

Application Programming Interfaces: Metadata Considerations

Biological and Physical Sciences

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☐ Subject

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 Open Science for Life in Space

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Study
OSD-678

Light has a principal role in the Arabidopsis transcriptomic response to the spaceflight environment

Organisms	Factors	Assay Types	Release Date	Description
Arabidopsis thaliana	Spaceflight Ecotype Treatment Genotype	transcription profiling	20-Dec-2024	The Characterizing Arabidopsis Root Attractions (CARA) spaceflight experiment provides comparative transcriptome analyses of plants grown in both light and dark conditions within the same spaceflight....

Highlights: *cgene*



Study
OSD-516

Modeling cellular responses to serum and vitamin D in microgravity using a human kidney microphysiological system

Organisms	Factors	Assay Types	Release Date	Description
Homo sapiens	Spaceflight Treatment Sex	transcription profiling	18-Jul-2024	The microgravity environment aboard the International Space Station (ISS) provides a unique stressor that can help understand underlying cellular and molecular drivers of pathological changes observed...

Highlights: *cgene*



Change profiles and immunohistochemical marker changes in cell walls of Arabidopsis thaliana roots

"Metadata in APIs"
Kirill Grigorev

NASA OSDR
NASA ARC, BMSIS

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Biological Metadata

- ▶ Biological metadata are heterogeneous and complex

Biological Metadata

- Biological metadata are heterogeneous and complex

```
"absorbed radiation dose": [
  "0 {centigray}",
  "0.18 {gray}",
  "0.19 {milligray}",
  "1-2.45 {Centigray}",
  ...
  "Not assessed"
],
"altered gravity": [
  "0.004G by centrifugation",
  "0.09G",
  "0.4G with partial weight bearing",
  "0G with hindlimb unloading",
  "1/6G with centrifugation",
  ...
  "uG"
],
"genotype": [
  "ADE2 mutant",
  "ARG1 KO",
  "CS",
  "Col-0",
  "FLO1 overexpression",
  "FLO8",
  "GSK3floxed",
  "GSK3mKD",
  "H5FA2 KO",
  "InsP 5-ptase Transgenic",
  "KCNQ370",
  "KCNQ97",
  "Mlh1+/-",
  "Mlh1+/-",
  ...
  "Not Applicable"
],
"hindlimb unloading": [
  "Hindlimb Loaded",
  "Hindlimb Unloaded",
  "Hindlimb Unloaded and Reloaded",
  "active recovery (AR)",
  ...
  "unilateral lower limb suspension (ULLS)"
],
"tissue": [
  "Brain",
  "Cerebrum",
  "Extensor digitorum longus",
  "Eye",
  "Gastrocnemius",
  "Humerus",
  "Intestines",
  "Kidney",
  "Liver",
  "Mandibular bone",
  "Ovary",
  "Parietal Bone",
  "Quadriceps femoris",
  "ROOT ZONE I (0.5mm)",
  "ROOT ZONE II (1.5mm)",
  "Soleus",
  "Spleen",
  "Temporal Bone",
  ...
],
```

Biological Metadata

- ▶ Biological metadata are heterogeneous and complex
- ▶ Legacy datasets, metadata "as provided"
- ▶ Curation is a crucial part of the process
- ▶ Analysis Working Groups (AWGs) and metadata standards

```
"absorbed radiation dose": [  
  "0 {centigray}",  
  "0.18 {gray}",  
  "0.19 {milligray}",  
  "1-2.45 {Centigray}",  
  ...  
  "Not assessed"  
],  
"altered gravity": [  
  "0.004G by centrifugation",  
  "0.09G",  
  "0.4G with partial weight bearing",  
  "0G with hindlimb unloading",  
  "1/6G with centrifugation",  
  ...  
  "uG"  
],  
"genotype": [  
  "ADE2 mutant",  
  "ARG1 KO",  
  "CS",  
  "Col-0",  
  "FLO1 overexpression",  
  "FLO8",  
  "GSK3floxed",  
  "GSK3mKD",  
  "H5FA2 KO",  
  "InsP 5-ptase Transgenic",  
  "KCNQ370",  
  "KCNQ97",  
  "Mlh1+/-",  
  "Mlh1+/-",  
  ...  
  "Not Applicable"  
],
```

```
"hindlimb unloading": [  
  "Hindlimb Loaded",  
  "Hindlimb Unloaded",  
  "Hindlimb Unloaded and Reloaded",  
  "active recovery (AR)",  
  ...  
  "unilateral lower limb suspension (ULLS)"  
],  
"tissue": [  
  "Brain",  
  "Cerebrum",  
  "Extensor digitorum longus",  
  "Eye",  
  "Gastrocnemius",  
  "Humerus",  
  "Intestines",  
  "Kidney",  
  "Liver",  
  "Mandibular bone",  
  "Ovary",  
  "Parietal Bone",  
  "Quadriceps femoris",  
  "ROOT ZONE I (0.5mm)",  
  "ROOT ZONE II (1.5mm)",  
  "Soleus",  
  "Spleen",  
  "Temporal Bone",  
  ...  
],
```

