

MESA-MIND Manual of Operations: Florbetaben PET

1. CONTACT INFORMATION

For any study-related questions, problems or issues, please contact the following resources:

- Participant eligibility or logistics: MESA-MIND <u>MESA-MIND@wakehealth.edu</u>
- PET acquisition or scanner specific reconstruction parameters: Email Robert Koeppe (koeppe@umich.edu)
- Scheduling tracer doses and production schedules Florbetaben/Neuraceq: Life Molecular Imaging (LMI) <u>orders.sterling@life-mi.com</u>, phone 800-392-2423

2. PET Scanner Qualification

Each site must be qualified for PET prior to scanning participants. If the PET scanner being used has already been qualified for ADNI by the PET Core (Koeppe lab, Univ. Michigan) and has not experienced any major software or hardware upgrades, re-qualification will not be required. If a new scanner must be introduced, please reach out to the PET Core for specific instructions on how to get PET scanners qualified. Your scanner will need to be qualified by the PET Core before imaging can be performed (see contact information above). Please contact koeppe@umich.edu for specific instructions on how to get PET scanners qualified.

Ideally, no hardware or software upgrades of the PET imaging system should occur during the duration of the study. In the event of such an upgrade, we ask that you inform the PET Core prior to the anticipated upgrade. Depending on the nature of the upgrade the site may be asked to repeat the phantom scans prior to scanning any additional participants.

3. Florbetaben (Neuraceq; Amyloid PET) Ordering

PET technologists (and in some circumstances, Study Coordinators) will need to register their contact information with Life Molecular Imaging (LMI) to place orders via their online ordering system. Please refer to **Appendix C** for detailed instructions on this process including the dose order form.

4. Amyloid (florbetaben) tracer injection procedures

- Have the participant use the restroom and empty their bladder.
- Allow the participant to lie comfortably in a bed or reclining chair in a room. Supply the
 participant with blankets/pillows as needed to maximize their comfort.
- Obtain intravenous access using a small angiocath.
- Inspect the radiopharmaceutical dose solution prior to administration and do not use it if it contains particulate matter or is discolored.
- IV injection of amyloid tracer:
 - Florbetaben (Neuraceg) 296 MBq (8.0 mCi) (minimum 5 mCi / maximum 8.8 mCi).

5. Participant positioning

Proper participant positioning is a key aspect of the successful completion of the PET exams. It should begin about 10 minutes before scanning begins. It is important to take the time necessary to ensure not only that the participant is properly positioned but also can comfortably maintain that position throughout the duration of the scanning session. Excessive

motion and in particular a difference in the participant's position between the emission scan and the transmission or CT scan used for attenuation correction is the single most common cause of failed studies.

- Have the participant remove any bulky items from their pockets such as billfolds, keys, etc. In addition, they should remove eyeglasses, earrings, and hair clips/combs if present. If possible, they should try and remove hearing aids also.
- Position the participant so their head and neck are relaxed. It may be necessary to add additional pads beneath the neck to provide sufficient support. Use the lasers to ensure there is little or no rotation in either plane. The head should be approximately positioned such that the PET scanning planes are parallel to the imaginary line between the external canthus of the eye and the external auditory meatus (orbitomeatal plane) and the head is centered in the sagittal plane. More important than matching the orbitomeatal plane is making sure the participant is comfortable, which will hopefully translate to less participant motion during the scan.
- Use support devices under the back and/or legs to help decrease the strain on these regions. This also will assist in the stabilization of motion in the lower body.
- Once the participant has been positioned foam pads can be placed alongside the head for additional support. Velcro straps and/or tape should also be used to secure the head position. Vacuum beanbags can also be used in this process.
- The participants should be offered a "panic button" or be reassured that someone is watching or able to hear them at all times.
- Proper positioning of the participant to get the entire head in the center of the field of view is critical to the success of the project.
- Checking the participant positioning and readjusting (if possible) the position of the participants' head should be done often throughout the study.

6. Attenuation Correction Procedures for PET/CT Scanners

- Standard CT acquisition parameters, but low effective mAs (~30 is typical).
- The participant must undergo the CT scan starting about 5 minutes prior to starting the PET scan. Be sure to prepare the participant so that you are ready to press "start" for the PET emission scan at the required time.

