We are exposed to radiation in the environment on a daily basis; however, some scientists have suggested that humans have a lifetime maximum exposure limit. Exposure to radiation is not without risk, but it is difficult to quantify the exact amount someone is exposed to. By participating in this study you will be exposed to radiation that will add to this lifetime maximum exposure limit. If you believe you have been exposed to a significant amount of radiation as part of your occupation or due to treatment for a specific medical condition, you should notify the study team to discuss whether or not this study would be appropriate for you.

PET Scans

FDG PET scan (Positron Emission Tomography): You will be asked to not eat or drink anything for at least four hours before your FDG PET scan. When you arrive for your PET scan, we will ask whether you ate or drank anything over the past four hours, and if you have we will re-schedule the scan for a later date. You will be asked to go to the bathroom when you arrive for your PET scan. Then, you will be asked to lie down on a bed or reclining chair in a quiet room. Your blood pressure and heart rate will be measured. You will then get an injection of a substance that is used to make pictures of your brain. After the injection you will be asked to lie still and awake, looking straight ahead, for about 30 minutes. After that 30 minute period you will be asked to go to the bathroom again. You will then be asked to lie down on a bed and be put into the PET scanner, which is like a long tube. You will be asked to lie still, stay awake, and look straight ahead for about 30 minutes in the PET scanner. After that, you will be taken out of the PET scanner and asked to use the bathroom one last time. Your blood pressure and heart rate will be measured again. Then, the FDG PET scan will be over.

The FDG PET scan is done to understand how much energy your brain is using, and what parts of your brain are using it.

Amyloid PET scan (Positron Emission Tomography): When you arrive for the Amyloid PET scan, you will go to the bathroom, have your blood pressure and heart rate measured, and get an injection in a quiet room. You will be asked to wait, lying still and awake and staring straight ahead, in the quiet room for 50 minutes. You will then be asked to go to the bathroom again, and you will be put in

the PET scanner for 20 minutes. After that you will be taken out of the PET scanner, your heart rate and blood pressure will be measured, and we will ask you to go to the bathroom one last time. Then the amyloid PET scan will be over.

The Amyloid PET scan is done to understand whether your brain has amyloid in it. Amyloid is found in the brains of older adults who were diagnosed with Alzheimer's disease, but it is not yet clear what it means when it is found in the brains of people who are cognitively healthy.

PET Scan Risks:

Radiation Exposure: There is minimal risk associated with radiation exposure.

The PET scan includes an injection of a certain dose of a substance called a tracer. The tracer gives off radiation as it travels through your body, and the radiation is what makes it possible to make pictures of your brain. The amount of tracer you get is kept as low as possible while making high quality pictures of your brain possible. In addition, the PET scan includes a low-dose CT scan of your brain to improve the quality of the PET data. The amount of radiation in the CT scan is kept as low as possible while making high quality PET data possible. The Food and Drug Administration, part of the U.S. federal government, has set guidelines for how much radiation you can be exposed to during a research study like this one. You will be exposed to an amount of radiation that is within those guidelines.

- **Lifetime radiation exposure:** We are exposed to radiation in the environment on a daily basis; however, some scientists have suggested that humans have a lifetime maximum exposure limit. Exposure to radiation is not without risk, but it is difficult to quantify the exact amount someone is exposed to. By participating in this study you will be exposed to radiation that will add to this lifetime maximum exposure limit. If you believe you have been exposed to a significant amount of radiation as part of your occupation or due to treatment for a specific medical condition, you should notify the study team to discuss whether or not this study would be appropriate for you.
- **Injection:** There is a possibility of pain, bruising, or infection at the site of the injection. Trained personnel minimize this risk.
- **Lying still:** Lying still in the quiet room and in the PET scanner is not expected to be uncomfortable. Padding, pillows and blankets will be provided in order to make you feel as comfortable as possible. However, if you have orthopedic issues, there is a chance that lying still for the required period of time could be uncomfortable for you.
- **Confinement:** During the PET scan, you will be lying down on a table inside of a metal tube. The metal tube is a confined place. This might produce a feeling of claustrophobia, which can be distressing. If you have experienced claustrophobia in the past, you might become too distressed to complete the scan. If you become distressed during the scan due to confinement in the scanner tube, please alert the PET technician and the scan will be halted.

DXA (Dual energy x-ray absorptiometry):

Hologic Discovery A

Whole Body Scan: ~4 minutes

This scan measures the amount of bone, muscle, and fat in your body. The scan will be performed using a whole-body scanner. You will be required to wear a hospital gown, to remove all metal-containing objects from your body, and to lie down on the table. A scanner emitting low energy X-rays and a detector will pass along your body. You will be asked to remain completely still while the scan is in progress. The scan takes less than four minutes. This scan is for research purposes only and not for diagnostic treatment.

Risks: Whole Body Scan

The amount of radiation used for this procedure is very small. The radiation dose for a DXA scan is equivalent to the radiation you are naturally exposed to in the environment in less than one day. Scans will not be performed on any subject who is pregnant. A pregnancy test will be performed within 72 hours before the scan on females of child-bearing-potential.

Lifetime radiation exposure: We are exposed to radiation in the environment on a daily basis; however, some scientists have suggested that humans have a lifetime maximum exposure limit. Exposure to radiation is not without risk, but it is difficult to quantify the exact amount someone is exposed to. By participating in this study you will be exposed to radiation that will add to this lifetime maximum exposure limit. If you believe you have been exposed to a significant amount of radiation as part of your occupation or due to treatment for a specific medical condition, you should notify the study team to discuss whether or not this study would be appropriate for you.

Whole Body Scan for Babies (Birth to 1 Year of Age): ~Less than 2 minutes

This scan measures the amount of bone, muscle, and fat in your baby's body. The scan will be performed using a whole-body scanner. After removing any metal-containing objects on your baby's body, your baby will be swaddled, in a blanket, with arms by the sides and legs laying as flat and straight as possible. Your baby will be carefully positioned on his/her back on the scanner table. A scanner emitting low energy X-rays and a detector will pass along your baby's body. The duration of the scan will be dependent upon the length of your baby with an average duration of ~45 seconds. For babies who are not able to rest quietly and still during the scan, we will make up to 3 attempts to complete the scan. This scan is for research purposes only and not for diagnostic treatment.

Risks: Whole Body Scan for Babies (Birth to 1 Year of Age)

The amount of radiation used for this procedure is small. The radiation dose for a DXA scan is equivalent to the radiation your baby is naturally exposed to in the environment in less than one day.

Lifetime radiation exposure: We are exposed to radiation in the environment on a daily basis; however, some scientists have suggested that humans have a lifetime maximum exposure limit. Exposure to radiation is not without risk, but it is difficult to quantify the exact amount someone is exposed to. By participating in this study your baby will be exposed to radiation that will add to this lifetime maximum exposure limit. If you believe your baby was exposed to a significant amount of radiation as part of treatment for a medical condition, or if you believe you were exposed to significant radiation during your pregnancy with this baby (because of your occupation or medical treatment), you should notify the study team to discuss whether or not this study would be appropriate for your baby.

