



Consortium for Advancing Management and Prevention of Cancer in People with HIV Data Commons (AMC-DC)

Data Standardization Plan for Cell Profiling

Template v2.0; 07APR2021

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1. GLOSSARY

Data Formats: A collection of requirements / templates to ensure that the data adheres to a certain standard including minimal required data elements, accepted values, control vocabulary and/or ontologies to be used for certain fields.

Meta data: Collection of data to be collected about the data. This includes information about each field to be collected for a certain assay, experimental information such as instrument, instrument configuration, measurement unit/description, descriptions of the file collection, and other information that is valuable for analysis. Minimal meta data descriptors are a subset of meta data that are considered to be essential.

Operations and Data Management Center (ODMC): provides operational, logistical, communications, contracting, protocol development, site management, data and specimen management, monitoring, regulatory and medical monitoring support to the AMC.

Statistics and Data Analysis Center (SDAC): provides statistical design and analysis of AMC studies

AMC Network Research Laboratories (NRLs): provide expertise in virology, viral oncology (e.g., KSHV, HPV, EBV), pharmacology, pathology, hematopathology, genomics, and advanced HIV diagnostics for correlative studies in support of AMC clinical trials

Data Standardization Teams: Develop Data Standardization Plans for each assay type specifying expected data pre-processing, sample quality metrics, data formats, data processing workflows, and experimental meta data descriptors.

2. INTRODUCTION

This document outlines specifications for raw data files/formats, data pre-processing, sample quality metrics, and experimental meta data descriptors for the following assays: cell profiling via mass cytometry (CyTOF) and flow cytometry.

Data submitted to the ODMC must follow the standards included in this document. This includes laboratory data generated by AMC network research laboratories (NRLs) and affiliate laboratories.

For each cell profiling dataset, the following tables will be provided along with a manifest of the files (see Section 7 for instructions on generating the file manifest):

1. Raw data in [Protocol ID]_[assay]_[date]_raw_data.fcs or in multiple lmd files
2. Pre-processing workflow step details in [Protocol ID]_[assay]_[date]_workflow.csv
3. Processed data in [Protocol ID]_[assay]_[date]_exp_data.csv
4. Specimen linkage data in [Protocol ID]_[assay]_[date]_specimen_linkage.csv (if .lmd files are provided)
5. Experimental metadata in [Protocol ID]_[assay]_[date]_exp_metadata.csv
6. Quality metrics in [Protocol ID]_[assay]_[date]_quality_metrics.csv

Multiple complete sets of data files will be provided if testing occurred for multiple assay types.

3. RAW DATA FILES AND FORMAT

3.1 Raw Data Files

Table 1: Raw Data File Overview

File Extension/Type	Description of File Content	Reference
.fcs	Flow cytometry and mass spectrometry standard raw data	https://en.wikipedia.org/wiki/Flow_Cytometry_Standard
.lmd	Flow cytometry raw data	N/A; when raw data is stored in .lmd files, multiple files will be provided per sample

3.2 Raw Data Format Description

Specifications for .fcs files are outlined in https://en.wikipedia.org/wiki/Flow_Cytometry_Standard

4. LABORATORY DATA PRE-PROCESSING

4.1 Data Pre-Processing Steps

The following data pre-processing steps will be performed for lab experiments conducted at Ohio State University. Specific software and database versions will be reported to the AMC-DC as outlined in Table 2:

Flow cytometry: Five color flow cytometry will be performed using defined antibody panels as previously described[1]. Flow cytometry will be performed via stain lyse run approach on automated Prep2 Workstation cell preparation system and TQ-prep Workstation with ImmunoPrep Reagent System, according to the manufacturer's instructions (Beckman Coulter). Acquisition and analysis will be performed using CXP software with Prism Plot utility, using CD45 and side scatter characteristics to gate on lymphocytes. The results will be expressed as absolute number or percentage of total gated lymphocytes and absolute number of cells per microliter of blood using absolute lymphocytes count from ActDiff hematology analyzer (Beckman Coulter).

Mass cytometry methods: PBMCs will be defrosted and cultured in RPMI medium supplemented with 10% FBS for 2-24 hours. PBMCs will be counted and stained with metal-labeled surface and intracellular antibodies per standard mass cytometry staining procedure. Data will be collected using a mass cytometer. Mass cytometry data analysis will be performed by manual gating using Cytobank software (premium.cytobank.org).