7. Amyloid (florbetaben) PET Scan Procedures

Adverse events (AEs) will be continuously monitored during any PET imaging session. Participants who experience an AE will not be discharged from the imaging center until the event has resolved or stabilized.

PET scan:

- Emission acquisition start time:
 - o Florbetaben (Neuraceq) 90 minutes post injection
- Acquire a 20 min dynamic scan consisting of four 5-minute frames. Acquisition should start promptly at 90 minutes post injection. Scans should never be started prior to 90 minutes; and every effort must be made to start the scan on time. Scheduling a PET scan

- very close in time following another study (which could run late) is not an acceptable reason for starting a scan late.
- The images will be immediately assessed for technical validity by the PET technologist and if considered inadequate due to motion or other artifact, the participant will have an additional 20 minutes of continuous imaging, collected as four 5-minute frames.

Post PET Scan:

- The participant will be requested to void after completion of each PET scan.
- Reconstruct images using parameters specific to the system used for scanning (see Appendix A). The same reconstruction parameters should be used for all emission scans. Upon completion of the reconstruction, review all the images to assess for artifacts.
- Image filenames should include the participant ID provided by the study coordinator.
- Archive ALL raw and processed image data including everything to reconstruct the data again if needed. It is necessary to archive and store raw and processed data at the imaging site for the duration of the project (approximately 5 years).
- Transfer reconstructed PET image data from the American College of Radiology Imaging Network (ACRIN)/TRIAD system (https://triadhelp.acr.org/) to the University of Pennsylvania within 24 hours per the procedures detailed in Appendix B of this MOP. Please upload only the fully corrected image set. Please refer to that chapter for instructions on account generation and image uploads. You may also reach out to Lisa Desiderio (<u>Lisa.Desiderio@pennmedicine.upenn.edu</u>) or Lisa Cimino (<u>lcimino@acr.org</u>) for assistance.
- Study Coordinator confirms that image data has been uploaded and data recorded on the form has been data entered as well within 24 hours. Study coordinator should follow-up within 3 4 days post scan to ensure that all imaging data has been entered. Detailed instructions on data entry of procedures forms can be found in **Appendix B**.

APPENDIX A. SCANNER SPECIFIC RECONSTRUCTION PARAMETERS FOR GE DISCOVERY RX (HOPKINS)

This appendix outlines the reconstruction parameters for the florbetaben scans (**GE DISCOVERY RX (HOPKINS) only)**

For questions regarding scanner specific reconstruction parameters: Email Robert Koeppe (koeppe@umich.edu)

The reconstruction parameters are as follows:

- 3D-iterative recon
- 4 iterations
- 21 subsets
- no smoothing
- 128x128 recon matrix
- 25.6 cm FoV (results in 2.0 mm voxels)
- scatter correction method (model-based)
- randoms correction method (singles)

APPENDIX B. MESA MIND CT/PET Imaging Protocol and Acquisition Form

MESA MIND Protocol Appendix - Detailed CT/PET Imaging Protocol

<u>Amyloid PET Brain Imaging.</u> Participants who enroll will complete a amyloid imaging protocol with the FDA approved [18F] Florbetaben (Neuroceq ®), which is similar to that used by the Alzheimer's Disease Neuroimaging Initiative – Study (ADNI). Participants will not receive the results from this scan unless so indicated by a clinically significant medical finding.

- Participants will report to the imaging facilities.
- Vital signs (blood pressure, heart rate, temperature) and body weight will be measured on the same day of tracer injection.
- [18F] Florbetaben Participants will be injected with an intravenous bolus of approximately 8 mCi of tracer (minimum 5 mCi / maximum 8.8 mCi). This is the standard dose used in the many published clinical reports using [18F] Florbetaben. After injection, participant will wait for an uptake period of 90 minutes before the PET image acquisition begins.
- Participants will be positioned in the PET/CT scanner by trained staff. Participants will be monitored via audio micorphone and video. During PET imaging, participants must remain as still as possible and thus every effort will be made to provide for their comfort including blankets, pillows and diligent assessment. The PET brain imaging procedure is similar to that used by large multicenter imaging clinical trials. Scanning will begin with a standard low dose CT transmission scan of the head that will be used to correctly position the participant and for attenuation correction. Brain emission images will be acquired continuously for a 20 minute period as four 5-minute frames. The images will be immediately assessed for technical validity by the PET technologist and if considered inadequate due to motion or other artifact, the participant will have an additional 20 minutes of continuous imaging, collected as four 5-minute frames.
- From the time of tracer injection until after the imaging session is complete, participants will be observed continuously for signs of adverse events or serious adverse events. The injection site will be observed for excessive inflammation or damage to the surrounding tissue.
- A physician or a person designated by the physician with appropriate training and experience will be present during the tracer injection and to approve discharge of the participant from the PET suite.



