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MEDICINE &
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SCIENCES

Medical Imaging in Clinical Trials: The Human Imaging Research Office and You!

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An overview of the HIRO's services

Road Map

- **What is medical imaging?**
- **What (and why) is the HIRO?**
- **What services does the HIRO provide, and how do they support research?**
- **Wrapping Up**

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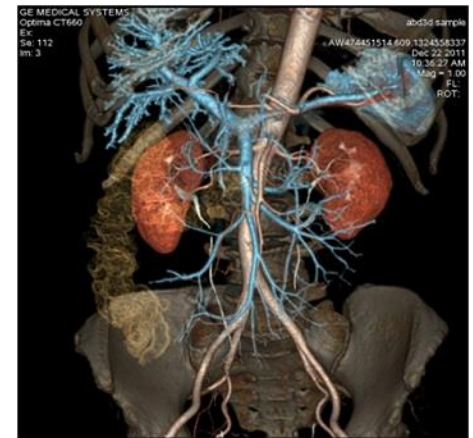
What is Medical Imaging?

- **Medical imaging** is the use of equipment and techniques to create images of the human body for clinical purposes and/or scientific research.
- There are a variety of medical imaging techniques that are often used to create images of internal structures and organs.
- Imaging techniques may be **spatial** (highlighting structure and anatomy) or **functional** (highlighting physiology) in nature. In some cases, they can be both.

What is Medical Imaging?



- Different types of imaging methods are known as **modalities**.
- The basic imaging modalities are:
 - Radiography (x-ray) and fluoroscopy
 - Computed Tomography (CT)
 - Magnetic Resonance Imaging (MRI)
 - Ultrasound (US, echo, vascular)
 - Nuclear Medicine (SPECT, PET, bone scans, theranostics)
- The HIRO assists with all of these modalities (and more!).



What is Medical Imaging?

- **Clinical trials** often use imaging to:
 - ✓ Determine patient eligibility
 - ✓ Measure response to treatment
 - ✓ Determine if an endpoint has been met
- To support these goals:
 - Imaging may need to be performed at routine intervals defined by the trial protocol.
 - Imaging may need to be performed using guidelines and parameters specific to the trial.
 - Copies of exams may need to be provided to the trial sponsor.



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Why is the HIRO a thing?



- It is increasingly common for clinical trials to include **imaging manuals**.
- These manuals may include specific scan parameters and paperwork that must be utilized when performing imaging exams on a trial patient.
- Investigator-initiated projects may also include specific parameters, which can be cumbersome to execute in a clinical setting.



Why is the HIRO a thing?

- Images and related data are increasingly forwarded to external core labs for central review. Some projects may also collect images as part of chart reviews or AI development.
 - Improperly de-identified image data carries increasingly significant institutional risks, as evidenced by the 2007 breach of mammography research data at UNC.
 - The database contained image & demographic data and was breached due to inadequate information security.
 - UNC paid \$250,000 to notify roughly 180,000 patients and set up a call center to field questions about the breach.
 - The PI, a tenured professor, was initially fired, but after appeal was merely demoted. Concerns were raised regarding the obligation of individual investigators vs. their institutions regarding data security and de-identification.
- <https://campustechnology.com/articles/2009/10/09/u-north-carolina-undertakes-review-in-face-of-7-state-data-breach.aspx>
 - https://www.insidehighered.com/news/2011/01/27/unc_case_highlights_debate_about_data_security_and_accountability_for_hacks
 - http://www.rsna.org/uploadedFiles/RSNA/Content/News/PDF/2011_RSNA_New_PDF/003%20RSNA_News_March2011.pdf



What is the HIRO?

- The mission of the **Human Imaging Research Office:**

“...to facilitate University of Chicago investigators conducting clinical trials and research studies that require medical imaging, and to ensure that the necessary imaging is performed and distributed in compliance with the research protocol, IRB requirements, and HIPAA regulations.”



What is the HIRO?

