GeneLab Standard Operating Procedure: Sample Aliquoting, Labeling and Storage

May 2020

Version 1.0

Document Revisions

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GL-SOP-1.1	1.0	May 2020	Original document

Scope and Purpose

This SOP describes in detail how GeneLab SPL handles sample storage, aliquoting, labeling and the consensus acronyms we use. There are 3 sections for the SOP:

1. Aliquoting and storage
2. Labeling
3. GeneLab abbreviation list

Procedure

1. Aliquoting and storage standardization

1.1. Tissue samples

1.1.1. Non GeneLab generated

1.1.1.1. Tissue aliquots received from a PI/collaborator/biorepository shall be stored in an original tube provided if it is intact and appropriate for the designated storage temperature.

1.1.2. GeneLab generated

1.1.2.1. Genelab generated tissues shall be aliquoted and stored in Brooks Life Science 2mL, 5mL or 7.8mL tubes or an acceptable alternative. Storage temperature of all tissue samples is -80°C.

1.1.2.2. If RNAlater used as a preservative, the tube shall be at least 12X bigger than the tissue mass to allow for 10X volume of preservative and headroom. After the submersion of the tissue into RNAlater, sample should be stored at 4°C for 24 hours before transfer to -80°C freezer.

1.2. RNA/DNA samples

1.2.1. Once RNA/DNA is extracted and quantified, it should be aliquoted as following:

1.2.1.1. Aliquot **"0"** – The remaining RNA/DNA sample after all aliquots were created. Stored in 0.5mL barcoded tube without a jacket from Brooks.

1.2.1.2. Aliquot **"1"** – Designated for subsequent library preparation, shall contain 1.5uG of RNA/DNA sample in 17-18uL of RNase/DNase free water. Stored in 1.5ml snap cap tube.

1.2.1.3. Aliquot **"2"** – Shall have 1.5uG of RNA/DNA. Stored in 0.5mL barcoded tube without a jacket from Brooks.

1.2.1.4. Aliquot **"3"** – Shall have 1.5uG of RNA/DNA. Stored in 0.5mL barcoded tube without a jacket from Brooks.

1.2.1.5. Aliquot **"4"** – Shall have 1.5uG of RNA/DNA. Stored in 0.5mL barcoded tube without a jacket from Brooks.

1.2.2. If total amount of RNA/DNA extracted is below 7.5uG, number of generated aliquots can be reduced.

1.2.3. If DNA is not to be processed and used for library preparation in the near future, it is acceptable to generate Aliquot "0" only.

1.2.4. All RNA/DNA vials should be stored at -80°C.

1.2.5. Samples received from a PI/collaborator/biorepository shall be stored in an original tube provided if it is intact and appropriate for the designated storage temperature.

1.3. Sequencing libraries and library pools

1.3.1. Libraries should be stored in a non-stick/low DNA binding tubes or plates.

1.3.2. Sequencing libraries shall be stored at -20°C for up to 6 months after generation.

1.3.2.1. For longer storage, it is advised to transfer libraries to -80°C storage right after the sequencing is completed. If a library needs to be re-sequenced, a re-quantification and an iSeq run are required to assess the library quality.

1.3.2.2. Multiplexed libraries can be stored for 6 - 12 weeks.

2. Label standardization

2.1. For all labels, only use freezer tested labels to avoid peeling. If using untested material, label the tube both in writing and with a label.

2.2. If incorporation of color coding is possible:

2.2.1. Use **BLUE** label/tape for DNA

2.2.2. Use **YELLOW** label/tape for RNA

2.3. Human readable side labeling format with example

2.3.1. "Study _ Treatment/Group _ Source-id _ Sample-id _ Extract-id _ Aliquot-number"

2.3.1.1. Example: second aliquot of DNA sample extracted from the left eye tissue sample dissected from mouse number G5 as was part of Rodent Research 1 mission in Ground Control group will have the following printed on its side label: RR1_GC_G5_LEYE_DNA_ALQ-2

2.4. Human readable top labeling format with example following

2.4.1. "Aliquot number"

"Source-id"
"Sample-id"
"Extract-id"

2.4.2. Example:

2.4.2.1. 2
G5
L EYE
DNA

2.4.3. If a microcentrifuge tube is used, write the aliquot number on the connecting part of the tube (see example image below):

2.5. Barcode side label

2.5.1. Affix the label in a way that will facilitate scanning, 1D barcode should be oriented lengthwise on the sample tube.

