# The NCI Co-Clinical Imaging Research Resources Program (CIRP)

**https://nciphub.org/groups/cirphub**

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# CIRP FOA: PAR-18-841

*Develop Co-Clinical imaging research resources that will encourage a consensus on how quantitative imaging (QI) methods are optimized to improve the quality of imaging results for co-clinical trials of [adult and/or pediatric cancers](#):*

❑ Perform optimization of pre-clinical quantitative imaging methods

❑ Implement optimized methods in co-clinical trials

❑ Populate a web-accessible research resource with all data, methods, workflow documentation, and results collected from co-clinical investigations.

# Structure of Individual CIRP Site

*Four Elements*

❑ **Co-clinical interventions**:

Known intervention
Therapeutic or prevention
Prospective or retrospective

❑ **GEMMs or PDXs models**:

Mice, available, credentialed, validated

❑ **Quantitative imaging**:
Preclinical identical to clinic one
New methods require IND or IDE
User developed software tools allowed

❑ **State-of-art informatics**:
Encourage data integration
Encourage to use TCIA, NCIP hub
Encourage to contribute to OMF, QIN, EDRN, etc.
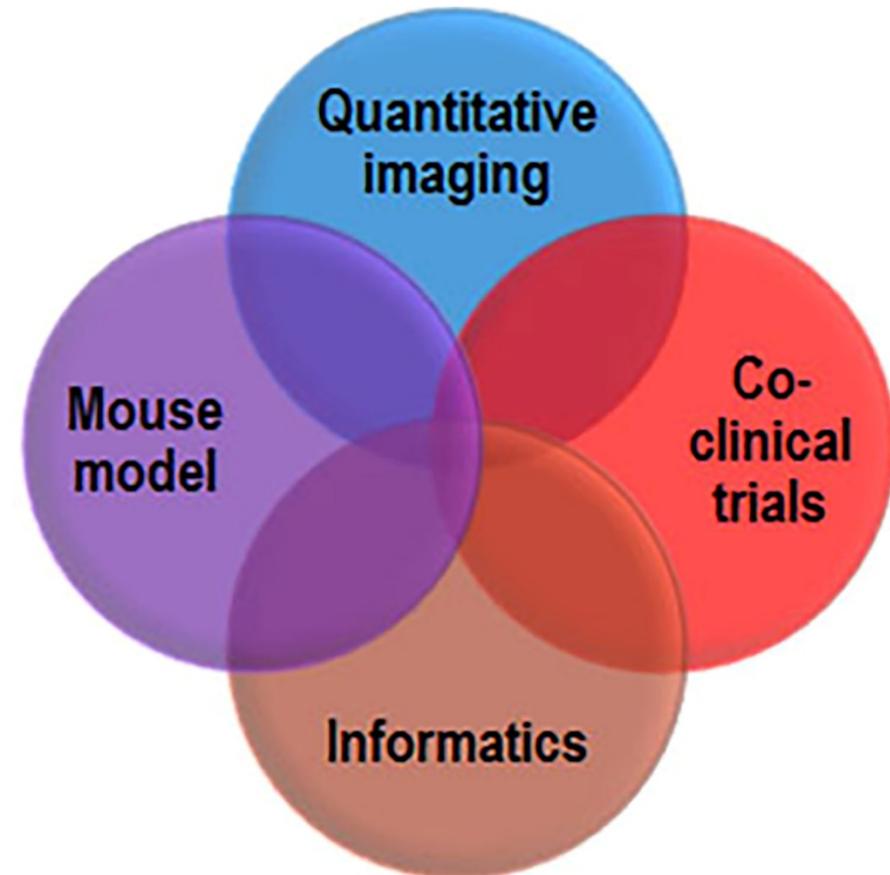
# Adult & Pediatric Cancers: Differences

## Adults

Bladder Cancer
**Breast Cancer***
**Colorectal Cancer***
Endometrial Cancer
Kidney Cancer
Leukemia
Liver Cancer
Lung Cancer
**Melanoma***
Non-Hodgkin Lymphoma
**Pancreatic Cancer***
**Prostate Cancer***
Thyroid Cancer

**\*CIRP projects**

## Children

Leukemia
Brain and spinal cord
Neuroblastoma
Wilms
Lymphoma
Rhabdomyosarcoma
Retinoblastoma
Bone cancer