Acquisition

Participant ID #:					Acrostic:*								
							*Do	not e	enter i	nto Pl	ET soft	ware	_
Technician ID:			ſ	Date	:			/					
					Month	D	ay			Ye	ar		

1. PET tech ID: 2. Time of today's scanner QC: O AM O PM	Participant Information 3. Sex:
Pre-scan Vitals 5. Blood pressure:/ 6. Pulse: bpm	15. Was appropriate time allowed for tracer uptake? O No O Yes, 40 minutes for (11C) PiB O Yes, 90 minutes for (18F) Florbetaben
7. Weight: lbs 8. Temperature: °F Tracer: O (11C) PiB O (18F) florbetaben 9. Dose: mCi 10. Dose assay time: O AM O PM	16. Scan start time:
11. Dose injection time: 12. Residual: 12.1 Residual Assay Time: Post-injection Vitals	Post-scan Vitals 19. Blood pressure: /
13. Blood pressure:/ 14. Pulse: bpm	



Additional measurements, if necessary:
21. Blood pressure:/
22. Pulse: bpm
23. Blood pressure:/
24. Pulse: bpm
25. Injection site <u>location</u> and <u>observations</u> :
26. Participant encouraged to void and drink plenty of fluids the rest of the day?
O Yes
O No
27. PET technician signature:
28. Notes:

CALL STUDY STAFF PRIOR TO RELEASING PARTICIPANT. [Insert site contact name and phone]

APPENDIX C. Florbetaben Instructional Slides and Dose Order Form

Mesa Mind-Florbetaben Kick-Off

Hillary J. Rouse, PhD Richard Keegan, PhD Medical Science Liaison, Life Molecular Imaging Monday, April 03, 2023



Life Molecular Imaging Team

Function	Contact	Email	Direct Phone	Location	
Medical Science Liaison	Richard Keegan, PhD	r.keegan@life- mi.com	(203)450-3652	TN	MSL
Medical Affairs Project Manager	Jesse Blom, MBA	j.blom@life- mi.com	(646)670-6609	NY	Operations
Medical Affairs Contracts Manager	Nicole Davis	n.davis@life- mi.com		CA	Contracts
Director – Global Supply Chain	Amit Kumar	a.kumar@life- mi.com	(856)207-4224	NJ	
Chemistry, Manufacturing, and Controls (CMC) Manager	James Havey, PhD	j.havey@life- mi.com		СТ	
Chief Medical Officer	Andrew Stephens, MD	a.stephens@life- mi.com		Berlin	
Head of Medical Affairs	Matt Trifilo, PhD	m.trifilo@life- mi.com		CA	



Sofie Information

Location	Address	Main Phone	FBB Production Schedule
Sterling, VA	21000 Atlantic Blvd #730 Sterling, VA 20166	(703)787-4075	Tuesday Wednesday Thursday



NeuraceqTM



Neuraceq[™] (florbetaben F18 injection) – Indications & Usage

- Neuraceq is indicated for Positron Emission Tomography (PET) imaging of the brain to estimate β-amyloid neuritic plaque density in adult patients with cognitive impairment who are being evaluated for Alzheimer's Disease (AD) and other causes of cognitive decline
- A negative Neuraceq scan indicates sparse to no amyloid neuritic plaques and is inconsistent with a neuropathological diagnosis of AD at the time of image acquisition; a negative scan result reduces the likelihood that a patient's cognitive impairment is due to AD
- A positive Neuraceq scan indicates moderate to frequent amyloid neuritic plaques; neuropathological examination has shown this amount of amyloid neuritic plaque is present in patients with AD, but may also be present in patients with other types of neurologic conditions as well as older people with normal cognition
- Neuraceq is an adjunct to other diagnostic evaluations