2.6. Barcode top/bottom label

2.6.1. Use Datamatrix (2D) format for top or bottom of the tube labeling.

2.7. Crybox/SBS Rack Labeling Procedure

2.7.1. All boxes must be labeled with the following information:

2.7.1.1. "Study-id"
"Sample-id"
"Extract-id"
"Box Number"
"Storage Temp"

2.7.1.2. Example:
RR-5
Skin
DNA
Box 5
-80°C

2.7.2. Make sure to erase all previous writing on the box.

2.7.3. It is preferred to label the box on 2 opposite sides.

2.8. Preferred labeling type

2.8.1. Tissue samples – Barcode and human readable

2.8.2. RNA/DNA samples:

Aliquot **"0"** – Barcode and human readable
Aliquot **"1"** – Barcode and human readable
Aliquot **"2"** – Barcode and human readable
Aliquot **"3"** – Barcode and human readable
Aliquot **"4"** – Barcode and human readable

2.8.3.Sequencing libraries and library pools - Barcode and human readable.

2.9. Use of Brady BMP55 for label printing

2.10. Use of Brooks Life Science Solutions FluidX IntelliXmark for label printing

2.11. Use of Brady CR2600 hand-held scanner for tube scanning

2.12. Use of Brooks Life Science Solutions Preception HD LF for tube scanning

2.13. Integration with Genohm SLIMS

3. GeneLab sample abbreviations

3.1. Abbreviation list is frequently updates. For the most current version refer to: *URL*

Table 1: GeneLab abbreviations

Abbreviation	Definition
1D11	Antibody that binds to TGFB and thus inhibits function
1G	1x gravity
2D	cells grown in 2D condition
2G	2x gravity
2T3cells	osteoblast cell line 2T3
3D	cells grown in 3D condition
3DCoC	3D co-culture model
4T1-Tumor	Flank tumor derived from the 4T1 murine mammary carcinoma cell line that was generated from a BALB/cfC3H mouse
28Si	Si 28 isotope
56Fe	Iron isotope
168	Strain of Bacillus subtilis
AB	Strain of Danio rerio
ACF	Animal Care Facility
act	activated
act2-3	Arabidopisis thaliana vegetative actin mutant
ADR	Adrenal Glands
AG01522	human fibroblasts AG01522 cells
AG1522	a normal human foreskin fibroblast cell line
AHSFS	air handling system filter screen of ISS
AJ-Jms-Slc	A/J Jms mice from Japan Slc, Inc
Alight	specimen grown in Ambient light

ALLCL	acute lymphoblastic leukemia cell line
ALQ	Aliquot
ALSDA	Ames Life Science Data Archive
aposym	aposymbiotic
ARG1-KO	A. thaliana Col-0 knock-out line deficient in the gene encoding Altered response to gravity-1
Asyn	Asynchronous cells, cells in various phases of cell cycle
AT	Adipose Tissue
Atha	Arabidopsis thaliana
ATM1	mutant defective in the DSB-sensing protein kinase ATM
B6.129S2KrasLA1	B6.129S2-*Kras*^{tm2Tyj}/Nci Mouse strain - This strain carries a targeted latent 'hit-and-run' K-ras allele that can be activated by an in vivo spontaneous recombination event ('run'). One half of the in vivo recombination events result in a normal K-ras allele and one half in an activated allele (K-rasG12D).
B#	mouse number from a basal group
BA1	BRIC A PDFU-1
BA2	BRIC A PDFU-2
BA3	BRIC A PDFU-3
BA4	BRIC A PDFU-4
BA5	BRIC A PDFU-5
BAL-JL	BALB/c mouse from Jackson Laboratory
BAL-SL	BALB/c mouse from Simonsen Labs
BAL-TAL	BALB/c mouse from Taconic Animal Laboratory
Batr	*Bacillus atrophaeus*
BB2	BRIC B PDFU-2
BB3	BRIC B PDFU-3
BB4	BRIC B PDFU-4
BB5	BRIC B PDFU-5
Bbas	Beauveria bassiana
BG1	BRIC G PDFU-1
BG2	BRIC G PDFU-2
BG3	BRIC G PDFU-3
bildisMCL	bilateral disruption of the medial collateral ligament
blank	no DNA or RNA added to extraction kit
BLD	Blood - we may want to revisit this - Whole Blood (WB), White Blood Cells (WBCs), Red Blood Cells (RBCs)
ble	bleomycin
BM	bone marrow
BMCs	bone marrow cells
BMSC	Bone Marrow Stromal Cells