Hip Scan: ~10 minutes

This scan measures bone density at your hip. The scan will be performed using a whole-body scanner. You will be required to wear a hospital gown, to remove all metal-containing objects from your body, and to lie down on the table. A plastic block will be placed under your feet. Depending upon which hip is to be scanned, one of your feet will be rotated inward and positioned against the block using a Velcro strap. A scanner emitting low energy X-rays and a detector will pass along your body. You will be asked to remain completely still while the scan is in progress. The scan takes less than four minutes. This scan is for research purposes only and not for diagnostic treatment.

Risks: Hip Scan

The amount of radiation used for this procedure is very small. The radiation dose for a DXA scan is equivalent to the radiation you are naturally exposed to in the environment in ten days. Scans will not be performed on any subject who is pregnant. A pregnancy test will be performed within 72 hours before the scan on females of child-bearing potential.

Lifetime radiation exposure: We are exposed to radiation in the environment on a daily basis; however, some scientists have suggested that humans have a lifetime maximum exposure limit. Exposure to radiation is not without risk, but it is difficult to quantify the exact amount someone is exposed to. By participating in this study you will be exposed to radiation that will add to this lifetime maximum exposure limit. If you believe you have been exposed to a significant amount of radiation as part of your occupation or due to treatment for a specific medical condition, you should notify the study team to discuss whether or not this study would be appropriate for you.

Spine Scan: ~10 minutes

This scan measures bone density at your spine. The scan will be performed using a whole-body scanner. You will be required to wear a hospital gown, to remove all metal-containing objects from your body, and to lie down on the table. A foam block will be placed under your knees in order to keep your spine straight. A scanner emitting low energy X-rays and a detector will pass along your body. You will be

asked to remain completely still while the scan is in progress. The scan takes less than four minutes. This scan is for research purposes only and not for diagnostic treatment.

Risks: Spine Scan

The amount of radiation used for this procedure is very small. The radiation dose for a DXA scan is equivalent to the radiation you are naturally exposed to in the environment in ten days. Scans will not be performed on any subject who is pregnant. A pregnancy test will be performed within 72 hours before the scan on females of child-bearing potential.

Lifetime radiation exposure: We are exposed to radiation in the environment on a daily basis; however, some scientists have suggested that humans have a lifetime maximum exposure limit. Exposure to radiation is not without risk, but it is difficult to quantify the exact amount someone is exposed to. By participating in this study you will be exposed to radiation that will add to this lifetime maximum exposure limit. If you believe you have been exposed to a significant amount of radiation as part of your occupation or due to treatment for a specific medical condition, you should notify the study team to discuss whether or not this study would be appropriate for you.

Forearm Scan: ~10 minutes

This scan measures bone density at your forearm. The scan will be performed using a whole-body scanner. You will be required to wear a hospital gown and to remove all metal-containing objects from your body. You will sit in a chair that has been placed next to the scanner table. You will be positioned with your non-dominant forearm (the arm you do not write with) in the middle of the table, and a measurement of this arm will be taken. A scanner emitting low energy X-rays and a detector will pass over your arm. You will be asked to remain completely still while the scan is in progress. The scan takes less than four minutes. This scan is for research purposes only and not for diagnostic treatment.

Risks: Forearm Scan

The amount of radiation used for this procedure is very small. The radiation dose for a DXA scan is equivalent to the radiation you are naturally exposed to in the environment in approximately one day. Scans will not be performed on any subject who is pregnant. A pregnancy test will be performed within 72 hours before the scan on females of child-bearing potential.

Lifetime radiation exposure: We are exposed to radiation in the environment on a daily basis; however, some scientists have suggested that humans have a lifetime maximum exposure limit. Exposure to radiation is not without risk, but it is difficult to quantify the exact amount someone is exposed to. By participating in this study you will be exposed to radiation that will add to this lifetime maximum exposure limit. If you believe you have been exposed to a significant amount of radiation as part of your occupation or due to treatment for a specific medical condition, you should notify the study team to discuss whether or not this

study would be appropriate for you.

GE iDXA

Whole Body Scan GE iDXA (Dual energy x-ray absorptiometry): ~10 minutes

This scan measures the amount of bone, muscle, and fat in your body. The scan will be performed using a whole-body scanner. You will be required to wear a hospital gown, to remove all metal-containing objects from your body, and to lie down on the table. You will be carefully positioned on the table, and your legs will be placed together using two Velcro straps. A scanner emitting low energy X-rays and a detector will pass along your body. You will be asked to remain completely still while the scan is in progress. The scan takes approximately ten minutes. This scan is for research purposes only and not for diagnostic treatment.

Risks: Whole Body Scan GE iDXA (Dual energy x-ray absorptiometry)

The amount of radiation used for this procedure is very small. The radiation dose for this scan is equivalent to the radiation you are naturally exposed to in the environment in less than one day. Scans will not be performed on any subject who is pregnant. A pregnancy test will be performed within 72 hours before the scan on females of child-bearing potential.

Lifetime radiation exposure: We are exposed to radiation in the environment on a daily basis; however, some scientists have suggested that humans have a lifetime maximum exposure limit. Exposure to radiation is not without risk, but it is difficult to quantify the exact amount someone is exposed to. By participating in this study you will be exposed to radiation that will add to this lifetime maximum exposure limit. If you believe you have been exposed to a significant amount of radiation as part of your occupation or due to treatment for a specific medical condition, you should notify the study team to discuss whether or not this study would be appropriate for you.

Whole Body Scan GE iDXA for Babies (Birth to 1 Year of Age): ~Less than 2 minutes

This scan measures the amount of bone, muscle, and fat in your baby's body. The scan will be performed using a whole-body scanner. After removing any metal-containing objects on your baby's body, your baby will be swaddled, in a blanket, with arms by the sides and legs laying as flat and straight as possible. Your baby will be carefully positioned on his/her back on the scanner table. A scanner emitting low energy X-rays and a detector will pass along your baby's body. The duration of the scan will be dependent upon the length of your baby with an average duration of ~45 seconds. For babies who are not able to rest quietly and still during the scan, we will make up to 3 attempts to complete the scan. This scan is for research purposes only and not for diagnostic treatment.

Risks: Whole Body Scan GE iDXA for Babies (Birth to 1 Year of Age)

The amount of radiation used for this procedure is small. The radiation dose

for a DXA scan is equivalent to the radiation your baby is naturally exposed to in the environment in less than one day.

Lifetime radiation exposure: We are exposed to radiation in the environment on a daily basis; however, some scientists have suggested that humans have a lifetime maximum exposure limit. Exposure to radiation is not without risk, but it is difficult to quantify the exact amount someone is exposed to. By participating in this study your baby will be exposed to radiation that will add to this lifetime maximum exposure limit. If you believe your baby was exposed to a significant amount of radiation as part of treatment for a medical condition, or if you believe you were exposed to significant radiation during your pregnancy with this baby (because of your occupation or medical treatment), you should notify the study team to discuss whether or not this study would be appropriate for your baby.