Neuraceq™ – Posology and Method of Administration

- A PET scan with Neuraceq should be requested by clinicians experienced in the clinical management of neurodegenerative disorders
- Neuraceq dosing <u>as per product label</u>
 - Target dose 300 MBq Neuraceq (up to 8.1 mCi)
 - Administer as a single dose over 1 minute (6 sec/mL)
 - In a total volume of up to 10 mL
 - Do not dilute Neuraceq
- Image acquisition and processing as per product label
 - Acquire PET images over 15 to 20 minutes starting 45 to 130 minutes after
 Neuraceq injection (or as described in the clinical study protocol if different)
 - A visual binary read (positive or negative) will be determined according to criteria established by Life Molecular Imaging to categorize subjects as amyloid-positive or amyloid-negative.



Neuraceq[™] – Important Safety Information

Risk for Image Interpretation and Other Errors

- Neuraceq can be used to estimate the density of β-amyloid neuritic plaque deposition in the brain. Neuraceq is an adjunct to other diagnostic evaluations. Neuraceq images should be interpreted independent of a patient's clinical information. Physicians should receive training prior to interpretation of Neuraceq images. Following training, image reading errors (especially false positive) may still occur.
- Additional interpretation errors may occur due to, but not limited to, motion artifacts or extensive brain atrophy.

Radiation Risk

 Administration of Neuraceq, similar to other radiopharmaceuticals, contributes to a patient's overall long-term cumulative radiation exposure. Long-term cumulative radiation exposure is associated with an increased risk of cancer. It is important to ensure safe handling to protect patients and health care workers from unintentional radiation exposure.



Neuraceq[™] – Important Safety Information (cont.)

Most Common Adverse Reactions

 In clinical trials, the most frequently observed adverse drug reactions in 872 subjects with 1090 Neuraceq administrations were injection/application site erythema (1.7%), injection site irritation (1.1%), and injection site pain (3.4%).

Radiation dose

- Mean effective radiation dosage from 300 MBq approved administration of Neuraceq is 5.8 millisievert (mSv)
- The organs receiving notable radiation exposure include the gallbladder, urinary bladder, upper large intestine wall, lower large intestine wall, small intestine and liver

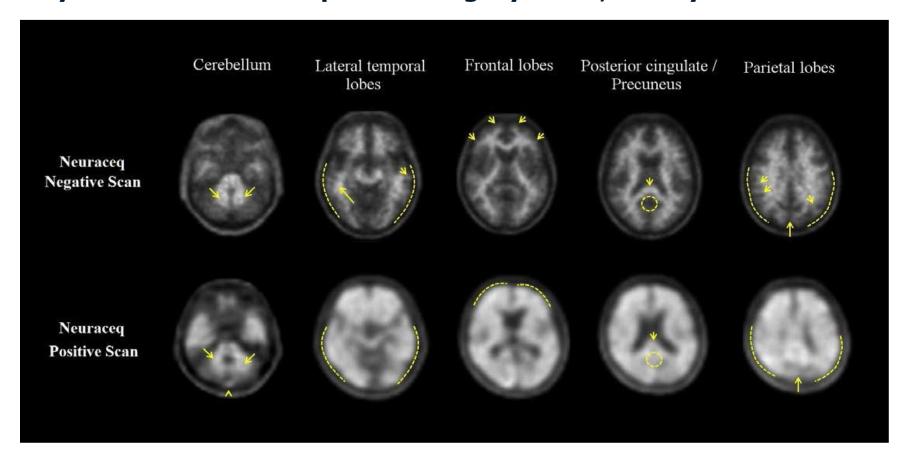
After administration of Neuraceq

 Avoid use in a breastfeeding mother or have the mother temporarily interrupt breastfeeding for 24 hours after exposure to Neuraceq.