The following data pre-processing steps will be performed for lab experiments conducted at UCSD. Specific software and database versions will be reported to the AMC-DC as outlined in Table 2:

Flow cytometry. Six color flow cytometry will be performed using defined antibody panels and protocols,

[1] Shindiapina P, Pietrzak M, Seweryn M, McLaughlin E, Zhang X, Makowski M, Ahmed EH, Schlotter S, Pearson R, Kitzler R, Mozhenkova A, Le-Rademacher J, Little RF, Akpek G, Ayala E, Devine SM, Kaplan LD, Noy A, Popat UR, Hsu JW, Morris LE, Mendizabal AM, Krishnan A, Wachsmann W, Williams N, Sharma N, Hofmeister CC, Forman SJ, Navarro WH, Alvarnas JC, Ambinder RF, Lozanski G, Baiocchi RA. Immune Recovery Following Autologous Hematopoietic Stem Cell Transplantation in HIV-Related Lymphoma Patients on the BMT CTN 0803/AMC 071 Trial. Front Immunol. 2021 Sep 3;12:700045. doi: 10.3389/fimmu.2021.700045. PMID: 34539628; PMCID: PMC8446430.¹

as described in Reid et al [2]. Panels that assess surface antigens will not need to be fixed and permeabilized and will use 7-AAD as a viability stain. Panels that assess intracellular antigens and require fixation and permeabilization will not include 7-AAD. Rather, viability will be determined by forward and side scatter characteristics. The staining will proceed manually. Cocktails will be produced for each panel and stored for at most 2 weeks. Staining will be conducted using standard protocols and according to the manufacturer's recommendations. Acquisition will be performed using a FACSCanto 2 laser flow cytometer. Analysis will be performed using FACSDiva or FlowJo software. Live singlets will be analyzed for expression of hematopoietic lineage and activation markers.

Data processing specifications will be reported in the following format. Requirements for collection are noted in the last column titled "Collection Requirement". Data processing specifications will be submitted in a .csv file to the ODMC.

- Filename will be [Protocol ID]_[assay]_[date]_workflow.csv
- The data must have the columns listed exactly as in the "Variable Name" column in the table below. Included values must be included as listed in the "Validation Rules" column in the table below.

[2] Erin G Reid, Kelly Shimabukuro, Page Moore, Richard F Ambinder, Jack D Bui, Semi Han, Otoniel Martínez-Maza, Dirk P Dittmer, David Aboulafia, Elizabeth Yu Chiao, Toby Maurer, Robert Baiocchi, Ronald Mitsuyasu, William Wachsman; AIDS Malignancy Consortium (AMC). AMC-070: Lenalidomide Is Safe and Effective in HIV-Associated Kaposi Sarcoma. Clin Cancer Res 2022 Jun 13;28(12):2646-2656. doi: 10.1158/1078-0432.CCR-21-0645.

Table 2: Variables to be Submitted in [Protocol ID]_[assay]_[date]_workflow.csv

Variable Name	Type	Length	Description	Validation Rules	Collection Requirement
Protocol	Num	5	Protocol ID	Must match ODMC-specified value for the study	Required
Software	Char	20	Software	Must be one of the following: CXP, Cytobank, FACSDiva or FlowJo. CXP, FACSDiva or FlowJo expected for flow cytometry and Cytobank expected for mass cytometry.	Required
Software_Version	Num	5(2)	CXP, Cytobank, FACSDiva or FlowJo software version	--	Required

4.2 Final Laboratory-Processed Data Format

Data will be submitted in the following processed data format. Requirements for collection are noted in the last column titled “Collection Requirement”. Laboratory-processed data will be submitted in a .csv file to the ODMC. Measured cell populations will vary by protocol; all measured cell populations will be reported.

- Filename will be [Protocol ID]_[assay]_[date]_exp_data.csv
- The data must have the columns listed exactly as in the “Variable Name” column in the table below. Included values must be included as listed in the “Controlled Vocabulary” and “Validation Rules” columns in the table below.

Table 3: Variables to be Submitted in [Protocol ID]_[assay]_[date]_exp_data.csv

Variable Name	Type	Length	Description	Controlled Vocabulary	Validation Rules	Collection Requirement
Protocol	Num	5	Protocol ID	N/A	Must match ODMC-specified value for the study	Required
Specimen ID	Num	9	Specimen number, refers to the GlobalTrace barcode number printed on each cryovial	N/A	Must be 9 characters long.	Required
Participant ID	Num	13	AMC study participant ID	N/A	Must match list of enrolled participants from ODMC	Optional
Test Date	Date	8	Date of test	N/A	xx/xx/xxxx (mm/dd/yyyy)	Required
Collection Date	Date	10	Date of specimen collection	N/A	xx/xx/xxxx (mm/dd/yyyy)	Required
Total Lymphocytes	Num	7	Total lymphocytes	N/A	--	Optional
Total Monocytes	Num	7	Total monocytes	N/A	--	Optional
Total Blasts	Num	7	Total blasts	N/A	--	Optional
CD14+/HLA DR+	Num	7	CD14+/HLA DR+ cell count	N/A	--	Optional
CD14+/HLA DR-	Num	7	CD14+/HLA DR- cell count	N/A	--	Optional
HLA DR-/CD14-	Num	7	HLA DR-/CD14- cell count	N/A	--	Optional
CD3-/CD56+/CD16+	Num	7	NK cell count	N/A	--	Optional
CD3+/CD56-/CD16-	Num	7	T cell count	N/A	--	Optional