- The HIRO is a BSD **Core Facility** under the direction of the Office of Shared Research Facilities (OSRF).
- Oversight of the HIRO is governed by its Faculty Oversight Committee.
- Day-to-day direction of the HIRO is provided by its Technical Director and Faculty Director. The HIRO also has two full-time staff and a few part-time professional staff.
- The HIRO occupies a single office in Mitchell/FMI.



Photo credit Sara Serritella/UChicago ITM

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HIRO Primary Services

- The HIRO provides local investigators and research staff with several services to support the imaging needs of their clinical trials.
 - Site Initiation / Qualification
 - Imaging Exam Coordination and Monitoring
 - Imaging Exam De-identification and Distribution

Service: Site Initiation

- The HIRO assists with the imaging-related initiation activities for clinical trials noted below:

- ✓ **Site surveys** – the completion of imaging surveys and questionnaires.
- ✓ **Site training** – participation in imaging tele-training and online training sessions.
- ✓ **Test scans** – performance and submission of test imaging when required.
- ✓ **SIVs** – participation as imaging personnel in site visits when required.

The image shows a screenshot of a 'CT/MRI Site Questionnaire' form. The form is titled 'VIRTUALSCOPICS Imaging for Clinical Trials' and 'CT/MRI Site Questionnaire (VS 33305)'. It contains several sections: 'Protocol' with a dropdown menu, 'Please Note' with a paragraph of text, 'Completing and Submitting This Form' with instructions and contact information, 'Site Information' with fields for Principal Investigator, Clinical Site Name, and Site Number, 'CT Scanner' with fields for Manufacturer, Model, and Software Version, 'Is this a Multi-slice Scanner?' with Yes/No options and a field for Number of Slices, 'Does your Site use a Power Injector?' with Yes/No options and a field for Manufacturer, 'Name of Contrast Agent(s) Used:' with a field for IV and a table for Oral, and 'CT Imaging Contact:' with fields for Name, Title, Phone, and Email, and 'Ship To Address:' with fields for Address, City, Country, State/Province, and Zip/Postal Code.

An example of an imaging questionnaire.

- HIRO staff will also assess feasibility and create a trial-specific workflow if needed to ensure compliance with a trial's imaging guidelines.

Service: Site Initiation

- The HIRO also reviews protocols and imaging guidelines.
 - ✓ The HIRO reviews most trials that are routed through the **CTRC (now PRMC)**.
 - ✓ Investigators can optionally request HIRO review or input on their protocol via the **AURA IRB** system.
 - ✓ The HIRO provides input during a study's **budget** process if requested (for example, by providing guidance to the CTFG).

Service: Exam Coordination



- **Not all scans are equal:** the imaging parameters required by a trial may not match UCM's routine clinical parameters!

- The HIRO can determine if trial-specific parameters are needed:

- ✓ **Exam ordering** – identification of the correct orderables in EPIC and order comments.
- ✓ **Exam monitoring and assistance** – availability to provide help to coordinators and imaging technologists at the time of an imaging exam.

Example guidelines documents.

- The HIRO may provide a customized workflow for ordering imaging exams. Be sure to keep the HIRO in the loop and utilize this workflow to ensure your scans will meet your trial's requirements!



Service: Exam Distribution

- Trials will often require that de-identified copies of imaging exams be submitted to a central reviewer or core lab.
- Increasingly, the use of a trial-specific electronic submission system is required.
- The HIRO is the **official UCM team** for providing de-identified copies of imaging exams to local teams for research purposes.
 - Usually scans performed here at UCM (including Orland Park, Silver Cross, and Ingalls) but can also include scans from other places (more on that later).
- Requests for image data are submitted to the HIRO by the research team via its website (<https://hiro.bsd.uchicago.edu>).
 - The HIRO can provide you with the data, or it can often submit the data directly to the trial sponsor/CRO.
 - Note if the *patient* wants copies of their scans, you should contact the Radiology Film Library.