Biological Metadata

- ▶ Biological metadata are heterogeneous and complex
- ▶ Legacy datasets, metadata "as provided"
- ▶ Curation is a crucial part of the process
- ▶ Analysis Working Groups (AWGs) and metadata standards
- ▶ **Metadata uniformity is necessary for reliable APIs and for use in meta-analyses**

```
"absorbed radiation dose": [
  "0 {centigray}",
  "0.18 {gray}",
  "0.19 {milligray}",
  "1-2.45 {Centigray}",
  ...
  "Not assessed"
],
"altered gravity": [
  "0.004G by centrifugation",
  "0.09G",
  "0.4G with partial weight bearing",
  "0G with hindlimb unloading",
  "1/6G with centrifugation",
  ...
  "uG"
],
"genotype": [
  "ADE2 mutant",
  "ARG1 KO",
  "CS",
  "Col-0",
  "FLO1 overexpression",
  "FLO8",
  "GSK3Floxed",
  "GSK3mKD",
  "HSFA2 KO",
  "InsP 5-ptase Transgenic",
  "KCNQ370",
  "KCNQ97",
  "Mlh1+/-",
  "Mlh1+/-",
  ...
  "Not Applicable"
],
"hindlimb unloading": [
  "Hindlimb Loaded",
  "Hindlimb Unloaded",
  "Hindlimb Unloaded and Reloaded",
  "active recovery (AR)",
  ...
  "unilateral lower limb suspension (ULLS)"
],
"tissue": [
  "Brain",
  "Cerebrum",
  "Extensor digitorum longus",
  "Eye",
  "Gastrocnemius",
  "Humerus",
  "Intestines",
  "Kidney",
  "Liver",
  "Mandibular bone",
  "Ovary",
  "Parietal Bone",
  "Quadriceps femoris",
  "ROOT ZONE I (0.5mm)",
  "ROOT ZONE II (1.5mm)",
  "Soleus",
  "Spleen",
  "Temporal Bone",
  ...
],
```

ISA-Tab Metadata

Samples							
Select Export Columns							
Source Name	Sample Name	Characteristics: Organism	Characteristics: Strain	Characteristics: Material Type	Factor Value: Spaceflight	Factor Value: Dissection Condition	Characteristics: A Source
RR1_VIV_M18	Mmus_C57-6J_LVR_VIV_C_Rep3_M18	Mus musculus	C57BL/6J	Liver	Vivarium Control	Carcass	Jackson Labora
RR1_VIV_M19	Mmus_C57-6J_LVR_VIV_C_Rep4_M19	Mus musculus	C57BL/6J	Liver	Vivarium Control	Carcass	Jackson Labora
RR1_VIV_M20	Mmus_C57-6J_LVR_VIV_C_Rep5_M20	Mus musculus	C57BL/6J	Liver	Vivarium Control	Carcass	Jackson Labora
RR1_FLT_M21	Mmus_C57-6J_LVR_FLT_I_Rep1_M21	Mus musculus	C57BL/6J	Liver	Space Flight	Upon euthanasia	Jackson Labora
RR1_FLT_M22	Mmus_C57-6J_LVR_FLT_I_Rep2_M22	Mus musculus	C57BL/6J	Liver	Space Flight	Upon euthanasia	Jackson Labora
RR1_FLT_M25	Mmus_C57-6J_LVR_FLT_C_Rep1_M25	Mus musculus	C57BL/6J	Liver	Space Flight	Carcass	Jackson Labora
RR1_FLT_M26	Mmus_C57-6J_LVR_FLT_C_Rep2_M26	Mus musculus	C57BL/6J	Liver	Space Flight	Carcass	Jackson Labora
RR1_FLT_M27	Mmus_C57-6J_LVR_FLT_C_Rep3_M27	Mus musculus	C57BL/6J	Liver	Space Flight	Carcass	Jackson Labora
RR1_FLT_M28	Mmus_C57-6J_LVR_FLT_C_Rep4_M28	Mus musculus	C57BL/6J	Liver	Space Flight	Carcass	Jackson Labora