Hip Scan GE iDXA (Dual energy x-ray absorptiometry): ~10 minutes

This scan measures bone density at your hip. The scan will be performed using a whole-body scanner. You will be required to wear a hospital gown, to remove all metal-containing objects from your body, and to lie down on the table. You will be carefully positioned on the table. A plastic block will be placed between your feet, and your feet will be rotated inward and positioned against the block using a Velcro strap. A scanner emitting low energy X-rays and a detector will pass along the area of your hip. You will be asked to remain completely still while the scan is in progress. The scan takes approximately ten minutes. This scan is for research purposes only and not for diagnostic treatment.

Risks: Hip Scan GE iDXA (Dual energy x-ray absorptiometry)

The amount of radiation used for this procedure is small. The radiation dose for this scan is equivalent to the radiation you are naturally exposed to in the environment in approximately ten days. Scans will not be performed on any subject who is pregnant. A pregnancy test will be performed within 72 hours before the scan on females of child-bearing potential.

Lifetime radiation exposure: We are exposed to radiation in the environment on a daily basis; however, some scientists have suggested that humans have a lifetime maximum exposure limit. Exposure to radiation is not without risk, but it is difficult to quantify the exact amount someone is exposed to. By participating in this study you will be exposed to radiation that will add to this lifetime maximum exposure limit. If you believe you have been exposed to a significant amount of radiation as part of your occupation or due to treatment for a specific medical condition, you should notify the study team to discuss whether or not this study would be appropriate for you.

Spine Scan GE iDXA (Dual energy x-ray absorptiometry): ~10 minutes

This scan measures bone density at your spine. The scan will be performed using a whole-body scanner. You will be required to wear a hospital gown, to remove all

metal-containing objects from your body, and to lie down on the table. You will be carefully positioned on the table, and a scanner emitting low energy X-rays and a detector will pass along your spine. You will be asked to remain completely still while the scan is in progress. The scan takes approximately ten minutes. This scan is for research purposes only and not for diagnostic treatment.

Risks: Spine Scan GE iDXA (Dual energy x-ray absorptiometry)

The amount of radiation used for this procedure is small. The radiation dose for this scan is equivalent to the radiation you are naturally exposed to in the environment in approximately ten days. Scans will not be performed on any subject who is pregnant. A pregnancy test will be performed within 72 hours before the scan on females of child-bearing potential.

Lifetime radiation exposure: We are exposed to radiation in the environment on a daily basis; however, some scientists have suggested that humans have a lifetime maximum exposure limit. Exposure to radiation is not without risk, but it is difficult to quantify the exact amount someone is exposed to. By participating in this study you will be exposed to radiation that will add to this lifetime maximum exposure limit. If you believe you have been exposed to a significant amount of radiation as part of your occupation or due to treatment for a specific medical condition, you should notify the study team to discuss whether or not this study would be appropriate for you.

Forearm Scan GE iDXA (Dual energy x-ray absorptiometry): ~10 minutes

This scan measures bone density at your forearm. The scan will be performed using a whole-body scanner. You will be required to wear a hospital gown and to remove all metal-containing objects from your body and to lie down on the table. You will be carefully positioned on the table, and your non-dominant (the arm you do not write with) forearm will be positioned and secured on a plastic block using two Velcro straps. A scanner emitting low energy X-rays and a detector will pass over your arm. You will be asked to remain completely still while the scan is in progress. The scan takes approximately ten minutes. This scan is for research purposes only and not for diagnostic treatment.

Risks: Forearm Scan GE iDXA (Dual energy x-ray absorptiometry)

The amount of radiation used for this procedure is very small. The radiation dose for this scan is equivalent to the radiation you are naturally exposed to in the environment in approximately one day. Scans will not be performed on any subject who is pregnant. A pregnancy test will be performed within 72 hours before the scan on females of child-bearing potential.

Lifetime radiation exposure: We are exposed to radiation in the environment on a daily basis; however, some scientists have suggested that humans have a lifetime maximum exposure limit. Exposure to radiation is not without risk, but it is difficult to quantify the exact amount someone is exposed to. By participating in this study you will be exposed to radiation that will add to this lifetime

maximum exposure limit. If you believe you have been exposed to a significant amount of radiation as part of your occupation or due to treatment for a specific medical condition, you should notify the study team to discuss whether or not this study would be appropriate for you.

QuickScan: about 4 minutes

This procedure uses a magnet to measure the amount of fat, muscle, and water in your body. You will lie on a table wearing a hospital gown with no objects containing metal. You will be asked to keep your hands on top of your body as the table is slowly pushed into the QuickScan machine and the see-through mesh door is closed. You will be asked to remain completely still while the scan is in progress. The scan takes less than four minutes. There is no noise associated with this procedure. This scan is for research purposes only and not for diagnostic treatment.

Risks: QuickScan: There is no radiation associated with the QuickScan and no known risk. The magnet can interfere with some active implanted devices such as cardiac pacemakers, cardiac defibrillators, implanted medical pumps and implanted nerve stimulating devices. Volunteers with removable active devices such as insulin pumps or hearing aids should remove them before starting the procedure. Scans will not be performed on any subject who is pregnant. A pregnancy test will be performed within 72 hours before the scan on females of child-bearing potential.

Optical Spectroscopy: 45 minutes (Fast for 10 hours before the test)

You will lie down on an examination table in a dimly lit room for a total of approximately 45 minutes. During this time, two small probes will be placed against the skin on your thigh. Light will travel through the probes into the muscle in your thigh to measure the amount of oxygen in your muscle. There is no pain associated with this light. It simply appears as frequent flashes of light.

After the probes are placed on your skin, you will breathe room air for three minutes. You will then breathe oxygen through a mask for the remainder of the test (34 minutes). After five minutes of breathing oxygen, a blood pressure cuff will be inflated on your thigh. The cuff will remain inflated for 17 minutes. After the cuff is released, you will continue breathing oxygen for 12 minutes. Throughout the test, you will need to remain still; however, you may breathe, talk, etc. as usual. This scan is for research purposes only and not for diagnostic treatment.

Risks: Optical Spectroscopy: There is a small risk for blood clot formation caused by the inflation of the blood pressure cuff; however, the risk is very small in the absence of risk factors (exclusion criteria). In addition, inflation of the blood pressure cuff may cause discomfort and pain. This will pass after the cuff is released. The cuff can be deflated immediately upon your request.

Magnetic Resonance Imaging (MRI) and Magnetic Resonance Spectrometry (MRS) Risks for MRI are listed below the various MRI procedure descriptions.