Variable Name	Type	Length	Description	Controlled Vocabulary	Validation Rules	Collection Requirement
CD19+	Num	7	B cell count	N/A	--	Optional
CD69+/CD3+	Num	7	Early Activation cell count	N/A	--	Optional
CD134+/CD3+	Num	7	Late Activation cell count	N/A	--	Optional
CD3+/HLADR+	Num	7	CD3+/HLADR+ cell count	N/A	--	Optional
CD3+/HLADR-	Num	7	CD3+/HLADR- cell count	N/A	--	Optional
HLADR-/CD69+/CD134+	Num	7	HLADR-/CD69+/CD134+ cell count	N/A	--	Optional
HLADR+/CD69+/CD3+/CD134-	Num	7	HLADR+/CD69+/CD3+/CD134- cell count	N/A	--	Optional
HLADR+/CD69- /CD3+/CD134+	Num	7	HLADR+/CD69- /CD3+/CD134+ cell count	N/A	--	Optional
HLADR+/CD69+/CD3+/CD134+	Num	7	HLADR+/CD69+/CD3+/CD134+ cell count	N/A	--	Optional
CD19+/CD80+	Num	7	Activation of B cell Markers CD19+/CD80+ cell count	N/A	--	Optional
CD19+/CD86+	Num	7	Activation of B cell Markers CD19+/CD86+ cell count	N/A	--	Optional
CD3+/CD80+	Num	7	Activation of T cell Markers CD3+/CD80+ cell count	N/A	--	Optional
CD3+/CD86+	Num	7	Activation of T cell Markers CD3+/CD86+ cell count	N/A	--	Optional
CD4+/CD45RA+	Num	7	Memory and Naive T Cells CD4+/CD45RA+ cell count	N/A	--	Optional
CD4+/CD45RA-	Num	7	Memory and Naive T Cells CD4+/CD45RA- cell count	N/A	--	Optional

Variable Name	Type	Length	Description	Controlled Vocabulary	Validation Rules	Collection Requirement
CD4+/CD45RO+	Num	7	Memory and Naive T Cells CD4+/CD45RO+ cell count	N/A	--	Optional
CD4+/CD45RO-	Num	7	Memory and Naive T Cells CD4+/CD45RO- cell count	N/A	--	Optional
CD4+/CD27+	Num	7	Markers of Transition CD4+/CD27+ cell count	N/A	--	Optional
CD4+/CD27-	Num	7	Markers of Transition CD4+/CD27- cell count	N/A	--	Optional
CD8+/CD45RA+	Num	7	CDH cells CD8+/CD45RA+ cell count	N/A	--	Optional
CD8+/CD45RA-	Num	7	CDH cells CD8+/CD45RA- cell count	N/A	--	Optional
CD8+/CD45RO+	Num	7	CDH cells CD8+/CD45RO+ cell count	N/A	--	Optional
CD8+/CD45RO-	Num	7	CDH cells CD8+/CD45RO- cell count	N/A	--	Optional
CD3+/CD8+/CD27+	Num	7	CD3+/CD8+/CD27+ cell count	N/A	--	Optional
CD3+/CD8+/CD27-	Num	7	CD3+/CD8+/CD27- cell count	N/A	--	Optional
CD3+/CD45RA+/CD45RO-	Num	7	CD3+/CD45RA+/CD45RO- cell count	N/A	--	Optional
CD3+/CD45RA-/CD45RO+	Num	7	CD3+/CD45RA-/CD45RO+ cell count	N/A	--	Optional
CD3+/CD45RA+/CD45RO+	Num	7	CD3+/CD45RA+/CD45RO+ cell count	N/A	--	Optional
CD3+/CD27+/CD45RA+	Num	7	CD3+/CD27+/CD45RA+ cell count	N/A	--	Optional
CD3+/CD27-/CD45RA+	Num	7	CD3+/CD27-/CD45RA+ cell count	N/A	--	Optional
CD3+/CD27+/CD45RO+	Num	7	CD3+/CD27+/CD45RO+ cell count	N/A	--	Optional
CD3+/CD27-/CD45RO+	Num	7	CD3+/CD27-/CD45RO+ cell count	N/A	--	Optional
CD4+/CD29+	Num	7	CD4+/CD29+ cell count	N/A	--	Optional
CD4+/CD29-	Num	7	CD4+/CD29- cell count	N/A	--	Optional