Example: MESH Terms

purl.bioontology.org/ontology/MESH/D013026

- ▶ Preferred Name:
 - ▶ Space Flight
- ▶ Definitions:
 - ▶ Travel beyond the earth's atmosphere
- ▶ Synonyms:
 - ▶ Spaceflight
 - ▶ Space Travel
 - ▶ Flight, Space
 - ▶ ...
- ▶ subClassOf:
 - ▶ Aviation
- ▶ ...

Example: EFO Terms

www.ebi.ac.uk/efo/EFO_0000606

- experimental factor
 - material entity (BFO)
 - organism (OBI)
 - Eukaryota (NCBITAXON)
 - Mus (NCBITAXON)
 - Mus musculus (NCBITAXON)
 - C57BL
 - C57BL/6J

C57BL/6J is a mouse strain as described in Jackson Laboratory

<http://phenome.jax.org/db/q?rtn=strains/details&strainid=7>

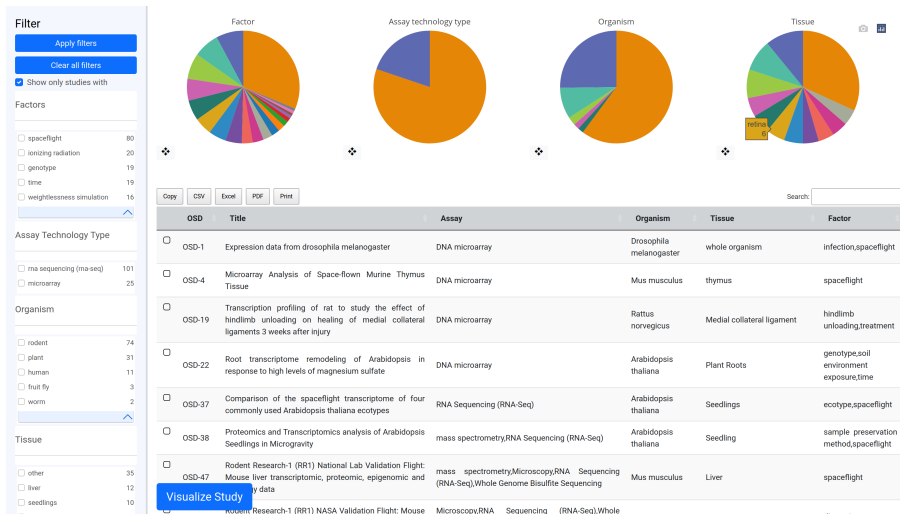
Synonym: C57BL6J

Example: FMA Terms

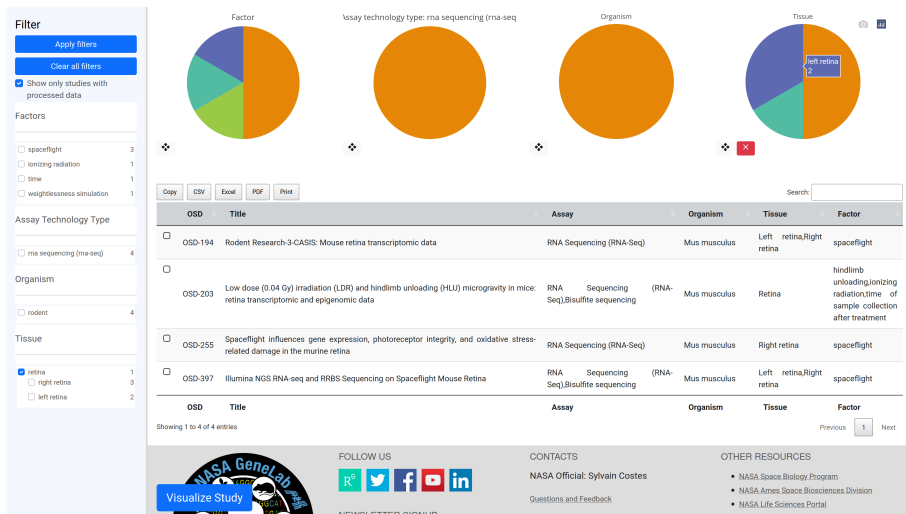
purl.org/sig/ont/fma/fma58301

- ▶ preferred name
 - ▶ Retina
- ▶ definition
 - ▶ Layer of wall of eyeball which is continuous with optic nerve.
- ▶ synonym
 - ▶ Tunica interna of eyeball
 - ▶ Inner layer of eyeball
- ▶ subclass of
 - ▶ Layer of wall of eyeball
- ▶ subclasses
 - ▶ Left Retina
 - ▶ Right Retina
- ▶ ...

Example: Visualization Portal



Example: Visualization Portal



Primary Type of Metadata Values

Everything is text

Everything is an object



GLOpenAPI Example

[https://visualization.genelab.nasa.gov/GLOpenAPI/metadata/?study.characteristics.material type=Retina](https://visualization.genelab.nasa.gov/GLOpenAPI/metadata/?study.characteristics.material%20type=Retina)

A		B	C	D
1	id			study.characteristics
2	accession	assay name	sample name	material type
3	OSD-87	OSD-87_transcription-profiling_dna-microarray_affymetrix	Mmus_C57-6CR_RTN_FLT_Rep1	Retina
4	OSD-87	OSD-87_transcription-profiling_dna-microarray_affymetrix	Mmus_C57-6CR_RTN_FLT_Rep2	Retina
5	OSD-87	OSD-87_transcription-profiling_dna-microarray_affymetrix	Mmus_C57-6CR_RTN_FLT_Rep3	Retina
6	OSD-87	OSD-87_transcription-profiling_dna-microarray_affymetrix	Mmus_C57-6CR_RTN_GC_Rep1	Retina
7	OSD-87	OSD-87_transcription-profiling_dna-microarray_affymetrix	Mmus_C57-6CR_RTN_GC_Rep2	Retina