MRI Leg Muscle Mass: 15 minutes

This scan takes an image of the muscles in your thigh from the hips to your knees or in your calf from the knee to the ankle. You will change into a hospital gown and remove all objects containing metal from your body. You will lie on your back on the scanner table in a comfortable position with your arms resting on your stomach. You will then be moved into the magnet, and the scan will proceed. The scan will take approximately 15 minutes. During the scan, you will hear loud tapping noises. You will be given head phones for protection from the scanner noise and can listen to music during the scan if desired. You will also be given a call button should you need the MRI tech during the exam. This scan is for research purposes only and not for diagnostic treatment.

MRI Brain T2 Axial: 15 minutes

This scan is performed to measure the size of your brain and lasts approximately ten minutes. You will change into a hospital gown and remove all objects containing metal from your body. During the scan, you will lie on your back on the scanner table with your head in a cradle. The scanner table will then move you into the magnet. During the scan, you will hear loud tapping noises. You will be given head phones for protection from the scanner noise and can listen to music during the scan if desired. You will also be given a call button should you need the MRI tech during the exam. This scan is for research purposes only and not for diagnostic treatment.

MRI Brain XL: 45 minutes

This scan is performed to measure blood flow in your brain and lasts approximately 45 minutes. You will change into a hospital gown and remove all objects containing metal from your body. During the scan, you will lie on your back on the scanner table with your head in a cradle. The scanner table will then move you into the magnet. During the scan, you will hear loud tapping noises. You will be given head phones for protection from the scanner noise and can listen to music during the scan if desired. You will also be given a call button should you need the MRI tech during the exam. This scan is for research purposes only and not for diagnostic treatment.

MRI Brain AD: 45 – 60 minutes

This scan is performed to image the structure of your brain and lasts approximately 45-60 minutes. You will change into a hospital gown and remove all objects containing metal from your body. During the scan, you will lie on your back on the scanner table with your head in a cradle. The scanner table will then move you into the magnet. During the scan, you will hear loud tapping noises. You will be given headphones for protection from the scanner noise and can listen to music during the scan if desired. You will also be given a call button should you need the MRI tech during the exam. This scan is for research purposes only and not for diagnostic treatment.

MRI Muscle- Full Body: 60-75 minutes

This scan measures muscle content throughout your body. You will change into a hospital gown and remove all objects containing metal from your body. You will lie on your back on the scanner table with your arms above your head. The scan will start at your fingertips and proceed down to your feet. Each area of the body scanned will be put inside of a stationary torso/array coil. A total of seven sets of scans will be completed. A few of the sets involve breath holds for approximately 16 seconds. The total scan time is approximately 60-75 minutes. During the scan, you will hear loud tapping noises. You will be given ear plugs for protection from the scanner noise. You will also be given a call button should you need the MRI tech during the exam. This scan is for research purposes only and not for diagnostic treatment.

MRI Organ size-VAT: 30 minutes

This scan is done to measure the amount of fat around your organs, as well as the size of your organs. You will change into a hospital gown and remove all objects containing metal from your body. You will lie on your back on the scanner table with your arms above your head. A large coil will be placed around your upper abdomen. You will then be moved into the magnet and will be instructed to hold your breath 3-5 times (once for six seconds, once for 13 seconds, and 2-3 times for about 18 seconds). After the upper abdominal scans are completed, you will be moved up on the table, and the coil will be placed over your lower abdomen. The same scans will be acquired over this area with the same 3-5 breath holds. The total scan time for this procedure is approximately 30-minutes. During the scan, you will hear loud tapping noises. You will be given head phones for protection from the scanner noise and can listen to music during the scan if desired. You will also be given a call button should you need the MRI tech during the exam. This scan is for research purposes only and not for diagnostic treatment.

MRI Abdomen: 30 minutes

This scan measures the amount of fat in your abdomen. You will change into a hospital gown and remove all objects containing metal from your body. You will lie on your back on the scanner table with your arms above your head. A large coil will be placed around your upper abdomen. You will then be moved into the magnet and will be instructed to hold your breath 4-5 times (once for six seconds, once for 13 seconds, and 2-3 times for about 18 seconds). After the upper abdominal scans are completed, you will be moved up on the table, and the coil will be placed over your lower abdomen. The same scans will be acquired over this area with the same 4-5 breath holds. The total scan time for this procedure is approximately 30 minutes. During the scan, you will hear loud tapping noises. You will be given headphones for protection from the scanner noise and can listen to music during the scan if desired. You will also be given a call button should you need the MRI Technician during the exam. This scan is for research purposes only and not for diagnostic treatment.

MRI Pelvis: 30 minutes

This scan is performed to view the ovaries and individual follicles within the ovaries. You will change into a hospital gown and remove all objects containing metal from your body. You will lie on your back on the scanner table with your arms resting on your chest. A large coil will be placed over your pelvis. The table will then move you into the magnet where a series of images will be taken. The entire procedure takes approximately 30 minutes. During the scan, you will hear loud tapping noises. You will be given head phones for protection from the scanner noise and can listen to music during the scan if desired. You will also be given a call button should you need the MRI tech during the exam. This scan is for research purposes only and not for diagnostic treatment.

MRI Thymus: 30 minutes

This scan is done to image the thymus gland (located in the upper chest under the breast bone). You will change into a hospital gown and remove all objects containing metal from your body. You will lie on your back on the scanner table with your arms above your head. A large coil will be placed over your chest. The table will then move you into the magnet where images will be taken. The scan takes approximately 30 minutes. During the scan, you will hear loud tapping noises. You will be given head phones for protection from the scanner noise and can listen to music during the scan if desired. You will also be given a call button should you need the MRI tech during the exam. This scan is for research purposes only and not for diagnostic treatment.

MRS IHL (Intrahepatic lipid): 20-30 minutes

This scan measures the amount of fat in your liver. You will change into a hospital gown and remove all objects containing metal from your body. You will be placed on the scanner table head first and on your stomach. The table will move you into the magnet where data will be obtained. The scan will last for approximately 20-30 minutes. During the scan, you will hear loud tapping noises. You will be given head phones for protection from the scanner noise and can listen to music during the scan if desired. You will also be given a call button should you need the MRI tech during the exam. This scan is for research purposes only and not for diagnostic treatment.

MRS IMCL (Intramyocellular lipid): 60 minutes

This scan measures the amount of fat in your muscle fibers. You will change into a hospital gown and remove all objects containing metal from your body. You will lie on your back on the scanner table with the right leg in a special coil. The top part of the coil will then be placed over your calf. Cushions will be inserted around the calf to help keep the leg as still as possible. The table will then move you into the scanner where a series of several scans will be obtained. The entire procedure will last approximately 60 minutes. During the scan, you will hear loud tapping noises. You will be given head phones for protection from the scanner noise and can listen to music during the scan if desired. You will also be given a call button should you need the MRI tech during the exam. This scan is for research purposes only and not for diagnostic treatment.