Variable Name	Type	Length	Description	Controlled Vocabulary	Validation Rules	Collection Requirement
CD29+/CD8+/CD45RA+	Num	7	CD29+/CD8+/CD45RA+ cell count	N/A	--	Optional
CD29+/CD8+/CD45RA-	Num	7	CD29+/CD8+/CD45RA- cell count	N/A	--	Optional
CD29+/CD8+/CD45RO+	Num	7	CD29+/CD8+/CD45RO+ cell count	N/A	--	Optional
CD29+/CD8+/CD45RO-	Num	7	CD29+/CD8+/CD45RO- cell count	N/A	--	Optional
CD8+/CD29+	Num	7	CD8+/CD29+ cell count	N/A	--	Optional
CD8+/CD29-	Num	7	CD8+/CD29- cell count	N/A	--	Optional
CD29+/CD45RA+/CD45RO-	Num	7	CD29+/CD45RA+/CD45RO- cell count	N/A	--	Optional
CD29+/CD45RA-/CD45RO+	Num	7	CD29+/CD45RA-/CD45RO+ cell count	N/A	--	Optional
CD29+/CD45RA+/CD45RO+	Num	7	CD 29+/ CD45RA+/CD45RO+ cell count	N/A	--	Optional
CD29+/CDRO+	Num	7	CD29+/CD45RO+ cell count	N/A	--	Optional
CD29-/CDRO+	Num	7	CD29-/CD45RO+ cell count	N/A	--	Optional
CD29+/CDRA+	Num	7	CD29+/CD45RA+ cell count	N/A	--	Optional
CD29-/CDRA+	Num	7	CD29-/CD45RA+ cell count	N/A	--	Optional
CD4+/CD193+	Num	7	TH2 CD4+/CD193+ cell count	N/A	--	Optional
CD4+/CD294+	Num	7	TH2 CD4+/CD294+ cell count	N/A	--	Optional
CD4+/CD183+	Num	7	TH2 CD4+/CD183+ cell count	N/A	--	Optional
CD4+/CD193+/CD183+	Num	7	TH2 CD4+/CD193+/CD183+ cell count	N/A	--	Optional
CD4+/CD193+/CD294+/CD183+	Num	7	TH2 CD4+/CD193+/CD294+/CD183+ cell count	N/A	--	Optional
CD4+/C194+	Num	7	TH1 CD4+/C194+ cell count	N/A	--	Optional
CD4+/CD193+/CD194+	Num	7	TH1 CD4+/CD193+/CD194+ cell count	N/A	--	Optional

Variable Name	Type	Length	Description	Controlled Vocabulary	Validation Rules	Collection Requirement
CD4+/CD294+/CD194+	Num	7	TH1 CD4+/CD294+/CD194+ cell count	N/A	--	Optional
CD4+/CD193+/CD294+/CD194+	Num	7	TH1 CD4+/CD193+/CD294+/CD194+ cell count	N/A	--	Optional
CD8-/CD127-/CD4+/CD25+	Num	7	CD8-/CD127-/CD4+/CD25+ cell count	N/A	--	Optional
CD4+/CD127+	Num	7	CD4+/CD127+ cell count	N/A	--	Optional
CD4+/CD127-	Num	7	CD4+/CD127- cell count	N/A	--	Optional
CD8+/CD25+	Num	7	CD8+/CD25+ cell count	N/A	--	Optional
CD8+/CD25-	Num	7	CD8+/CD25- cell count	N/A	--	Optional
CD4+	Num	7	Total CD4+ cell count	N/A	--	Optional
CD8+	Num	7	Total CD8+ cell count	N/A	--	Optional
CD8+/CD127+	Num	7	CD8+/CD127+ cell count	N/A	--	Optional
CD8+/CD127-	Num	7	CD8+/CD127- cell count	N/A	--	Optional
CD3+/AB+	Num	7	CD3+/AB+ cell count	N/A	--	Optional
CD3+/GD+	Num	7	CD3+/GD+ cell count	N/A	--	Optional
CD3+/CD158b+	Num	7	CD3+/CD158b+ cell count	N/A	--	Optional
CD3-/CD56+/CD16-/CD69+	Num	7	CD3-/CD56+/CD16-/CD69+ cell count	N/A	--	Optional
CD3+/CD69+/CD158b+	Num	7	CD3+/CD69+/CD158b+ cell count	N/A	--	Optional
CD3-/CD56+/CD16+/CD158b+	Num	7	CD3-/CD56+/CD16+/CD158b+ cell count	N/A	--	Optional
CD3-/CD56+/CD16+/CD69+	Num	7	CD3-/CD56+/CD16+/CD69+ cell count	N/A	--	Optional
CD3-/CD56+/CD16+/CD69+/CD158b+	Num	7	CD3-/CD56+/CD16+/CD69+/CD158b+ cell count	N/A	--	Optional
CD3+/CD159a+	Num	7	CD3+/CD159a+ cell count	N/A	--	Optional