Brap	*Brassica rapa*
BRN	Brain
BSL	baseline (or basal) control for a spaceflight experiment - subjects from the same cohort as a spaceflight experiment that are processed at the start of a spaceflight experiment to establish the initial condition of the experimental subjects
BSP	Biospecimen Sharing Program
Bsub	Bacillus subtilis
BY4742	Strain of Saccharomyces cerevisiae
BY4742_FLO1	S. cerevisiae strain BY4742 over-expressing the FLO1 member of the Flo adhesin protein family
BY4742_FLO8	S. cerevisiae strain BY4742 over-expressing the FLO8 member of the Flo adhesin protein family
C	dissected from frozen carcass
C	Celsius
C3H-He-Slc	C3H/He mice from Japan Slc, Inc.
C3H-HeJ	C3H Heston mouse from Jackson Labs (aka C3H/HeJ)
C57-6	C57BL/6 mouse from an unknown origin
C57-6CR	C57BL/6 mouse from Charles River
C57-6IBCh	C57BL/6 mouse from Shemyakin & Ovchinnikov Institute of Bioorganic Chemistry, Russia
C57-6J	C57BL/6 mouse from Jackson Labs
C57-6J-Jms-Slc	C57BL/6J Jms mice from Japan Slc, Inc.
C57-6T	C57BL/6 mouse from Taconic Biosciences
C57-10J	C57BL/10J mouse from Jackson Labs
C#	Cohort Number
Cab	wild type Cab strain of Oryzias latipes (Japanese medaka fish)
Can-S	Canton-Special (strain of Drosophila melanogaster)
cax1-1	describes cax1-1 transgenic line of Arabidopsis thaliana
Cb	cerebellum
CC	Cohort Control
Cele	Caenorhabditis elegans
cells	material type - cell line
cGy	centigray
Clinorotation	Clinorotation
CLN	Colon
cls	plant callus
CO2	Carbon Dioxide
Col-0	Arabidopsis thaliana Columbia-0 ecotype
Col-0-PhyD	Columbia ecotype with a mutation in phytochrome D (PhyD)
CPCs	Cardiac progenitor cells
CRCCL	colorectal cancer cell line
Cs137	Caesium-137 isotope

CTRL	control group for a space-relevant (but NOT spaceflight) experiment
CTRLSet	control set of animals (or samples) processed/preserved in a given day of operations
Cvi-0	Cape Verde Islands - 0 (Arabidopsis thaliana) ecotype, species variant 98
CyroC	Cyrochiller
D	Dorsal
d	day (time)
dark	specimen grown in darkness
dhfq	isogenic hfq deletion mutant
DI	Dry Ice
DIN	DNA integrity number
DLD-1	DLD-1 cells epithelial, adherent cell line derived from a colorectal adenocarcinoma (Dukes type C)
Dmel	Drosophila melanogaster
DNA	Deoxyribonucleic acid
do	days old
Drer	Danio rerio
DSKN	Dorsal Skin
dT	delta (change in) Temperature
Ecol	Escherichia coli
EDL	Extensor Digitorum Longus
EMF	treated with electromagnetic fields
Epi200MT	3-dimensional tissue model of human epidermis, MatTek Corporation, Ashland, MA
Esco	Euprymna scolopes
Etsl	Etiolated seedlings - after further review I think "etiolation" should be made into standalone factor
Euth	Euthasol
ext1	RNA was extracted the same day organs were dissected from frozen carcasses
ext2	Organs were dissected from frozen carcasses, flash frozen in (l)N2 and stored at -80C then RNA was extracted on a later date
EYE	Eye
F	Femoral
F#	mouse number from a spaceflight group
FBC	fibroblasts cells
FCS	Feces
FirstSet	first set of animals (or samples) processed/preserved in a given day of operations
FLT	spaceflight
FNR	Fast Neutron Radiation
FourthSet	fourth set of animals (or samples) processed/preserved in a given day of operations
FS	Freezing Study