## Differences

Patient groups
Types
Organ sites
Treatment
Long term side effect

**Need different imaging protocols**

# CIRP Expectation: To Deliver Standards & SOPs



**Co-clinical Study**

Biology relevant

**In vivo Imaging** — Pre-clinical / Clinical
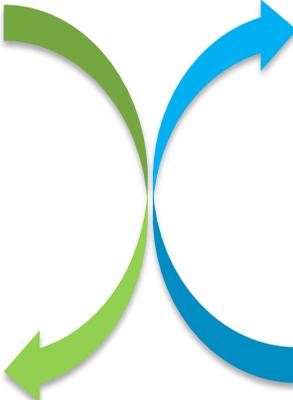
**Pathology** — routine / option

**-Omics** — routine / option

**Informatics** — Information archive

Metadata integration: need, encouraged

To be established
To be leveraged
Need development

NIH NATIONAL CANCER INSTITUTE

# CIRP Deliverable: *A web-accessible resource with functional information and functionality.*

## Data Examples:
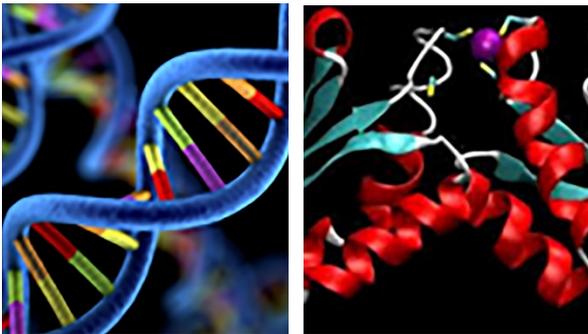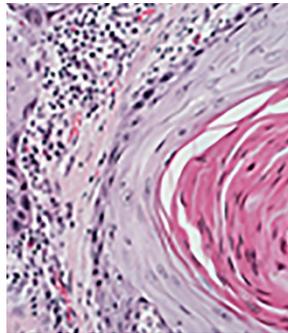
**Clinical imaging**

**Preclinical imaging**

**Pathology**
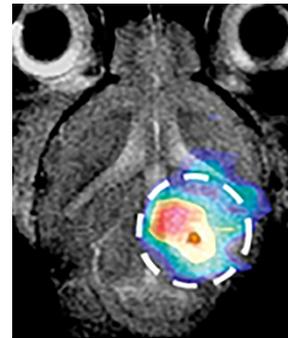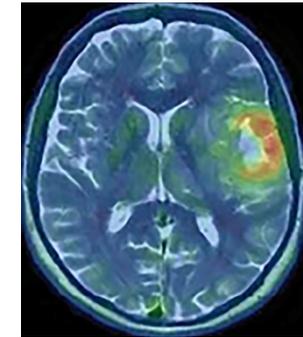


**RNA-Seq & WES (PDXs)**

**Anatomical**

**Protocols**
**Software**
**Workflow**
**Tools, etc.**

Correlated data sets

**Molecular**

# CIRP Web-Resources Are On The Way

**Award**

| 2017 | 2018 | 2019 | 2020 | 2021 |

**Team**

WUSTL*

Duke*

Vanderbilt — MDACC

UPENN

U Michigan

BCM/UTA/Stanford