Variable Name	Type	Length	Description	Controlled Vocabulary	Validation Rules	Collection Requirement
CD3+/CD107a+/CD107b+	Num	7	CD3+/CD107a+/CD107b+ cell count	N/A	--	Optional
CD3+/CD159a+/CD107b+	Num	7	CD3+/CD159a+/CD107b+ cell count	N/A	--	Optional
CD3- /CD56+/CD16+/CD107a+/CD107b+	Num	7	CD3- /CD56+/CD16+/CD107a+/CD107b+ cell count	N/A	--	Optional
CD3-/ CD56+/CD16+/CD107a+/CD107b+	Num	7	CD3-/ CD56+/CD16+/CD107a+/CD107b+ cell count	N/A	--	Optional
CD3-/CD56+/CD16+/CD159a+	Num	7	CD3-/CD56+/CD16+/CD159a+ cell count	N/A	--	Optional
CD3-/CD56+/CD16+/CD159a+/ CD107a+/CD107b+	Num	7	CD3-/CD56+/CD16+/CD159a+/ CD107a+/CD107b+	N/A	--	Optional
CD3+/CD314+	Num	7	CD3+/CD314+ cell count	N/A	--	Optional
CD3-/CD56+/CD16-/CD63+	Num	7	CD3-/CD56+/CD16-/CD63+ cell count	N/A	--	Optional
CD3-/CD56+/CD16-/CD314+	Num	7	CD3-/CD56+/CD16-/CD314+ cell count	N/A	--	Optional
CD3+/CD63+/CD314+	Num	7	CD3+/CD63+/CD314+ cell count	N/A	--	Optional
CD3-/CD56+/CD16+/CD314+	Num	7	CD3-/CD56+/CD16+/CD314+ cell count	N/A	--	Optional
CD3-/CD56+/CD16+/CD314+	Num	7	CD3-/CD56+/CD16+/CD314+ cell count	N/A	--	Optional
CD16-/CD56-/CD3-/CD117-	Num	7	CD16-/CD56-/CD3-/CD117- cell count	N/A	--	Optional
CD16+/CD56-/CD3-/CD117-	Num	7	CD16+/CD56-/CD3-/CD117- cell count	N/A	--	Optional
CD16-/CD56+/CD3-/CD117-	Num	7	CD16-/CD56+/CD3-/CD117- cell count	N/A	--	Optional
CD16+/CD56+/CD3-/CD117-	Num	7	CD16+/CD56+/CD3-/CD117- cell count	N/A	--	Optional
CD16-/CD56-/CD3+/CD117-	Num	7	CD16-/CD56-/CD3+/CD117- cell count	N/A	--	Optional
CD16+/CD56-/CD3+/CD117-	Num	7	CD16+/CD56-/CD3+/CD117- cell count	N/A	--	Optional