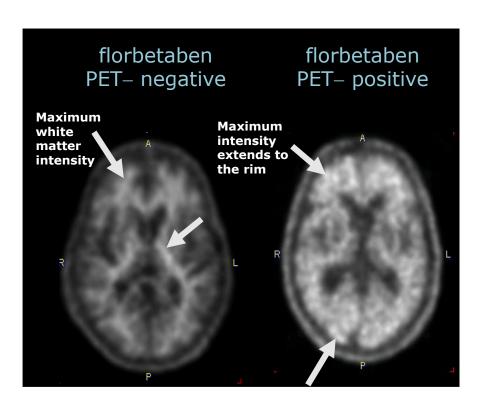
Visual Assessment of Neuraceq® (florbetaben F18 injection) Scans

Systemic visual interpretation: gray scale, binary assessment





Visual Assessment of Neuraceq® (florbetaben F18 injection) Scans



- Images should be read in transaxial orientation
- Grayscale or inverse grayscale
- Four target regions:
 - 1. Frontal cortex
 - 2. Posterior cingulate/precuneus
 - 3. Lateral temporal cortex
 - 4. Parietal cortex
- Gray matter signal intensity compared to maximum white matter intensity
- If one target region is β-amyloid positive, then they entire brain is "positive"



Neuraceq™

Safety Reporting Requirements

The PI shall report to LMI safety relevant information:

By e-mail: PHV@life-mi.com or By Fax: +49 (0) 30 46 11 24 629

- Immediately, within 2 business days after awareness of event, all cases concerning Serious Adverse Events (SAE), independent of their causal relationship to the TAU or Neuraceq tracer that occur within 5 days after injection;
- Within 2 business days, all cases concerning Adverse Drug Reactions (ADRs);
- Within 2 business days, even if no ADR/SAE occur "Extraordinary Situations" that
 come to the attention of the PI (such as exposure during pregnancy, exposure during
 breastfeeding, data on use in Children, reports on compassionate use/named patient use, lack of
 efficacy or effect, report of suspected transmission of infectious agents, reports of Overdose
 (accidental or intentional), abuse of Product, misuse of product, reports of Medication Error, drug
 exposure via mother or father or other, occupational exposure). Please see contract for further
 details.
- Any communication concerning safety related information to regulatory authorities or ethics committees including but not limited to:
 - Annual Safety Reports/relevant parts of IND reports for the study;
 - Any other safety related reports, issues and queries that are either raised by or communicated to the regulatory authorities or ethics committees.
- Within 48 hours, any quality issue (technical complaint) regarding the product.



First Contact Sheet (Neuraceq)

- All communication with LMI will be in English.
- Safety Event information will be provided to LMI using the attached 1st Contact Sheet, or alternatively the Council for International Organizations of Medical Sciences (CIOMS) form or other Institutional reporting form may be used as long as all required information is included.
- All Safety Events will be transferred via fax or secure email.
- All Safety Event for Exchange will be sent to <u>gra@lifemi.com</u> by Sponsor. All reports must contain, but not limited to, the following:
- name and contact information of the reporter
- description of the reported safety relevant information
- patient identified by one or more of the following:
 - patient initials
 - patient number
 - age
 - sex
- Additional information requested if available:
- name and batch number of the study drug(s) (including administration time point and date) if available
- Investigator assessment of study drug causality.



Original Reporter	/ Source	e						
☐ Physician ☐ Registry								
 □ Pharmacist □ Patient / Consumer 						Other:		
☐ Patient / Consumer ☐ Health Authority								
Country of Occur	rence							
Outside I Barrantan	1	_4!						
Original Reporter	Intorm	ation	1					
Name								
Address								
Tel. / Mobile								
Email								
Profession								
Comment Day ()								
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Patient Information	on				1			
Patient Initials Birth Date o			irth Date or A	ge	Gende	r 🗆	Male Female	
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Adverse events or other safety relevant information								
Event(s) Start date / time					ne	End date / time		
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Tel. / Mobile								
Email								
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Neuraceq™

Supply Chain / Ordering / Logistics

- Primary Contact: Amit Kumar (Life Molecular Imaging) Supply Chain
- Sofie and Life Molecular Imaging relationship
- Dose dispensed +/- % limits (10%)
- Calibration times (out of door plus travel plus 30 min)
- Equipment (Cases/Shields) (lead lined container, pre-filled syringe)
- Service related issues (Delivery and Quality Assurance) local Sofie Pharmacy