FSKN	Femoral Skin
G1	G1 phase of cell cycle
G2	G2 phase of cell cycle
G#	mouse number from a ground control group
GC	ground control for a spaceflight experiment - mimics the environmental conditions, timeline, and equipment used for the spaceflight samples
GF	Glovebox Freezer
GM15036	Lymphoblastoid Cell Line GM15036
GM15510	Lymphoblastoid Cell Line GM15510
Gspe	Genus species
GST	Gastrocnemius
Gy	Gray
h	hour (Time)
HARV	high-aspect-ratio rotating wall vessel bioreactors
HBECs	human bronchial epithelial cells
HBF	hyper-buoyancy flotation (used for bed-rest study)
HEBC3KT	a human bronchial epithelial cell line
HF	Hair Follicles
HG	hypergravity http://bioportal.bioontology.org/ontologies/MESH?p=classes&conceptid=D018471
Hi-LET	High Linear Energy Transfer
HIR	Heavy Ion Radiation
HLLC	hind limb loaded control
HLU	hind limb unloading (aka hindlimb suspension)
Hml-Gal4-UAS-GFP	Hemolectin-GAL4 crossed with UAS-GFP to make a transgenic line in Dmel
HMVEC-dBL	Human dermal microvascular endothelial cells
Hsap	Homo sapiens
HSFA2-KO	a knockout Arabidopsis thaliana line deficient in the gene encoding HSFA2
HT1080	a human fibrosarcoma cell line
HT-29	human colorectal adenocarcinoma cell line with epithelial morphology
HUVEC	Cells derived from the endothelium of veins from the umbilical cord
Hypocotyl	hypocotyl
HypocotylCC	Hypocotyl cell culture (a cell culture derived from the hypocotyl part of the plant)
HZE	High (H) Charge (Z) and Energy (E) HZE ionizing radiation
I	dissected immediately after euthanasia
IMR90iPSCs	induced pluripotent stem cells derived from the IMR90 human cell line
In-FLT-CTRL	In-flight Control
infdw	infected with
inFLT	in spaceflight (describes condition in which sample was collected)

InsP-5-ptase	transgenic Arabidopsis thaliana (Columbia-0) plants constitutively express the mammalian type I inositol polyphosphate 5-phosphatase (InsP 5-ptase)
INT	Intestines
IR	Irradiation
IRC	Irradiation Control - No mock IR was performed, i.e. subjects were not exposed to IR nor an IR set-up
IsoCTRL	Isotype control - primary antibodies that lack specificity to the target, but match the class and type of the primary antibody used in the application
ISS	International Space Station
ISS-T	ISS Terminal Animal
ITS	Fungal amplicon sequence
JAXA	Japan Aerospace Exploration Agency
JC	JAXA Chow
JCwFOS	JAXA Chow fortified with fructooligosaccharides (FOS)
JkTcells	Jurkat T cells
K-12MG1655	strain (of E. coli) K-12 MG1655
KDN	Kidney
KDN	Kidney
Ket-Xyl	Ketamine/Xylazine
kPa	kilopascals
KSC	Kennedy Space Center
L	Left
Lac	Lactating
LAR	Live Animal Return
LC	Laboratory control - may refer to a control group or groups grown under standard laboratory conditions and processed to test an aspect(s) of spaceflight experimental parameters
LCL	Lymphoblastoid Cell Line
LD	longissimus dorsi muscle
LDC	Large Diameter Centrifuge
Ler-0	Landsberg ecotype
leu	Leukocytes
LHM4	Strain of Mycobacterium marinum
LLC	Lewis lung carcinoma
LLU	Loma Linda University
Lminus	Launch minus (usually followed by a time frame, for example Lminus30d means 30 days before launch)
LN2	Liquid nitrogen
LNG	Lung
LO	Light Organ