MRI Lipoma: 20 minutes

This scan measures the size of a lipoma, a non-cancerous tumor made of fat cells, in your body. You will change into a hospital gown and remove all objects containing metal from your body. You will be positioned on the scanner table according to the location of the lipoma. You will then be moved into the magnet for scanning. The scan will last for approximately 20 minutes. During the scan, you will hear loud tapping noises. You will be given head phones for protection from the scanner noise and can listen to music during the scan if desired. You will also be given a call button should you need the MRI tech during the exam. This scan is for research purposes only and not for diagnostic treatment.

MRI Epicardial Fat: 60-90 minutes

This scan measures the amount of fat around your heart. You will change into a hospital gown and remove all objects containing metal from your body. You will lie on your back on the scanner table with your arms above your head. Four electrodes will be placed on the skin of your chest, and a large coil will be placed around your upper abdomen. In addition, a soft strap will be placed over your stomach. You will then be moved into the magnet. Throughout the scan, you will be instructed to hold your breath at certain time intervals. These breath holds will not exceed ~15 seconds. During the scan, you will hear loud tapping noises. You will be given head phones for protection from the scanner noise. You will also be given a call button should you need the MRI tech during the exam. This scan is for research purposes only and not for diagnostic treatment.

MRI Risks:

There are no known biological risks associated with magnetic resonance scanning. It has been used routinely for over 20 years. It produces side effects in very few situations. Those situations include:

Metal: Because the magnetic resonance machine uses a magnetic field, it can move any metallic objects that are inside the body. This disruption of metal inside the body is extremely dangerous to you and may even be life threatening. If you think you may have a cardiac stent, cochlear implant, metallic implant, metallic piercings, shrapnel, or any other metallic material in your body, it is of utmost importance that you alert the study coordinator or MR technician. If you have metallic materials in your body that cannot be removed, study staff will evaluate the safety of MRI scanning in the presence of those metallic materials and may exclude you from MRI for that reason.

Electronics: Magnetic resonance imaging involves the use of radio frequency energy that can disrupt the functioning of electronic devices. If you think you might possess a pacemaker or any other electronic medical device inside your body, it is of utmost importance that you inform the study coordinator or MR technician. If you have any such electronic devices we will exclude you from this study for your safety.

Tattoos and cosmetics: Some tattoos and cosmetics contain metallic materials that can heat up during scanning, especially if they are located on the part of the body being scanned. If the metallic material heats up enough, you may feel an uncomfortable burning sensation, and a skin burn may develop. If you have any tattoos or cosmetics that might contain metallic materials, please alert the study coordinator or MR technician. If you feel a burning sensation on your skin, alert the study coordinator or MR technician. In some cases, the amount of metallic material in the area being scanned is so excessive that the scan must be stopped. In other cases, a cold compress placed over the metallic material will be used to prevent the burning sensation.

Confinement: During the MR scan, you will be lying down on a table inside of a metal tube. The metal tube is a confined place. This might produce a feeling of claustrophobia, which can be distressing. If you have experienced claustrophobia in the past, you might become too distressed to complete the scan. If you become distressed during the scan due to confinement in the scanner tube, please alert the MR technician and the scan will be halted.

Noise: The MRI machine creates a loud, rhythmic noise that sounds like grinding or churning. This can be distressing to those who are sensitive to loud noises. You will be provided with earplugs to reduce the noise. But if you find the machine noises distressing, alert the MR technician and the scan can be halted.

Peripheral nerve stimulation: During the MR scan, the magnetic field around your body goes through rapid changes. These changes are all within safety limits set by the Food and Drug Administration. But, some people experience twitching in the nerves of their arms or legs as a result of these magnetic field changes. This twitching is generally not painful, and it stops at the end of the MR scan. But the feeling of inadvertent muscle twitching may make you feel disoriented or uncomfortable. If you experience this and wish to stop the scan as a result, please tell the MR technician.

Physical frailty: The MR technologist performing the scan has received extensive training in how to position all participants, including elderly ones, in the MRI machine safely and comfortably. However, some older people have a more difficult time walking or moving their bodies due to arthritis and other conditions. There is a slight chance that these individuals could feel discomfort or fall during transitions into or out of the MRI scanner. The technologist will insure that the walkway to the scanner is safe for you to walk on, will place cushioning on the scanner table for your comfort, and will carefully guide your movements around the scanner to minimize this risk.

Venous thromboembolism: In some elderly or obese individuals, lying down perfectly still for multiple hours can slightly increase the risk that blood clots develop in the blood vessels. These blood clots can be hazardous to your health. The technologist will make every effort to keep your time in the MRI

machine as short as possible to reduce this risk. Also, you will have breaks during your time in the MRI machine, and during these breaks the technologist will ask you to move your arms and legs and reposition your body to get comfortable. Moving around in this way reduces your risk of blood clots.

MRS FRS ATPase: 45 minutes - Fast for 10 hours before the test

This scan measures energy transfer in muscle. You will change into a hospital gown and remove all objects containing metal from your body. You will lie on your back on the scanner table, and a blood pressure cuff will be placed on your upper thigh. A small, metal coil will also be taped to the same leg below the cuff. After approximately 25 minutes, the blood pressure cuff will be inflated. The blood pressure cuff may become uncomfortable but is not unbearable. After 15 minutes, the cuff will be deflated, and you will rest for another ~10 minutes during the scan. The total scan time for this procedure is approximately 50 minutes. During the scan, you will hear loud tapping noises. You will be given head phones for protection from the scanner noise and can listen to music during the scan if desired. You will also be given a call button should you need the MRI tech during the exam. This scan is for research purposes only and not for diagnostic treatment.

Risks: MRS FRS_ATPase: 45 minutes (Fast for 10 hours before the test)

There is a small risk for blood clot formation caused by the inflation of the blood pressure cuff; however the risk is very small in the absence of risk factors (exclusion criteria). In addition, inflation of the blood pressure cuff may cause discomfort and pain. This will pass after the cuff is released. The cuff can be deflated immediately upon your request.

There are no known biological risks associated with magnetic resonance scanning. It has been used routinely for over 20 years. It produces side effects in very few situations. Those situations include:

Metal: Because the magnetic resonance machine uses a magnetic field, it can move any metallic objects that are inside the body. *This disruption of metal inside the body is extremely dangerous to you and may even be life threatening.* If you think you may have a cardiac stent, cochlear implant, metallic implant, metallic piercings, shrapnel, or any other metallic material in your body, it is of utmost importance that you alert the study coordinator or MR technician. If you have metallic materials in your body that cannot be removed, we will exclude you from this study for your safety.

Electronics: Magnetic resonance imaging involves the use of radio frequency energy that can disrupt the functioning of electronic devices. If you think you might possess a pacemaker or any other electronic medical device inside your body, it is of utmost importance that you inform the study coordinator or MR technician. If you have any such electronic devices we will exclude you from this study for your safety.