UCSF
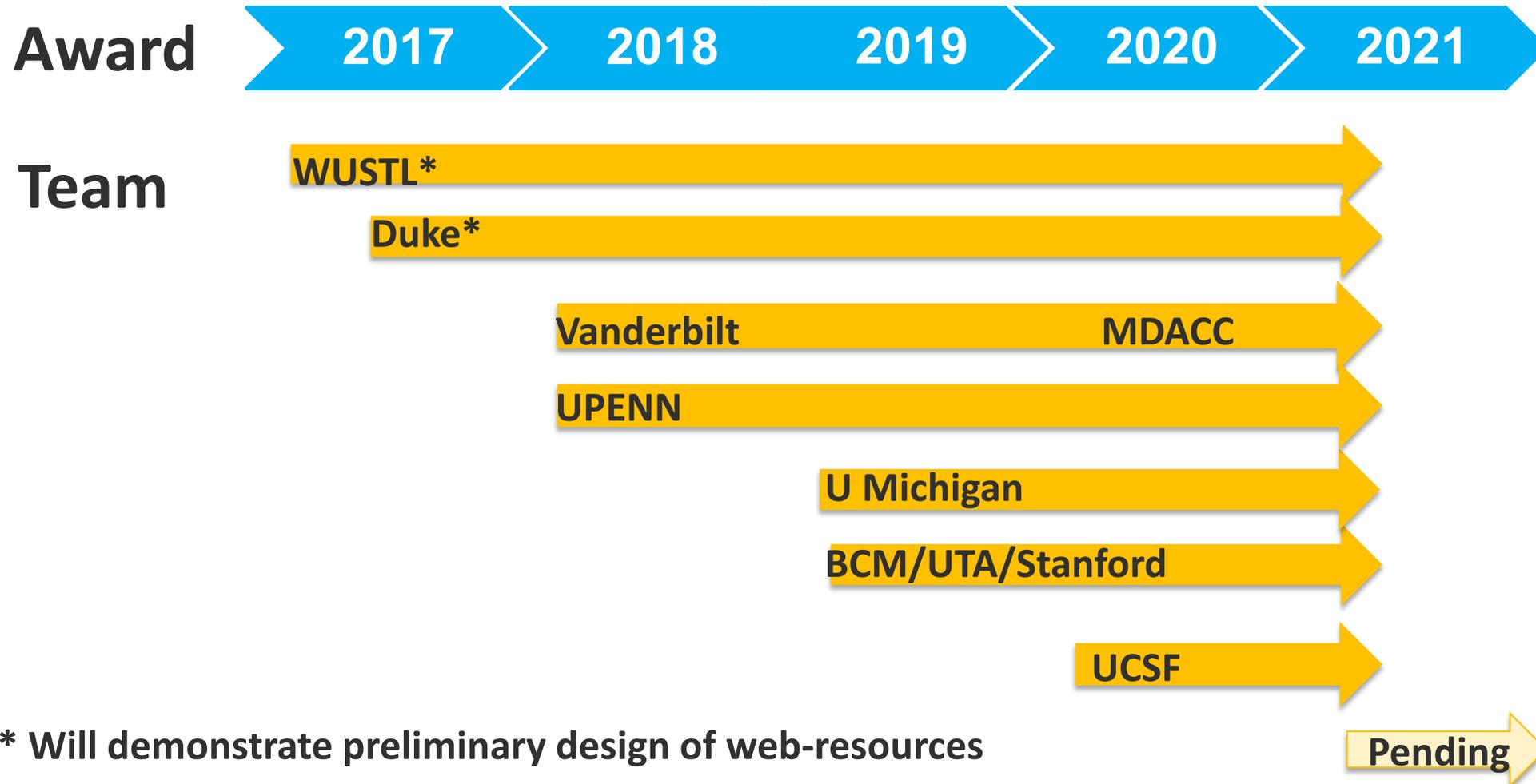
* Will demonstrate preliminary design of web-resources

Pending

# CIRP Projects

| Institute | Animal Models | Therapy | Imaging | Leveraged Resources |
|---|---|---|---|---|
| WUSTL | Breast TNBC orthotopic PDXs | Chemotherapy | PET/MRI, FDG PET T1, T2, DW, DCE MRI | PDXnet, ITCR, QIN, QIBA, SAIR, HTAN, XNAT |
| Duke | Soft Tissue Sarcoma GEMMs | Immunotherapy Radiation therapy | T1, T2, DW micro-MRI Micro-CT | CIVM, QIBA |
| MD Anderson (transferred from Vanderbilt) | RAS CRC, Subcutaneous, Orthotopic PDXs, Immuno-competent | Targeted therapy | Dual tracer dynamic PET 18F-FSPG, 11C-Acetate | SPORE, PET probe lab |
| UPENN | PDA KPC GEMMs | Targeted therapy | Radial sampling MRI DCE, DW, MTC MRI | SAIR, Mouse hospital, |
| U Michigan | Myelofibrosis, bone marrow transplant GEMMs | Targeted therapy | Cryoprobe MRI DFPP, DW, MTC, Spleen MRI | SAIR, QIN |
| Baylor/UT Austin/Stanford | Breast TNBC orthotopic PDX | Chemotherapy | DW, DCE MRI | PDXnet, CPTAC, QIN, ITCR, ePAD, LinkedOmics |
| UCSF | Prostate Metastatic PDXs | Chemotherapy | Hyperpolarized 13C MRI,T2, DW, DCE MRI | NIH P41 HP 13C MRI Center, |