Neuraceq[™] – Ordering Doses

- Neuraceq[™] dose orders can be placed by:
 - Printing and Faxing a completed dose Order Form to a predefined number
 - Emailing the completed Order Form

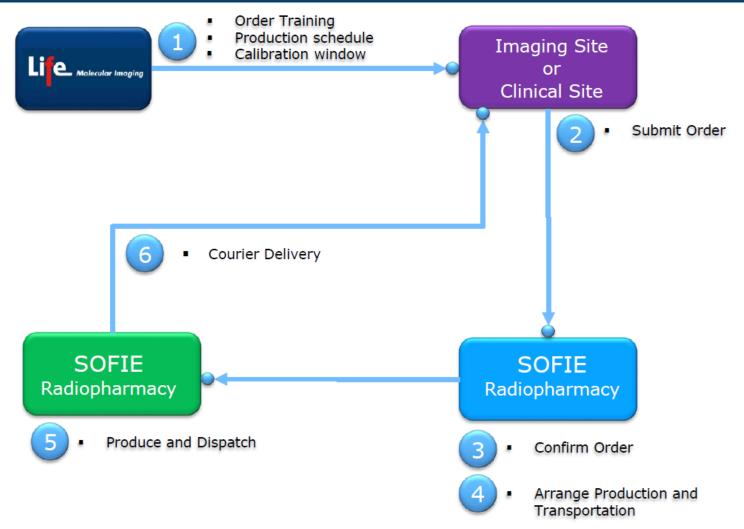
All the above info is PREFILLED in SECTION 1 of the Order Form.

- A confirmation for the received order will be sent if required.
- Dose availability may vary, based on location, day and calibration times.
- A Production Schedule will be provided at regular intervals or whenever there is a change to facilitate scheduling of study participants.
- The Injections Window for scheduling patients will be communicated to site.

Please provide Life Molecular Imaging (Supply chain Manager) the email addresses of the individuals that need to receive production schedule updates



High Level Ordering Process





Ordering Deadlines



Place Dose Orders by 14:00 local time **2 business days** in advance of required delivery day





Place Orders by 14:00 local time

5 business days in advance of required delivery day





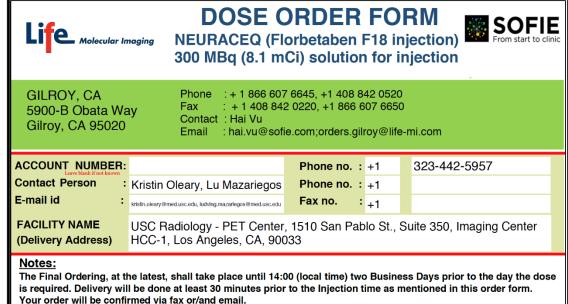
Dose Cancellation Policy

- Life Molecular Imaging's standard order cancellation is two business days prior to scheduled delivery for road transportation and four business days prior to scheduled delivery for flight transportation.
- Cancellation requests must be made to SOFIE manufacturing pharmacy by phone with follow up in writing.
- Any cancellations made after these time points will be invoiced to study site.



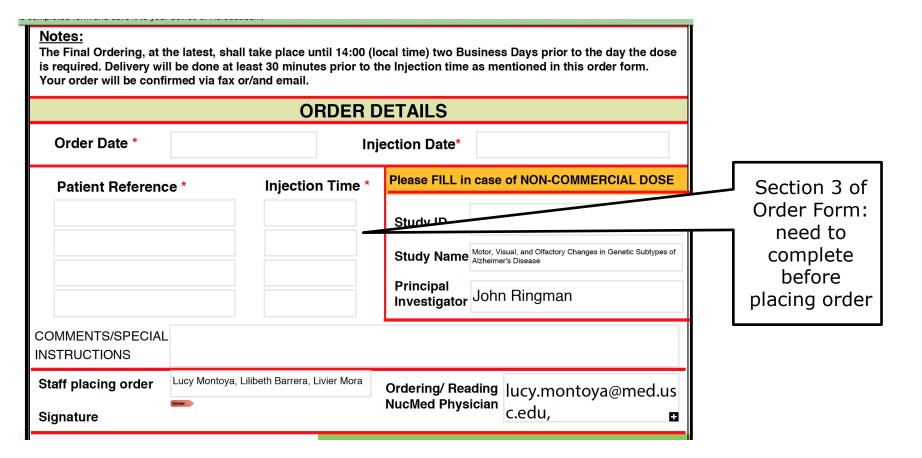
NeuraceqTM Dose Order Form

- The form is a sample form.
- 2. This will be prefilled and released after we get the details for the site.
- Required details:
 - Delivery address
 - Contact person and contact details
 - Any special instructions.