Variable Name	Type	Length	Description	Controlled Vocabulary	Validation Rules	Collection Requirement
CD16-/CD56+/CD3+/CD117-	Num	7	CD16-/CD56+/CD3+/CD117- cell count	N/A	--	Optional
CD16+/CD56+/CD3+/CD117-	Num	7	CD16+/CD56+/CD3+/CD117- cell count	N/A	--	Optional
CD16+/CD56-/CD3+/CD117+	Num	7	CD16+/CD56-/CD3+/CD117+ cell count	N/A	--	Optional
CD16-/CD56+/CD3-/CD117+	Num	7	CD16-/CD56+/CD3-/CD117+ cell count	N/A	--	Optional
CD16+/CD56+/CD3-/CD117+	Num	7	CD16+/CD56+/CD3-/CD117+ cell count	N/A	--	Optional
CD16-/CD56-/CD3+/CD117+	Num	7	CD16-/CD56-/CD3+/CD117+ cell count	N/A	--	Optional
CD16-/CD56+/CD3+/CD117+	Num	7	CD16-/CD56+/CD3+/CD117+ cell count	N/A	--	Optional
CD16+/CD56+/CD3+/CD117+	Num	7	CD16+/CD56+/CD3+/CD117+ cell count	N/A	--	Optional
% CD4 in total cells	Num	5,2	Percentage of CD4 in total cell count	N/A	--	Optional
% CD25+CD127- Tregs	Num	5,2	Percentage of CD25+CD127- Tregs in total cell count	N/A	--	Optional
% FoxP3+ in CD25+ CD127- Tregs	Num	5,2	Percentage of FoxP3+ in CD25+ CD127- Tregs	N/A	--	Optional
% CD25+ CD127- FoxP3+ in CD4+ T cells	Num	5,2	Percentage of CD25+ CD127- FoxP3+ in CD4+ T cells	N/A	--	Optional
% Granzyme B+ Perforin+ in CD4 T cells	Num	5,2	Percentage of Granzyme B+ Perforin+ in CD4 T cells	N/A	--	Optional
% PD-1 in CD4	Num	5,2	Percentage of PD-1 in CD4 Cells	N/A	--	Optional
% CD69 in CD4	Num	5,2	Percentage of CD69 in CD4 Cells	N/A	--	Optional
% Ki-67 in CD4	Num	5,2	Percentage of Ki-67 in CD4 Cells	N/A	--	Optional
% CCR4 in CD4	Num	5,2	Percentage of CCR4 in CD4 Cells	N/A	--	Optional
% CXCR3 in CD4	Num	5,2	Percentage of CXCR3 in CD4 Cells	N/A	--	Optional

Variable Name	Type	Length	Description	Controlled Vocabulary	Validation Rules	Collection Requirement
% CCR6 in CD4	Num	5,2	Percentage of CCR6 in CD4 Cells	N/A	--	Optional
% CD127 in CD4	Num	5,2	Percentage of CD127 in CD4 Cells	N/A	--	Optional
% GATA3 in CD4	Num	5,2	Percentage of GATA3 in CD4 Cells	N/A	--	Optional
% CD62L in CD4	Num	5,2	Percentage of CD62L in CD4 Cells	N/A	--	Optional
% CCR7 in CD4	Num	5,2	Percentage of CCR7 in CD4 Cells	N/A	--	Optional
% CD45RA in CD4	Num	5,2	Percentage of CD45RA in CD4 Cells	N/A	--	Optional
% CD45RO in CD4	Num	5,2	Percentage of CD45RO in CD4 Cells	N/A	--	Optional
% CXCR5 in CD4	Num	5,2	Percentage of CXCR5 in CD4 Cells	N/A	--	Optional
% Granzyme B+ Perforin+ in CD8 T cells	Num	5,2	Percentage of Granzyme B+ Perforin+ in CD8 T cells	N/A	--	Optional
% PD-1 in CD8	Num	5,2	Percentage of PD-1 in CD8 cells	N/A	--	Optional
% CD69 in CD8	Num	5,2	Percentage of CD69 in CD8 cells	N/A	--	Optional
% Ki-67 in CD8	Num	5,2	Percentage of Ki-67 in CD8 cells	N/A	--	Optional
% CCR4 in CD8	Num	5,2	Percentage of CCR4 in CD8 cells	N/A	--	Optional
% CXCR3 in CD8	Num	5,2	Percentage of CXCR3 in CD8 cells	N/A	--	Optional
% CCR6 in CD8	Num	5,2	Percentage of CCR6 in CD8 cells	N/A	--	Optional
% CD127 in CD8	Num	5,2	Percentage of CD127 in CD8 cells	N/A	--	Optional
% GATA3 in CD8	Num	5,2	Percentage of GATA3 in CD8 cells	N/A	--	Optional
% CD62L in CD8	Num	5,2	Percentage of CD62L in CD8 cells	N/A	--	Optional
% CCR7 in CD8	Num	5,2	Percentage of CCR7 in CD8 cells	N/A	--	Optional
% CD45RA in CD8	Num	5,2	Percentage of CD45RA in CD8 cells	N/A	--	Optional
% CD45RO in CD8	Num	5,2	Percentage of CD45RO in CD8 cells	N/A	--	Optional

Variable Name	Type	Length	Description	Controlled Vocabulary	Validation Rules	Collection Requirement
% CXCR5 in CD8	Num	5,2	Percentage of CXCR5 in CD8 cells	N/A	--	Optional
Comments	Char	200	Comment Text or Cancellation Reason, where applicable	N/A	N/A	Optional

Specimen and data file linkages will be reported in the following format if .lmd files are provided. Requirements for collection are noted in the last column titled “Collection Requirement”. Specimen linkages will be submitted in a .csv file to the ODMC.