# CIRP Network

## https://nciphub.org/groups/cirphub
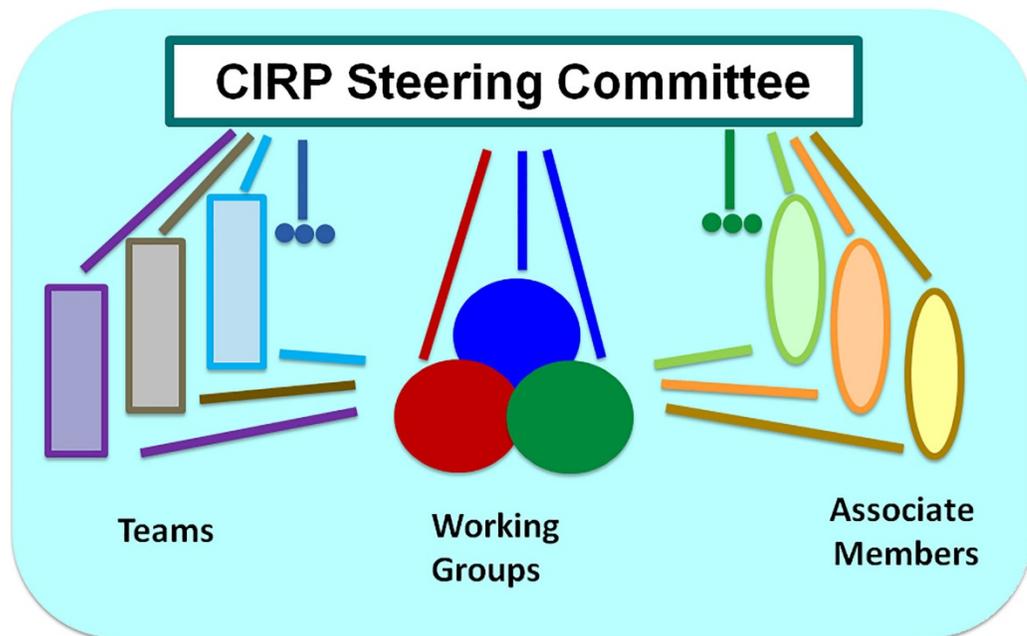


❑ **Steering Committee (SC)**

❑ **Three Working Groups (WGs):**
  o **Animal models and co-clinical trials (AMCT)**
  o **Imaging acquisition and data process (IADP)**
  o **Informatics and outreach (IMOR)**

❑ **Associate Members:**
  o **Join WGs T-cons**
  o **Contribute to consensus development**
  o **Participate annual meetings**
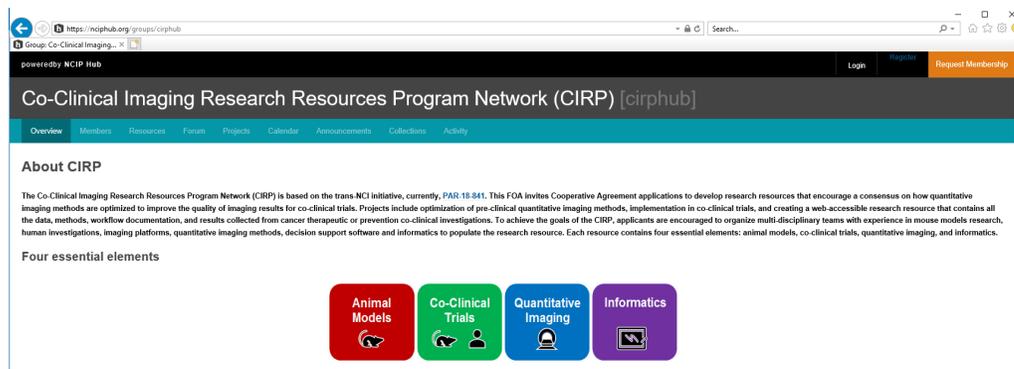
# CIRP Network Efforts

**WMIC 2019**
WORLD MOLECULAR IMAGING CONGRESS

**MONTRÉAL** SEPTEMBER 4-7, 2019

LATE BREAKING ABSTRACT
SUBMISSION PERIOD:
**JUNE 3 — JULY 1, 2019**

THE DYNAMICS OF LIFE:
INTEGRATING MOLECULAR IMAGING

*wmis.org*

Program
Speakers
Print

## Spotlight 5: Co-clinical Imaging in Precision Medicine

| Thu, September 05 | 8:00 - 9:30 | 520a |

### Description

The National Cancer Institute (NCI) has recently launched the Co-Clinical Imaging Research Resources

## Co-Clinical Imaging Resource Program (CIRP): Bridging the Translational Divide to Advance Precision Medicine

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**Key Words:** Coclinical trial, preclinical PET, MR, CT, quantitative imaging, informatics, precision medicine, patient-derived tumor xenograft (PDX), genetically engineered mouse model (GEMM), cell transplant model (CTM)

**Abbreviations:** Co-Clinical Imaging Research Resource Program (CIRP), genetically engineered mouse models (GEMM), cell transplant models (CTM), patient-derived tumor xenograft (PDX), quality assurance (FLP, flippase; QA), steering committee (SC), working group (WG), hematopoietic stem cells (HSCs), quantitative imaging (QI), National Cancer Institute (NCI), magnetic resonance imaging (MRI), computed tomography (CT), positron emission tomography (PET), American College of Radiology (ACR), field of view (FOV), Bland–Altman analysis (BA)