Service: Exam Distribution



- Some trials may require the completion of **data transmittal forms** with each exam submitted.
- These forms often vary in complexity.
- The HIRO is generally able to complete imaging transmittal forms and will do so when submitting exams if required.

Data Transmittal Form

TRANSMITTAL FORM

SUBJECT INFORMATION

Subject Number: [REDACTED] 15 Modality: multi_slic Body Region: Chest Abdomen Pelvis Brain Other

VISIT INFORMATION

Exam Date: [REDACTED] 2016
Time Point: 070_week_45 Unscheduled Visit Description:

COMMENTS

SQC RESULTS

Ensure Slice Thickness for CTs is between 2.5 and 8.0 mm : Pass
Ensure no non-DICOM files : Pass
Ensure no lossy images : Pass
Checking for gaps in images : Fail

Form Completed by: [REDACTED]

Example data transmittal forms.

MNI PET Acquisition Document

Country ID: 78 Site ID: 28 Subject ID: E7828006
Country ID: [REDACTED] Site ID: 2016 Subject: [REDACTED]

Ligand: AV-1451 Florbetapir FDG Scan Acquisition Date: [REDACTED] DD MON YEAR

Imaging Center Name: University of Chicago Medicine PET Imaging Center
Clinical Site Name: University of Chicago Medicine

Check the appropriate PET scan: AV-1451 Baseline (Scan 1) AV-1451 Week 52 (Scan 2)
 AV-1451 Week 104 (Scan 3) AV-1451 Early Discontinuation (ED Scan)
 Florbetapir Screening (Scan 1) Florbetapir Week 104 (Scan 2) Florbetapir Early Discontinuation (ED Scan)
 FDG Baseline (Scan 1) FDG Week 104 (Scan 2) FDG Early Discontinuation (ED Scan)

Document for QC of Florbetapir or AV-1451 Production Received Prior to Injection? Yes No N/A NOTE: If QC Document has not been received, DO NOT inject subject (if QC document is applicable to your country)

Pre-Injection Information: Weight: 190.000 kg lbs kg

Injection Information:
Initial Activity in Syringe: 1.080 mCi Time Measured (24hr): 12:21
Date of Injection: [REDACTED] 2016 Time of Injection (24hr): 12:24
Residual Activity Post Injection: 0.12 mCi Time Measured (24hr): 12:26

Imaging Protocol Parameters:
Camera: Siemens Biograph mCT
Acquisition Protocol Used (Use protocol created at set-up visit): PETCT_florbetapir_Amaranth_4x5min
Recon Filter Type (e.g. Gaussian, All-pass...): GAUSSIAN Kernel (FWHM): 5 Iterations: 4 Subsets: 12
CT/Transmission Scan Start Time: 13:13 Stop Time: 13:13 (24hr clock)
Emission Scan Start Time: 13:14 Stop Time: 13:34 (24hr clock)

TECHNICAL COMMENTS:

Please fax to MNI at +1-203-401-4303 or email to corelab@mniimaging.com

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Service: Exam Distribution

- The HIRO can pull copies of **most** imaging exams that are listed in the patient's EPIC chart* (including **echocardiography** and **DXA scans**).
- This includes scans performed at outside hospitals *as long as* a copy of the scan was forwarded to UCM at some point and loaded into our hospital archive (PACS).
 - If you have a copy of an outside scan on disc, you can bring it directly to the HIRO and we can de-identify & submit it to the sponsor as needed. Note you will still need to submit an image data request in our website!
- The HIRO can also assist in resolving imaging-related queries from the sponsor or CRO.
 - It is not unusual for the CRO to send queries directly to the HIRO. The HIRO may reach out to you for assistance when needed!
 - If you receive a query and you're not sure what it means, please reach out to the HIRO!