8	OSD-87	OSD-87_transcription-profiling_dna-microarray_affymetrix	Mmus_C57-6CR_RTN_GC_Rep3	Retina
9	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_1mon_Rep1_M110	Retina
10	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_1mon_Rep2_M111	Retina
11	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_1mon_Rep3_M112	Retina
12	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_1mon_Rep4_M113	Retina
13	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_1mon_Rep5_M114	Retina
14	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_1mon_Rep6_M115	Retina
15	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_4mon_Rep1_M75	Retina
16	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_4mon_Rep2_M80	Retina
17	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_4mon_Rep3_M82	Retina
18	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_4mon_Rep4_M84	Retina
19	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_4mon_Rep5_M89	Retina
20	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_7d_Rep1_M1	Retina
21	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_7d_Rep2_M7	Retina
22	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_7d_Rep3_M13	Retina
23	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_7d_Rep4_M23	Retina
24	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_7d_Rep5_M24	Retina
25	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IRC_1mon_Rep1_M98	Retina
26	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IRC_1mon_Rep2_M99	Retina
27	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IRC_1mon_Rep3_M100	Retina
28	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IRC_1mon_Rep4_M101	Retina
29	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IRC_1mon_Rep5_M103	Retina

GLOpenAPI Example

[https://visualization.genelab.nasa.gov/GLOpenAPI/metadata/?study.characteristics.material type=/retina/](https://visualization.genelab.nasa.gov/GLOpenAPI/metadata/?study.characteristics.material%20type=/retina/)