LoopG	Loop Genomics
Low-LET	Low Linear Energy Transfer
Lplus	Launch plus (usually followed by a time frame, for example Lplus30d means 30 days after launch)
LPS	lipopolysaccharide
lpup	late pupae - may want to revisit. combining time/development and organism part
LS292	C.elegans strain representing a dys1(cx18) mutant
LSDA	Life Science Data Archive
ltdO2	limited Oxygen
lvCMC	left ventricular cardiomyocytes
LVR	liver
MCC	MidiCAR centrifuge
MCF10Acells	MCF10A cells - human mammary epithelial cells
MCL	medial collateral ligament
MG	Mammary Gland
MgSO4	magnesium sulfate
MHU	Mouse Habitat Unit (JAXA mouse habitat unit)
min	minute
MIX1	ERCC Spike In mix 1
MIX2	ERCC Spike In mix 2
ML	Magnetic Levitator
MM2d	Arabidopsis thaliana MM2d cell line
Mmar	Mycobacterium marinum
Mmus	Mus musculus
MOLT-4	MOLT-4 cell line T lymphoblast, suspension cell line derived from an acute lymphoblastic leukemia
mon	month
MSCs	Mesenchymal Stem Cells
MUT	mutant
N2	Bristol N2 (C.elegans strain)
NCTC-86	strain (of E. coli) NCTC 86; ATCC 4157
nipp	*nipposinica* (variant of *Brassica rapa)*
Node3	node 3 of ISS
NOdT	no change in Temperature
nonact	non-activated
noODNCpG	adjuvant treatment control (animals were not treated with ODNCpG, just the solution used to dilute the ODNCpG)
normO2	normal Oxygen levels
noSx	no surgery

not-ind	not induced
noTT	tetanus toxoid control (animals were not treated with tetanus toxoid, just the solution used to dilute the tetanus toxoid)
nSMK	non-Smoker
NuRFB	Nutrient Upgraded Rodent Food Bar
OD	Optical Density
ODNCpG	adjuvant treatment of a synthetic oligodeoxynucleotide (ODN) containing unmethylated CpG motifs (CpG)
Olat	Oryzias latipes
oLDC	outside the Large Diameter Centrifuge
oML	outside the Magnetic Levitator
OR	Oregon R (Fruit Fly strain)
oRPoM	outside the Random Positioning Machine
os-ind	osteo-induced
OVY	Ovary or Ovaries
PA01	PAO1 strain - Pseudomonas aeruginosa
Paer	Pseudomonas aeruginosa
PAS	passive aerosol sample
PBLD	Peripheral Blood
PBLs	peripheral blood lymphocytes
PBMCs	peripheral blood mononuclear cells
PC	pipette centrifuge
PCar	Partial Carcass (i.e. the samples was extracted from a carcass that had one or more part(s) removed)
pFLT	parabolic flight
pGC	ground control for parabolic flight (i.e. samples were grown/processed in the same equipment as those in the pFLT groups)
PhaB	Pharyngeal Bones
pip2Dclino	2D pipette clinostat
pipcent	pipette centrifuge
post-IR	describes sample post irradiation
post-Sham	describes sample post sham
postFLT	post spaceflight (describes condition in which sample was collected)
preFLT	pre spaceflight (describes condition in which sample was collected)
Preg	Pregnant
PRT	Protein
PTN-OSF1	transgenic mice overexpressing the osteogneic factor PTN/OSF1
Quad	Quadricep
R	Right