Tattoos and cosmetics: Some tattoos and cosmetics contain metallic materials that can heat up during scanning, especially if they are located on the part of the body being scanned. If the metallic material heats up enough, you may feel an uncomfortable burning sensation, and a skin burn may develop. If you have any tattoos or cosmetics that might contain metallic materials, please alert the study coordinator or MR technician. If you feel a burning sensation on your skin, alert the study coordinator or MR technician. In some cases, the amount of metallic material in the area being scanned is so excessive that the scan must be stopped. In other cases, a cold compress placed over the metallic material will be used to prevent the burning sensation.

Confinement: During the MR scan, you will be lying down on a table inside of a metal tube. The metal tube is a confined place. This might produce a feeling of claustrophobia, which can be distressing. If you have experienced claustrophobia in the past, you might become too distressed to complete the scan. If you become distressed during the scan due to confinement in the scanner tube, please alert the MR technician and the scan will be halted.

Noise: The MRI machine creates a loud, rhythmic noise that sounds like grinding or churning. This can be distressing to those who are sensitive to loud noises. You will be provided with earplugs to reduce the noise. But if you find the machine noises distressing, alert the MR technician and the scan can be halted.

Peripheral nerve stimulation: During the MR scan, the magnetic field around your body goes through rapid changes. These changes are all within safety limits set by the Food and Drug Administration. But, some people experience twitching in the nerves of their arms or legs as a result of these magnetic field changes. This twitching is generally not painful, and it stops at the end of the MR scan. But the feeling of inadvertent muscle twitching may make you feel disoriented or uncomfortable. If you experience this and wish to stop the scan as a result, please tell the MR technician.

Physical frailty: The MR technologist performing the scan has received extensive training in how to position all participants, including elderly ones, in the MRI machine safely and comfortably. However, some older people have a more difficult time walking or moving their bodies due to arthritis and other conditions. There is a slight chance that these individuals could feel discomfort or fall during transitions into or out of the MRI scanner. The technologist will insure that the walkway to the scanner is safe for you to walk on, will place cushioning on the scanner table for your comfort, and will carefully guide your movements around the scanner to minimize this risk.

Venous thromboembolism: In some elderly or obese individuals, lying down perfectly still for multiple hours can slightly increase the risk that blood clots develop in the blood vessels. These blood clots can be hazardous to your health. The technologist will make every effort to keep your time in the MRI machine as short as possible to reduce this risk. Also, you will have breaks during your time in the MRI machine, and during these breaks the technologist will ask you to move your arms and legs and reposition

your body to get comfortable. Moving around in this way reduces your risk of blood clots.

MRS FRS ATPmax: 60 minutes

This scan measures energy transfer in muscle. You will change into a hospital gown and remove all objects containing metal from your body. You will lie on your back on the scanner table, and a small metal coil will be taped to your leg in the lower thigh area. You will then be placed into the magnet. During this exercise period, you will be asked to do a kicking motion repeatedly as hard and fast as you can in order to contract and tire your thigh muscle. Data will be obtained before, during, and after a 30-second period of exercise. The total scan time is approximately 60 minutes. During the scan, you will hear loud tapping noises. You will be given head phones for protection from the scanner noise and can listen to music during the scan if desired. You will also be given a call button should you need the MRI tech during the exam. This scan is for research purposes only and not for diagnostic treatment.

Risks: MRS FRS_ATPmax: 60 minutes

Repetitively contracting your thigh muscle may cause muscle soreness.

There are no known biological risks associated with magnetic resonance scanning. It has been used routinely for over 20 years. It produces side effects in very few situations. Those situations include:

Metal: Because the magnetic resonance machine uses a magnetic field, it can move any metallic objects that are inside the body. *This disruption of metal inside the body is extremely dangerous to you and may even be life threatening.* If you think you may have a cardiac stent, cochlear implant, metallic implant, metallic piercings, shrapnel, or any other metallic material in your body, it is of utmost importance that you alert the study coordinator or MR technician. If you have metallic materials in your body that cannot be removed, we will exclude you from this study for your safety.

Electronics: Magnetic resonance imaging involves the use of radio frequency energy that can disrupt the functioning of electronic devices. If you think you might possess a pacemaker or any other electronic medical device inside your body, it is of utmost importance that you inform the study coordinator or MR technician. If you have any such electronic devices we will exclude you from this study for your safety.

Tattoos and cosmetics: Some tattoos and cosmetics contain metallic materials that can heat up during scanning, especially if they are located on the part of the body being scanned. If the metallic material heats up enough, you may feel an uncomfortable burning sensation, and a skin burn may develop. If you have any tattoos or cosmetics that might contain metallic materials, please alert the study coordinator or MR technician. If you feel a burning sensation on your skin, alert the study coordinator or MR technician. In some cases, the amount of metallic material in the area being scanned is so excessive that the scan must be stopped. In other cases, a cold compress placed over the metallic material will be used to prevent the burning sensation.

Confinement: During the MR scan, you will be lying down on a table inside of a metal tube. The metal tube is a confined place. This might produce a feeling of claustrophobia, which can be distressing. If you have experienced claustrophobia in the past, you might become too distressed to complete the scan. If you become distressed during the scan due to confinement in the scanner tube, please alert the MR technician and the scan will be halted.

Noise: The MRI machine creates a loud, rhythmic noise that sounds like grinding or churning. This can be distressing to those who are sensitive to loud noises. You will be provided with earplugs to reduce the noise. But if you find the machine noises distressing, alert the MR technician and the scan can be halted.

Peripheral nerve stimulation: During the MR scan, the magnetic field around your body goes through rapid changes. These changes are all within safety limits set by the Food and Drug Administration. But, some people experience twitching in the nerves of their arms or legs as a result of these magnetic field changes. This twitching is generally not painful, and it stops at the end of the MR scan. But the feeling of inadvertent muscle twitching may make you feel disoriented or uncomfortable. If you experience this and wish to stop the scan as a result, please tell the MR technician.

Physical frailty: The MR technologist performing the scan has received extensive training in how to position all participants, including elderly ones, in the MRI machine safely and comfortably. However, some older people have a more difficult time walking or moving their bodies due to arthritis and other conditions. There is a slight chance that these individuals could feel discomfort or fall during transitions into or out of the MRI scanner. The technologist will insure that the walkway to the scanner is safe for you to walk on, will place cushioning on the scanner table for your comfort, and will carefully guide your movements around the scanner to minimize this risk.

Venous thromboembolism: In some elderly or obese individuals, lying down perfectly still for multiple hours can slightly increase the risk that blood clots develop in the blood vessels. These blood clots can be hazardous to your health. The technologist will make every effort to keep your time in the MRI machine as short as possible to reduce this risk. Also, you will have breaks during your time in the MRI machine, and during these breaks the technologist will ask you to move your arms and legs and reposition your body to get comfortable. Moving around in this way reduces your risk of blood clots.