- Filename will be [Protocol ID]_[assay]_[date]_specimen_linkage.csv
- The data must have the columns listed exactly as in the “Variable Name” column in the table below. Included values must be included as listed in the “Controlled Vocabulary” and “Validation Rules” columns in the table below.

Table 4: Variables to be Submitted in [Protocol ID]_[assay]_[date]_specimen_linkage.csv

Variable Name	Type	Length	Description	Controlled Vocabulary	Validation Rules	Collection Requirement
Specimen ID	Num	9	Specimen number, refers to the GlobalTrace barcode number printed on each cryovial	--	Must be 9 characters long. If a Specimen is being entered as a reference (control) sample, the SN will be labeled as [specified value]	Required
File Name	Char	256	Name of the file	See details in each section	See details in each section	Required
File Type	Char	256	Type of the file	Raw Data, Interim-Processed Data, Final-Processed Data	Must match one of the values listed in the Controlled Vocabulary column	Required

5. EXPERIMENTAL INFORMATION AND KEY META DATA DESCRIPTORS

Experiments conducted at OSU will be performed as outlined in Shindiapina P, et al [1].

Experiments conducted at UCSD will be performed as outlined in Erin G Reid, et al [2].

Experimental meta data descriptors will be collected and reported in the following format. Requirements for collection are noted in the last column titled “Collection Requirement”. Experimental meta data descriptors will be submitted in a.csv file to the ODMC.

- Filename will be [Protocol ID]_[assay]_[date]_exp_metadata.csv
- The data must have the columns listed exactly as in the “Variable Name” column. Included values must be included as listed in the “Controlled Vocabulary” and “Validation Rules” columns in the table below.

Table 5: Variables to be Submitted in [Protocol ID]_[assay]_[date]_exp_metadata.csv

Variable Name	Type	Length	Description	Controlled Vocabulary	Validation Rules	Collection Requirement
Protocol	Num	5	Protocol	--	Must match ODMC-specified value for the study	Required
Assay Type	Char	50	Assay type Name	Cell Profiling	Must match the value listed in the Controlled Vocabulary column	Required
Assay	Char	50	Assay Name	Flow Cytometry, mass cytometry	Must match one of the values listed in the Controlled Vocabulary column	Required

Variable Name	Type	Length	Description	Controlled Vocabulary	Validation Rules	Collection Requirement
Lab	Char	25	Testing Laboratory Name	University of California San Diego, The Ohio State University	Must match one of the values listed in the Controlled Vocabulary column	Required
Lab Institution	Char	50	Testing Laboratory Institution	University of California San Diego, The Ohio State University	Must match one of the values listed in the Controlled Vocabulary column	Required
PI	Char	25	Testing Laboratory Principal Investigator	J. Bui, R. Baiocchi	Must match one of the values listed in the Controlled Vocabulary column	Required for university-based laboratories
Specimen Type	Char	25	Specimen Type	PBMC, Whole Blood	Must match one of the values listed in the Controlled Vocabulary column	Required
Instrument	Char	50	Instrument	Prep2 Workstation cell preparation system and TQ-prep Workstation with ImmunoPrep Reagent System, Fluidigm Sciences	Must match one of the values listed in the Controlled Vocabulary column The following values are expected for flow cytometry: Prep2 Workstation cell preparation system and TQ-prep Workstation with ImmunoPrep Reagent System The following values are expected for mass cytometry: Fluidigm Sciences	Required
Clone	Char	50	Clone	UCHT1	Must match one of the values listed in the Controlled Vocabulary column	Required

Variable Name	Type	Length	Description	Controlled Vocabulary	Validation Rules	Collection Requirement
Vendor	Char	50	Vendor	Biolegend	Must match one of the values listed in the Controlled Vocabulary column	Required
Fluorochrome	Char	50	Fluorochrome	PE	Must match one of the values listed in the Controlled Vocabulary column	Required when applicable. Not expected when Heavy metal is populated.
Heavy metal	Char	50	Heavy metal	Sm 154	Must match one of the values listed in the Controlled Vocabulary column	Required when applicable. Not expected when Fluorochrome is populated.
Biomarker	Char	50	Biomarker	CD3	Must match one of the values listed in the Controlled Vocabulary column	Required

6. QUALITY METRICS

Sample quality metrics will be collected and reported in the following format. Requirements for collection are noted in the last column titled “Collection Requirement”. Sample quality metrics will be submitted in a .csv file to the ODMC.

- Filename will be [Protocol ID]_[assay]_[date]_quality_metrics.csv
- The data must have the columns listed exactly as in the “Variable Name” column in the table below. Included values must be included as listed in the “Validation Rules” column in the table below.