Neuraceq[™] Dose Order Form (*variable*)





What you need to do now



1. Check the pre-filled order form you are provided with. Ensure the pre-filled information is correct. Make corrections if necessary.



Provide SOFIE (contact details on the order form) with the contact details of the individuals that need to receive the following:



Order confirmations email addresses or Fax

3. Provide <u>a.kumar@life-mi.com/r.keegan@life-mi.com</u> with a list of the email addresses of the individuals to receive updates to the production schedules.

Project Management

- Life Molecular Imaging primary contacts
- Coordinate regular meeting with PI and/or Study Coordinators (progress report, adverse event reporting, special requests concerns, patient scheduling)
- Communicate progress to Life Molecular Imaging's Project Manager, notably through the Monthly Reporting Form (see an example next slide)



Project Management (Monthly Report Form)

Research Monthly Report Form

Please submit copy to:
Elisa Canzoneri, e.canzoneri@life-mi.com, Medical Science Liaison - Medical Affairs, Life Molecular Imaging

Main Project Information:	
Project Title	Motor, Visual, and Olfactory changes in genetic subtypes of Alzheimer's Disease
Name of Institution	USC
Name of Principal Investigator	Dr. John Ringman
Contact Date	Enter date

Study Progress:	
Study Phase	Not Yet Recruiting X Recruiting □ Recruitment Complete □
Total Scanned (Cumulative)	Type here
Number Scanned this month	Type here
• Comments:	

Doses:	
Number of Doses Ordered this month	Type here
Number of Doses required next month (indicate if estimated)	Type here
• Comments: Type here	

Adverse Event Reporting:					
Adverse Events					
Any Adverse Events	☐ Yes Choose a date. If yes, please ask Sponsor to complete the AE Form and provide this to you.				



Email: info@life-mi.com

Web: www.life-mi.com

Life Molecular Imaging Inc.

75 State Street Floor 1

THANK YOU





DOSE ORDER FORM



NEURACEQ (Florbetaben F18 injection) 300 MBq (8.1 mCi) solution for injection

Sterling, VA 100 Executive Dr, Ste 3 Sterling, VA 20166

Phone : + 1 800 392 2423, +1 703 787 4075

: + 1 703 478 0499 Contact: Nasrin Pourkiani

Email: orders.sterling@life-mi.com

ACCOUNT NUMBER:

Phone no.: +1

410-897-2167, 704-231-3996

Contact Person

Hailey Maranto, Noh Mebrahtu, Shika Inala, Jeffrey Shin

Phone no.: +1

+1

240-586-0066, 954-683-2183

E-mail id

Fax no.

FACILITY NAME (Delivery Address)

Johns Hopkins Hospital

600 N. Wolfe St, Nelson B1175 PET CTR Baltimore, MD 21287

Notes:

The Final Ordering, at the latest, shall take place until 14:00 (local time) two Business Days prior to the day the dose is required. Delivery will be done at least 30 minutes prior to the Injection time as mentioned in this order form. Your order will be confirmed via fax or/and email.

	ORDER DETAILS
Order Date *	Injection Date*
Patient Reference	e * Injection Time * Please FILL in case of NON-COMMERCIAL DOSE
	Study ID RC111 Study Name "MESA-MIND: Multi-Ethnic Study of Atherosclerosis (MESA) Multisite Study of Alzheimer 's Disease
	Principal Timothy Hughes Investigator
COMMENTS/SPECIAL INSTRUCTIONS	
Staff placing order Signature	Ordering/ Reading NucMed Physician
	FOR RADIOPHARMACY USE
	Order Entered By
	Orders.Sterling@life-mi.com