1	A		B	C	D
2	id				study.characteristics
3	accession	assay name	sample name		material type
4	OSD-87	OSD-87_transcription-profiling_dna-microarray_affymetrix	Mmus_C57-6CR_RTN_FLT_Rep1		Retina
5	OSD-87	OSD-87_transcription-profiling_dna-microarray_affymetrix	Mmus_C57-6CR_RTN_FLT_Rep2		Retina
6	OSD-87	OSD-87_transcription-profiling_dna-microarray_affymetrix	Mmus_C57-6CR_RTN_FLT_Rep3		Retina
7	OSD-87	OSD-87_transcription-profiling_dna-microarray_affymetrix	Mmus_C57-6CR_RTN_GC_Rep1		Retina
8	OSD-87	OSD-87_transcription-profiling_dna-microarray_affymetrix	Mmus_C57-6CR_RTN_GC_Rep2		Retina
9	OSD-87	OSD-87_transcription-profiling_dna-microarray_affymetrix	Mmus_C57-6CR_RTN_GC_Rep3		Retina
10	OSD-194	OSD-194_transcription-profiling_ma-sequencing-(rna-seq)_illumina	Mmus_BAL-TAL_LRTN_BSL_Rep1_B7		Left retina
11	OSD-194	OSD-194_transcription-profiling_ma-sequencing-(rna-seq)_illumina	Mmus_BAL-TAL_LRTN_FLT_Rep1_F6		Left retina
12	OSD-194	OSD-194_transcription-profiling_ma-sequencing-(rna-seq)_illumina	Mmus_BAL-TAL_LRTN_FLT_Rep2_F7		Left retina
13	OSD-194	OSD-194_transcription-profiling_ma-sequencing-(rna-seq)_illumina	Mmus_BAL-TAL_LRTN_FLT_Rep3_F8		Left retina
14	OSD-194	OSD-194_transcription-profiling_ma-sequencing-(rna-seq)_illumina	Mmus_BAL-TAL_LRTN_FLT_Rep4_F9		Left retina
15	OSD-194	OSD-194_transcription-profiling_ma-sequencing-(rna-seq)_illumina	Mmus_BAL-TAL_LRTN_FLT_Rep5_F10		Left retina
16	OSD-194	OSD-194_transcription-profiling_ma-sequencing-(rna-seq)_illumina	Mmus_BAL-TAL_LRTN_GC_Rep1_G6		Left retina
17	OSD-194	OSD-194_transcription-profiling_ma-sequencing-(rna-seq)_illumina	Mmus_BAL-TAL_LRTN_GC_Rep2_G8		Left retina
18	OSD-194	OSD-194_transcription-profiling_ma-sequencing-(rna-seq)_illumina	Mmus_BAL-TAL_LRTN_GC_Rep3_G9		Left retina
19	OSD-194	OSD-194_transcription-profiling_ma-sequencing-(rna-seq)_illumina	Mmus_BAL-TAL_RRTN_BSL_Rep2_B8		Right retina
20	OSD-194	OSD-194_transcription-profiling_ma-sequencing-(rna-seq)_illumina	Mmus_BAL-TAL_RRTN_BSL_Rep3_B9		Right retina
21	OSD-194	OSD-194_transcription-profiling_ma-sequencing-(rna-seq)_illumina	Mmus_BAL-TAL_RRTN_BSL_Rep4_B10		Right retina
22	OSD-194	OSD-194_transcription-profiling_ma-sequencing-(rna-seq)_illumina	Mmus_BAL-TAL_RRTN_GC_Rep4_G10		Right retina
23	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_1mon_Rep1_M110		Retina
24	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_1mon_Rep2_M111		Retina
25	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_1mon_Rep3_M112		Retina
26	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_1mon_Rep4_M113		Retina
27	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_1mon_Rep5_M114		Retina
28	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_1mon_Rep6_M115		Retina
29	OSD-203	ldr-hlu_retina_DNA_methylation_profiling_Bisulfite_sequencing	Mmus_C57-6J_RTN_HLLC_IR_1mon_Rep7_M116		Retina

GLOpenAPI: Note

Also understood:

`study.characteristics.material type=left retina|right retina`

etc.