Ultrasounds

Brachial Artery Ultrasound: 45 minutes (Fast for 10 hours before the test)

An ultrasound is a procedure that uses sound waves to create a picture. The brachial artery ultrasound measures how elastic your veins are and the thickness of the major blood vessel in your upper arm (your brachial artery). After resting on your back for ten minutes, an ultrasound probe will be placed over your brachial artery in

the elbow area on your non-dominant arm (the arm that you do not write with). A blood pressure cuff will be inflated around your forearm for five minutes to reduce blood flow. When the cuff is deflated, the ultrasound will be continued for five more minutes to observe the blood flowing back into your arm. You may feel a warm tingling in your forearm from the return of blood flow after the cuff is deflated. The entire procedure takes approximately 45 minutes. This scan is for research purposes only and not for diagnostic treatment.

Risks: Brachial Artery Ultrasound: There is no known risk associated with a low level ultrasound. Inflation of the blood pressure cuff on the forearm carries no risk, but you may experience temporary discomfort with inflation. This discomfort will pass after the cuff is released. The cuff can also be deflated immediately upon your request.

Carotid Artery Ultrasound: 20 minutes

An ultrasound is a procedure that uses sound waves to create a picture. The carotid ultrasound test measures the thickness of the lining of your carotid arteries (an artery that supplies oxygenated blood to your head and neck). A measurement of your carotid artery will be taken by placing an ultrasound probe against the side of your neck and observing blood flow to your head and neck. The entire procedure takes approximately 20 minutes. This scan is for research purposes only and not for diagnostic treatment.

Risks: Carotid Artery Ultrasound: There is no known risk associated with a low level ultrasound. During this procedure, there is a possibility of fainting and/or temporary slowing of the heart rate and a very small possibility of carotid plaque destabilization resulting in a stroke. These occurrences are rare. This test is completed often in the medical field for diagnostic purposes.

Liver Ultrasound: 20 minutes

An ultrasound is a procedure that uses sound waves to create a picture of an organ or soft tissue. This test measures the size of your liver. For this procedure, you will be asked to raise your shirt, disrobe from the waist up, or change into a hospital gown and lie flat on your back on an examination table. A gel will be spread on the ultrasound probe, and the probe will be applied to your abdomen and directed towards your liver. You will feel slight pressure on the skin of your abdomen from the probe. You also may be asked to breathe in a certain way or to roll over. The entire procedure will take approximately 20 minutes. This scan is for research purposes only and not for diagnostic treatment.

Risks: Liver Ultrasound: There is no known risk associated with a low level ultrasound.

Echocardiogram: 45 minutes

An echocardiogram is a procedure that uses sound waves to create a moving picture of your heart. For this procedure, you will be asked to disrobe from the waist up or change into a hospital gown and lie on an examination table on your left side. A gel will be spread on the skin of your chest, and the ultrasound probe will be applied to your chest and directed toward your heart to record the activity of your heart. You will feel slight pressure on the skin of your chest from the probe. You also may be asked to breathe in a certain way or to roll over. Electrodes will be also placed onto your chest to allow an electrocardiogram (ECG) to be performed during this procedure. The entire procedure will take approximately 45 minutes. This scan is for research purposes only and not for diagnostic treatment.

Risks: Echocardiogram: There is no known risk associated with a low level ultrasound.

Endometrial Ultrasound: 20 minutes

This procedure is performed to view and measure the uterus and ovaries. You will empty your bladder and change into a gown (removing all clothing from the waist down). You will lie flat on your back with your knees flexed and slightly open. An ultrasound probe, covered with a condom and ultrasound gel, will be inserted into the vaginal canal by a trained technologist. Images will be taken of the uterus and ovaries. The procedure lasts about 15 minutes. This scan is for research purposes only and not for diagnostic treatment.

Risks: Endometrial Ultrasound: There is no known risk associated with a low level ultrasound. You may experience some discomfort when the probe is positioned.

Gallbladder Ultrasound: 20 minutes

An ultrasound is a procedure that uses sound waves to create a picture of an organ or soft tissue. This test identifies any abnormalities within your gallbladder. For this procedure, you will be asked to raise your shirt or disrobe from the waist up or change into a hospital gown and lie flat on your back on an examination table. A gel will be spread on the ultrasound probe, and the probe will be applied to your abdomen and directed towards your gallbladder. You will feel slight pressure on the skin of your abdomen from the probe. You also may be asked to breathe in a certain way or to roll over. The entire procedure will take approximately 20 minutes.

Risks: Gallbladder Ultrasound: There is no known risk associated with a low level ultrasound.

Transcranial Doppler Ultrasound: 30 minutes

An ultrasound is a procedure that uses sound waves to create a picture. The transcranial Doppler test measures the blood circulation within your brain. For this procedure, you will be asked to sit very still and may be asked to stand during certain portions of the test. A gel will be spread on the ultrasound probe, and the

probe will be placed against the side of your head near your temple. Blood flow in the large arteries of your brain will be observed. You will feel slight pressure on your head from the probe. The entire procedure will take approximately 30 minutes. This scan is for research purposes only and not for diagnostic treatment.

Risks: Transcranial Doppler Ultrasound: There is no known risk associated with a low level ultrasound.

PAT – Peripheral Arterial Tonometry: 1 hour (Fast for 12 hours before the test)

This procedure is performed to determine the response of your blood vessels to a stimulus. You will lie on your back on a bed and have a blood pressure cuff placed on your non-dominant arm (the arm you do not write with). Probes will be attached to the index finger on both of your hands, and these probes will be slightly inflated to be held in place. The blood pressure cuff will be inflated for five minutes. It will then be deflated rapidly. Data will be recorded continuously throughout the test. The entire procedure will take approximately 1 hour. This scan is for research purposes only and not for diagnostic treatment.

Risks: PAT – Peripheral Arterial Tonometry: Inflation of the blood pressure cuff on your forearm carries no known risk, but you may feel a warm tingling in your forearm and fingers. This will pass after the cuff is released, and the cuff can be deflated immediately upon your request.

EXERCISE TESTING CORE:

Note regarding Exercise Test (VO₂ Max) – If this procedure is included in your study, you must also include the following procedures:

- Physical exam and history
- EKG
- EKG review by MD or qualified practitioner

Exercise Test may proceed only if subject qualifies

Please work with the Exercise Testing Core to ensure appropriate language for the specific procedure(s) you are using in your study is being used in your protocol and consent.

Exercise Test (VO₂ Max test) (About 1 hour)

The time involved with this test depends on your exercise capacity. Your aerobic fitness level will be assessed while you either walk or run on a treadmill or ride a bicycle ergometer. Regardless of the device you use for testing, the amount of energy

you expend during the test will increase at regular increments. Typically, the protocols used for testing take two forms: Stage protocols or ramp protocols.

Stage Protocols increase in intensity after several minutes at each stage. These stages can be as brief as 2 minutes or as long as 5 minutes. For some specialized study protocols the stages may last longer.