- **Image Data Distribution for Basic Science**
 - The HIRO also provides image data to basic science researchers and investigator-initiated projects.
 - The HIRO can provide copies of de-identified imaging exams for **retrospective studies**, **chart reviews**, and other types of epidemiologic, analytic, machine learning/AI or quality improvement projects.
 - The HIRO can assist with cohort identification and build databases of imaging exams based on specific criteria. This may be performed in conjunction with the Clinical Research Data Warehouse team.

Service: Exam Distribution



- Requests for image data must be submitted via the HIRO's website.
- In order to submit requests, you must first create an account in the system.
- You must also register the trial in question with the HIRO (or if it is already registered, you must request access to it).
 - To register a trial on behalf of a PI, you must become a **Technical Liaison**.
- Quick tutorials for all of these activities are available on the HIRO's website.

Human Imaging Research Office (HIRO) | THE UNIVERSITY OF CHICAGO

Imaging Research Institute • The University of Chicago

Welcome!

Our goal is to assist University of Chicago investigators and research staff with medical imaging performed on human subjects for research purposes. This includes the acquisition, analysis, collection, anonymization and distribution of image data. We also provide access to and support for the University's Broker Systems, which allow investigators to obtain HIPAA- and IRB-compliant clinical research data. Our website is meant to serve as a complete portal, or "one stop shop," for biomedical researchers to learn about the University's research policies and to provide access to the various resources that researchers can use to obtain compliant clinical data.

Month	No. of Exams Processed
Jan-2016	213
Feb-2016	327
Mar-2016	283
Apr-2016	140

Register IRB Protocol
View Protocols
Submit Image Request
View Image Requests

Submit an image request to the HIRO

Back

Select Scans

You can request one or more scans using the form below. Simply fill out the form for each scan, then add it to your cart. When you are done, click the 'continue to delivery options' button.

Your order cart

Scan List
Your cart is empty
0 scan(s)

Enter scan details

Please enter the details for a **single** scan below. Once a scan has been added to your cart, you will be given a chance to add further scans, or to continue to the delivery options for your request.

Outside exam

Please check this box if this is the exam was performed at an outside facility.

Medical Record Number (MRN) *

The medical record number of the patient in question.

Patient name



Service Fees

- The HIRO recovers its costs through a recharge model.
 - ✓ HIRO fees are subject to standard University indirect rates.
 - ✓ The HIRO's invoicing and collections are handled by the OSRF.
- Most industry clinical trials include the HIRO's fees in the trial budget.
- Investigator-initiated projects can include the HIRO's fees in grant budgets and can utilize local funding programs like **ITM Core Subsidy** awards.
- The HIRO also receives a subsidy from the **Cancer Center** for qualifying projects.

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The Importance of the HIRO

- The HIRO's primary goal is to ensure that the imaging exams performed for, and distributed to, clinical trials and research projects are compliant with the research protocol, IRB requirements, and HIPAA regulations.
- Failure to properly engage the HIRO's services with your trial may lead to:
 - **Queries and Deviations** – Imaging exams that are not performed according to trial guidelines or properly submitted to the trial sponsor will generate numerous trial queries and may even trigger an official protocol deviation or violation.
 - **Repeat Imaging** – Imaging exams that are not performed according to trial guidelines may need to be repeated at UCM's expense. This may also increase patient radiation exposure and decrease patient satisfaction.

The Importance of the HIRO

- Failure to properly engage the HIRO's services with your trial may lead to:
 - **Patient Removal** – Imaging exams that are not performed according to trial guidelines or properly submitted to the trial sponsor may force the removal of the patient from the trial. This may have an adverse impact on patient care and satisfaction.
 - **FDA Action** – Numerous or repeated deviations or violations may prompt an audit from both the trial sponsor and the FDA. Such audits may lead to the suspension of patient enrollment and trial activities and could jeopardize participation in future trials.
 - **HIPAA Compliance** – Improperly de-identified data may generate protocol deviations or violations and may even trigger federal HIPAA violations and fines to the institution.