GLOpenAPI Example

<https://visualization.genelab.nasa.gov/GLOpenAPI/metadata/?study.characteristics.age=11 {day}>

	A	B	C	D
1	id			study.characteristics
2	accession	assay name	sample name	age
3	OSD-406	glds-406_transcription_profiling_RNA_Sequencing_(RNA-Seq)	GSM4880354	11 {day}
4	OSD-406	glds-406_transcription_profiling_RNA_Sequencing_(RNA-Seq)	GSM4880355	11 {day}
5	OSD-406	glds-406_transcription_profiling_RNA_Sequencing_(RNA-Seq)	GSM4880356	11 {day}
6	OSD-406	glds-406_transcription_profiling_RNA_Sequencing_(RNA-Seq)	GSM4880357	11 {day}
7	OSD-406	glds-406_transcription_profiling_RNA_Sequencing_(RNA-Seq)	GSM4880358	11 {day}
8	OSD-406	glds-406_transcription_profiling_RNA_Sequencing_(RNA-Seq)	GSM4880359	11 {day}
9	OSD-406	glds-406_transcription_profiling_RNA_Sequencing_(RNA-Seq)	GSM4880360	11 {day}
10	OSD-406	glds-406_transcription_profiling_RNA_Sequencing_(RNA-Seq)	GSM4880361	11 {day}
11	OSD-406	glds-406_transcription_profiling_RNA_Sequencing_(RNA-Seq)	GSM4880362	11 {day}
12	OSD-406	glds-406_transcription_profiling_RNA_Sequencing_(RNA-Seq)	GSM4880363	11 {day}
13	OSD-406	glds-406_transcription_profiling_RNA_Sequencing_(RNA-Seq)	GSM4880364	11 {day}
14	OSD-406	glds-406_transcription_profiling_RNA_Sequencing_(RNA-Seq)	GSM4880365	11 {day}
15	OSD-416	OSD-416_dna-methylation-profiling_bisulfite-sequencing_illumina	GSM3330758	11 {day}
16	OSD-416	OSD-416_dna-methylation-profiling_bisulfite-sequencing_illumina	GSM3330759	11 {day}
17	OSD-416	OSD-416_dna-methylation-profiling_bisulfite-sequencing_illumina	GSM3330760	11 {day}
18	OSD-416	OSD-416_dna-methylation-profiling_bisulfite-sequencing_illumina	GSM3330761	11 {day}
19	OSD-416	OSD-416_dna-methylation-profiling_bisulfite-sequencing_illumina	GSM3330762	11 {day}
20	OSD-416	OSD-416_dna-methylation-profiling_bisulfite-sequencing_illumina	GSM3330763	11 {day}
21	OSD-416	OSD-416_dna-methylation-profiling_bisulfite-sequencing_illumina	GSM3330764	11 {day}
22	OSD-416	OSD-416_dna-methylation-profiling_bisulfite-sequencing_illumina	GSM3330765	11 {day}
23	OSD-416	OSD-416_dna-methylation-profiling_bisulfite-sequencing_illumina	GSM3330766	11 {day}
24	OSD-416	OSD-416_dna-methylation-profiling_bisulfite-sequencing_illumina	GSM3330767	11 {day}
25	OSD-416	OSD-416_dna-methylation-profiling_bisulfite-sequencing_illumina	GSM3330768	11 {day}
26	OSD-416	OSD-416_dna-methylation-profiling_bisulfite-sequencing_illumina	GSM3330769	11 {day}
27	OSD-416	OSD-416_dna-methylation-profiling_bisulfite-sequencing_illumina	GSM3330770	11 {day}
28	OSD-416	OSD-416_dna-methylation-profiling_bisulfite-sequencing_illumina	GSM3330771	11 {day}
29	OSD-416	OSD-416_dna-methylation-profiling_bisulfite-sequencing_illumina	GSM3330772	11 {day}

GLOpenAPI Goal

<https://visualization.genelab.nasa.gov/GLOpenAPI/metadata/?study.characteristics.age>=1 {week}>

- ▶ 11 day
- ▶ 1 week
- ▶ 1 month
- ▶ 1-2 weeks old
- ▶ adult stage

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Thank you!