Ramp Protocols increase the workload every minute by increasing either speed and/or grade on the treadmill or tension on the bike. On some occasions the ramp may increase at shorter increments and can be as short as 5-seconds. The rate that work increases during your study is specific to the objectives of the study.

Prior to the initiation of the treadmill test protocol, you will perform a 5-minute walk/warm-up on the treadmill. Once the test protocol is initiated, speed and/or grade will become progressively more difficult until you are too tired to continue. Your fatigue will in most cases be due to your muscles becoming too tired to perform the work required of the stage or you may become short of breath and feel unable to consume enough air. Both or a combination of both are normal responses for this type of test.

If the test is performed on a bicycle ergometer, you will warm up on the bicycle at a low level of tension. Afterward you will ride the bike with increasing amounts of tension until you are unable to continue pedaling.

During the test, the volume of oxygen intake and carbon dioxide (CO₂) production will be measured continuously using an instrument known as a metabolic cart. The test requires that you breathe through a mouthpiece – similar to a snorkel – with a nose clip on. That mouthpiece is attached to a long tube, which is then attached to the metabolic cart. By collecting all the air that you breathe out enables us to accurately measure how much energy you are expending during each stage of your exercise test. Your heart rate will also be monitored continuously using a 12 lead ECG/Heart Rate monitor.

Risks: VO₂ Max exercise test:

All Exercise Testing Core standard operating procedures are in accordance with the American College of Sports Medicine's Guidelines for Exercise Testing and Prescription as well as the American Heart Association. There is minimal risk of injury or a cardiovascular event during exercise testing. We believe the risk of an event during exercise testing is minimized with a pretest review of the medical history, physical examination by a physician or mid-level health care professional, use of a highly trained staff, and well-defined emergency procedures. Participants may experience temporary discomfort during blood pressure recordings due to the pressure of the blood pressure cuff on the arm. All tests are conducted in the presence of Exercise Testing Core personnel with extensive experience in conducting maximal exercise testing. All laboratory staff are trained in BLS (basic life support – CPR) and/or ACLS (advanced

cardiac life support). In the event of a life threatening emergency, the subject would be treated with BLS/ACLS by trained individuals and subsequently be transported to the nearest acute care medical-surgical facility via Emergency Medical Services which is a parish wide paramedic response unit.

Biodex.

A Biodex test is a form of exercise testing designed to examine muscular strength and endurance. Typically, these tests are short, yet intense, and the duration of the test depends on the study protocol. The test itself is one where you will work against a fixed amount of resistance and perform a set number of repetitions similar to a weight machine you may have seen in a health club. In our lab, “resistance” is set as degrees-per-second of work and can range from as low as 1 deg/sec up to 500 deg/sec. The lower the number, the more resistance you will encounter during the test. The amount of tension you encounter during your test has been designed specifically for the study you are participating in.

The tests themselves can take two forms: Isokinetic or Isometric. Isokinetic means that the joint area we are examining will move through an established range of motion. If the test is isometric you will push or pull against a fixed resistance where your joint will not move.

The muscle groups that we can measure are as follows:

- Knee Extension/Flexion
- Ankle Extension/Flexion
- Ankle Plantar/Dorsiflexion
- Closed Chain Knee, Ankle, Hip Extension/Flexion
- Shoulder External/Internal Rotation
- Shoulder Flexion/Extension
- Shoulder Abduction/Adduction
- Shoulder Diagonal
- Elbow Extension/Flexion
- Wrist Extension/Flexion
- Wrist Radial/Ulnar Deviation
- Forearm Supination/Pronation
- Hip Flexion/Extension
- Hip Abduction/Adduction

The terms flexion or extension refer to the straightening or shortening of a joint. For example, if you kick your leg out straight, this is called extension. If you pull your leg back into a bent position this is called flexion. Depending on the test protocol we may test one joint, multiple joints, or make a comparison of joints between the right and left side of your body.

Before each test you will be allowed to warm-up for 5-minutes on either a bike or treadmill. You will then be positioned on the testing apparatus according to your

body dimensions and secured to the seat with a series of seatbelt like devices to help secure that position. These belts are easily released, just like a seat belt, so you are not constrained and can be moved easily if needed or desired. Prior to each test you will be provided with a short period of practice so that you can get the feel of each test before you do it. These practice bouts are short in duration and you will be asked to perform them at an easy pace. During each test, however, you will be asked to work as hard as you can during the test from the start through the tests completion. After each test you will be given a short duration of rest before performing the next test of multiple work bouts are required.

Risks: Biodex exercise test:

There is minimal risk of injury during exercise testing protocols on a Biodex. We believe the risk of an event during exercise testing is minimized with a pretest review of the medical history, use of a highly trained staff, and well-defined emergency procedures. You may experience muscle fatigue, weakness, soreness and/or muscle pulls or tears. All tests are conducted in the presence of Exercise Testing Core personnel with extensive experience in conducting exercise testing.

Risks Associated with Procedures

Blood Draws: There is the possibility of infection and/or pain and bruising at the vein on your arm where the needle is inserted. Aseptic (sterile) technique and trained personnel minimize these risks.

Electrocardiogram (EKG or ECG): There are minimal risks associated with this test. There is a small possibility there may be some redness or irritation while cleaning the skin prior to applying the electrodes or if you happen to be allergic to the adhesive on the electrodes.

Anti-depressants/Suicide: There have been reports of suicidal impulses in children, adolescents, and adults who take a certain kind of antidepressant. The FDA has revised the labeling for all anti-depressants to include a warning that children and adults taking these drugs should report to their doctors immediately if they experience anxiety, agitation, panic attacks, irritability, hostility, impulsivity, severe restlessness, mania, or suicidal ideation.

Reproductive Risks: The effects of the study medication on an unborn child are not known. Use of the drug may be associated with risks to a fetus. If you are a woman who is sexually active and capable of becoming pregnant, you must use an effective form of birth control throughout the study. You should inform the study coordinator immediately if you have any reason to believe that you may be pregnant. Medically acceptable methods include oral contraceptive medication, an intrauterine device (IUD), an implantable contraceptive (such as Implanon), an injectable contraceptive (such as Depo-Provera), or a barrier method (such as condom or diaphragm with spermicide).

VLCD (Very Low Calorie Diet) & Diabetes: There is a very small risk of hypoglycemia (very low blood sugar) when starting on a diet lower in calories than you are accustomed to, particularly when taking sulfonylureas (a certain class of anti-diabetic drugs). You will be asked to monitor your blood sugar at least twice a day, once in the morning before breakfast and once in the evening before dinner. You should check your blood sugar when you have symptoms such as lightheadedness, shakiness, shaking of the hands, sweating, tingling, blurred vision or difficulty concentrating.

Rapid Weight Loss: Gallstones are also a risk if rapid weight loss occurs (greater than 3 pounds per week) with the liquid diet. You can minimize gallstone risk by including two teaspoons of vegetable oil with one meal each day.