Keys to Remember

- The HIRO is here to help you! Here are some keys that will help keep your trial's imaging running smoothly:
 - ✓ **Engage the HIRO with new trials early** – if your new trial will involve imaging, contact the HIRO as soon as possible. This is especially important if the trial will use a central reviewer or requires imaging site qualification. Forward any imaging materials you receive to the HIRO, and if you don't receive any, ask the sponsor to provide them!



Keys to Remember

- The HIRO is here to help you! Here are some keys that will help keep your trial's imaging running smoothly:
 - ✓ **Notify the HIRO of upcoming scans as soon as possible** – remember to keep the HIRO in the loop when you schedule imaging appointments! If the HIRO asked to be notified when scans are scheduled, be sure to email the HIRO as soon as possible. This will allow the HIRO to provide the imaging technologists with the resources needed to perform the exam properly.

HIRO Email: hirohelp@bsd.uchicago.edu

Keys to Remember

- The HIRO is here to help you! Here are some keys that will help keep your trial's imaging running smoothly:
 - ✓ **Submit image data requests as soon as possible** – most clinical trials require that we submit exams 3-5 days after they are performed. Failure to do so will usually generate queries. The HIRO cannot submit an exam without the proper data request, so make sure you submit the necessary requests via the HIRO's website!
 - ✓ You can even submit an image data request for a scan scheduled in the future!



Keys to Remember

- A note about EPIC CareEverywhere:
 - ✓ **A great way to see if a patient has outside scans!** – the CareEverywhere feature will display a patient’s imaging exam records from outside hospitals, letting us know that they have had scans performed elsewhere.
 - ✓ **Not a great way to get copies of outside scan images!** – unfortunately, CareEverywhere only lets us know that an outside scan was performed (and sometimes it will give us a copy of the report). It does **not** share the actual scan images. If images must be submitted to a sponsor, *you will need to request a copy of the scan on disc (or via Ambra) from the outside facility.* Once the disc is available, you can submit an image data request via the HIRO’s website and we can use the disc to upload the images to the sponsor.

Keys to Remember

- The MRI Research Center (Mitchell Q300):
 - ✓ The MRIRC is a core facility that can perform complex MRI scans. If your trial includes MRI scans, the HIRO will review the requirements and determine if their level of complexity requires the MRIRC. The MRI requirements for most trials are relatively routine and do not require the MRIRC. The HIRO will provide you with its assessment during start-up.
 - ✓ If the HIRO assigns your trial's MRI scans to the MRIRC, we will let you know as they have a slightly different start-up and scan scheduling process. *If your trial's MRI scans have been assigned to the MRIRC, they **must** be performed by the MRIRC.*
 - ✓ If you are not sure if your trial has been assigned to the MRIRC, *please check with the HIRO.* The MRIRC cannot perform scans for trials that have not gone through their start-up process.

More Protips!

- If you submit an image data request and ask us to expedite it (“**stat**”), please be available in case there are questions.
- Similarly, please be available for discussion if you submit a large image data request (> 10 scans). Large requests often take longer to process and generate questions.
- If you receive a missing data query for a scan you’ve already requested, or if you’re not sure if a scan has been uploaded, please reach out to the HIRO and ask. Don’t submit a (duplicate) request!
- Double-check the subject numbers and time points in your image data requests (**don’t guess!**).
 - Incorrect subject IDs or time points can lead to multiple queries and require lots of time to untangle. Although the HIRO tries to double-check when possible, we don’t always have all the required information.

Questions?

- The HIRO is always available to help answer any imaging-related questions you might have! If we can't answer them, we will help find the people who can!



❖ **Phone:** 702-9172

❖ **Fax:** 834-6721

❖ **Office:** Billings/FMI I-102

❖ **Website:** <https://hiro.bsd.uchicago.edu>

❖ **Email:** hirohelp@bsd.uchicago.edu

❖ **Hours:** 8AM – 4PM, Monday - Friday



Photo credit Sara Serritella/UChicago ITM