**ABSTRACT**

The National Institutes of Health's (National Cancer Institute) precision medicine initiative emphasizes the biological and molecular bases for cancer prevention and treatment. Importantly, it addresses the need for consistency in preclinical and clinical research. To overcome the translational gap in cancer treatment and prevention, the cancer research community has been transitioning toward using animal models that more faithfully recapitulate human tumor biology. There is a growing need to develop best practices in translational research, including imaging research, to better inform therapeutic choices and decision-making. Therefore, the National Cancer Institute has recently launched the Co-Clinical Imaging Research Resource Program (CIRP). Its overarching mission is to advance the practice of precision medicine by establishing consensus-based best practices for co-clinical imaging research by developing optimized state-of-the-art translational quantitative imaging methodologies to enable disease detection, risk stratification, and assessment/prediction of response to therapy. In this communication, we discuss our involvement in the CIRP, detailing key considerations including animal model selection, co-clinical study design, need for standardization of co-clinical instruments, and harmonization of preclinical and clinical quantitative imaging pipelines. An underlying emphasis in the program is to develop best practices toward reproducible, repeatable, and precise quantitative imaging biomarkers for use in translational cancer imaging and therapy. We will conclude with our thoughts on informatics needs to enable collaborative and open science research to advance precision medicine.

# CIRP Outreach & Dissemination
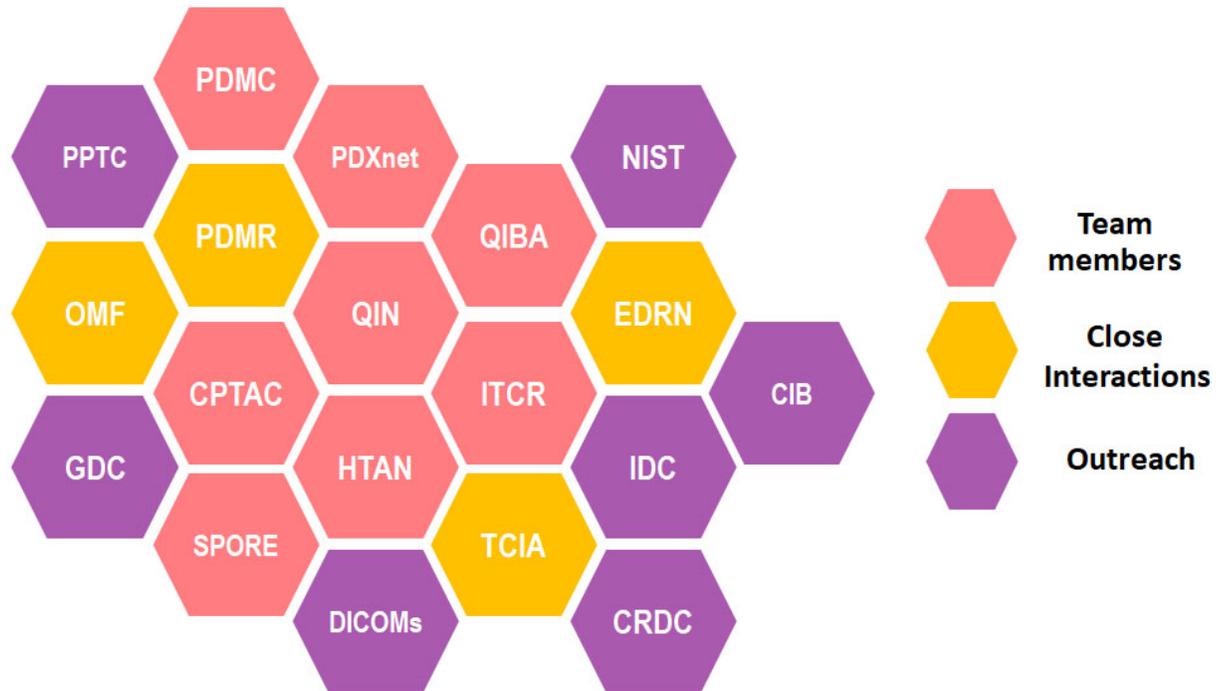


- ☐ **CIRP annual meeting**
- ☐ **Talks by outside speakers at WGs**
- ☐ **CIRP sessions at scientific meetings/conferences**
- ☐ **Scientific meetings**
- ☐ **CIRP Web-resources**

# CIRP Annual Meeting



*2021 CIRP Annual Virtual Meeting: opens to public*
*Registration Link: https://events.cancer.gov/cip/cirp*

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