Table 6: Variables to be Submitted in [Protocol ID]_[assay]_[date]_quality_metrics.csv

Variable Name	Type	Length	Description	Reference	Validation Rules	Collection Requirement
Protocol	Num	5	Protocol ID	--	Must match ODMC-specified value for the study	Required
Specimen ID	Num	9	Specimen number, refers to the GlobalTrace barcode number printed on each cryovial	N/A	Must be 9 characters long	Required
Cell viability (%)	Num	4,1	Percent cell viability prior to testing	N/A	Must be between 0.000-99.99%	Required for mass cytometry; Optional for flow cytometry
Events collected	Num	7	Number of reads made by instrument	N/A	Expected values range into millions	Required to studies conducted after finalization of standardization plan
% Cells	Num	5,2	Percent of events that are cells	N/A	Must be between 0.000-99.99%	Required to studies conducted after finalization of standardization plan
Abs # cells analyzed	Num	7	Absolute number of cells analyzed	N/A	--	Required to studies conducted after finalization of standardization plan

7. MANIFEST OF FILE COLLECTION TO BE SUBMITTED TO THE ODMC

The manifest of the file collection describes the collection of files that are expected along with the transferred files to ensure the integrity of the collection. The following files are expected to be listed in the manifest, at minimum: [Protocol ID]_[assay]_raw_data.fcs, [Protocol ID]_[assay]_[date]_workflow.csv, [Protocol ID]_[assay]_[date]_exp_data.csv, [Protocol ID]_[assay]_[date]_exp_metadata.csv, [Protocol ID]_[assay]_[date]_quality_metrics.csv, [Protocol ID]_[assay]_[date]_exp_manifest.csv.

Manifests will be submitted in a .csv to the ODMC. Requirements for collection are noted in the last column titled “Collection Requirement”.

- Filename will be [Protocol ID]_[assay]_[date]_exp_manifest.csv
- The data must have the columns listed exactly as in the “Variable Name” column. Included values must be included as listed in the “Controlled Vocabulary” and “Validation Rules” columns in the table below.

Table 7: Variables to be Submitted in [Protocol ID]_[assay]_[date]_exp_manifest.csv

Variable Name	Type	Length	Description	Controlled Vocabulary	Reference	Validation Rules	Collection Requirement
Protocol	Num	5	Protocol ID	--	N/A	Must match ODMC-specified value for the study	Required
File Name	Char	256	Name of the file	--	N/A	--	Required
File Type	Char	256	Type of the file	Raw, Interim-Processed, Final-Processed, Meta-Data, Quality-Metrics	N/A	Must match one of the values listed in the Controlled Vocabulary column (.csv, .fcs, etc.)	Required
sha256sum	Char	256	sha256 Checksum	--	See Data Preparation Instructions available at https://amcoperations.com/committee/amc-data-commons	--	Required
Timestamp	yyyy-mm-dd hh:mm		Data / Time of file creation	--	N/A	--	Required

Assay results will be reviewed for accuracy and compliance with specified data standards by the laboratory staff prior to transfer per the laboratory's procedures and SOPs.

8. ODMC DATA PROCESSING

The AMC ODMC will convert data submitted by labs from the wider format described above into a longer data table with fewer cell specific fields. Example below:

Table 8: Converted Data Format for Submission to the DC

Variable Name	Type	Length	Description	Controlled Vocabulary	Validation Rules	Collection Requirement
Protocol	Num	5	Protocol ID	--	Must match ODMC-specified value for the study	Required
Specimen ID	Num	9	Specimen number, refers to the GlobalTrace barcode number printed on each cryovial	--	Must be 9 characters long.	Required
Test Date	Date	8	Date of test	--	xx/xx/xxxx (mm/dd/yyyy)	Required
Cell Population	Char	30	Description of measured cell population	Values to be input per column names included in Table 3	--	Required
Parent Population	Char	30	Description of parent cell population	Values to be input per column names included in Table 3	--	Required if applicable
Cell Population # Cells	Num	10	Absolute number of cells measured	--	--	Required
% Cells	Num	4	Percent of target cells in parent population	--	--	Required if applicable
Comments	Char	200	Result Comment Text or Cancellation Reason, where applicable	--	--	Optional

9. APPROVAL

Data Standardization Plan Approval	
By signing this data transfer plan, I approve of the included specifications.	
Laboratory Resource Committee Chair:	
Signature:	X <i>Jeffrey Bethony</i> Electronically signed by: Jeffrey Bethony Reason: I am Approving this document Date: Oct 14, 2026 16:31:06 ADT
Jeffrey Bethony	10/14/2026
Signature	Date