R1	Forward Read
R2	Reverse Read
RAD51	RAD51 gene
RAW2647cells	RAW 264.7 cell line
RBCs	Red Blood Cells
RCCS	Rotary Cell Culture System
Rep	replicate
RIN	RNA integrity number
RL	re-loaded - subjects re-exposed to limb/body loading
RLT	RNeasy Lysis Buffer
Rminus	Return minus (usually followed by a time frame, for example Rminus30d means 30 days before return to earth)
RNA	Ribonucleic acid
RNAlat	RNA later
Rnor	Rattus norvegicus
Rotation	rotation
Rplus	Return plus (usually followed by a time frame, for example Rplus30d means 30 days after return to earth)
RPoM	Random Positioning Machine
RR	Rodent Research
RTN	Retina
RWV	Rotating Wall Vessel
RWV-H	Rotating Wall Vessel in horizontal direction
RWV-V	Rotating Wall Vessel in veritical direction
S288C	strain of Saccharomyces cerevisiae
S-UHRR	Stratagene Universal Human Reference RNA
Saur	Staphylococcus aureus
Scer	Saccharomyces cerevisiae
SDR	Sprague Dawley Rats
SDR-TF	Sprague Dawley Rats from Taconic Farms
SecondSet	second set of animals (or samples) processed/preserved in a given day of operations
Sham	type of control sample
shamIR	mock irradiation (i.e. subject to irradiation equipment but not exposed to irradiation)
shamSx	sham surgery
Si	Silicon isotope
SIEVd	sieved dust
SKN	Skin
sl	seedling
SL1344	Salmonella enterica subsp. enterica serovar Typhimurium strain SL1344

sl-pool	pool of 2 or more whole seedlings
SLS	Soleus
SM	Skeletal Muscle
SMK	Smoker - not to be confused with Super Mario Kart
Smut	Streptococcus mutans
soFLT	suborbital ballistic rocket flight
soGC	ground control for suborbital ballistic rocket flight (i.e. samples were grown/processed in the same equipment as those in the soFLT groups)
SP	spleen pool - spleens from 2 or more animals pooled together to make one sample
SPL	spleen
ss-tissues	tissues that underwent size selection during library prep (after extraction)
sShoots	seedling shoots - will probably change.
Styp	Salmonella typhimurium
suG	simulated microgravity
suppO2	supplemented with Oxygen
Sx	surgery
sym	symbiotic
T	tesla (magnetic field unit)
TA	Tibialis Anterior
Tcells	T cells
TES	Testis or Testes
TGFB	Tumor Growth Factor Beta
TGFB-Het	TGFBeta-Heterozygote
TGFP-ODsRed	Oryzias latipes (Japanese medaka) F1 fish of two closed colonies; Japanese medaka wild type Cab and Cab strain transgenic fish (TRAP:GFP, Osterix:DsRed)
ThirdSet	third set of animals (or samples) processed/preserved in a given day of operations
tissues	more than 1 tissue from 1 animal was pooled
TK6cells	TK6 Lymphoblast Cell Line
TKSC	Tsukuba Space Center (JAXA)
TLCs	T lymphocyte cells
TMS	Thymus
TNG	tongue
TNR	Thermal Neutron Radiation
TRHLLC	tail restrained hind limb loaded control
Trp53N-MG	Trp53 null mammary gland
Trp53N-MGT	Trp53 null mammary gland tumor
TT	tetanus toxoid (treatment with tetanus toxoid)
tumor	tumor
U937	human macrophage cell line established from a diffuse histiocytic lymphoma

UAMS-1	Strain of Staphylococcus aureus
UdCC	undifferentiated cell culture
uG	microgravity
ug-mL	concentration in micrograms per milliliter
UHRR	Universal Human Reference RNA
um	micrometer
UMRR	Universal Mouse Reference RNA
uninfd	uninfected
URR	Universal Reference RNA
V	Ventral
V#	mouse number from a vivarium group
VIV	vivarium control for a spaceflight experiment - same timeline and subjects as the spaceflight experiment but housed under standard laboratory conditions
VL	vastus lateralis
WB	whole blood
WBCs	White Blood Cells
WCar	Whole Carcass (i.e. the sample was extracted from an intact carcass)
wk	week (Time)
WN624	Strain of Bacillus subtilis
WN1106	Strain of Bacillus subtilis
wo	whole organism
Ws	Wassilewskija (Arabidopsis thaliana) ecotype, species variant 382
Ws-0	Wassilewskija-0 (Arabidopsis thaliana) ecotype, species variant 391
Ws-2	Wassilewskija-2 (Arabidopsis thaliana) ecotype, species variant 393
WT	wild-type
X-ray	X-ray irradiation
y	year(s)
yo	years old
YR	Gamma Radiation
Zone-I	region of root apex: 0.5 mm, root cap and meristematic zone
Zone-II	region of root apex: 1.5 mm, transition, elongation and growth terminating zone