

Agenda

- » An introduction to IMPC and organisation of the data
 - » Speaker: Sharon Cheng


- » An introduction to querying Solr and use of the IMPC Solr APIs
 - » Speaker: Marina Kan
 - » Exercises: to build Solr query skills

- » IMPC disease associations and use of the Phenodigm Solr core
 - » Speaker: Diego Pava
 - » Exercises: to practice using the Phenodigm core

Housekeeping

- » Keep cameras and microphones off

- » If you have any questions
 - First Talk:
 - Q & A at the end of the talk

 - Second & Third Talks and Exercises:
 - Feel Free to post your questions on the chat anytime
 - Reacting with  when writing our response



IMPC

International Mouse Phenotyping Consortium

 @impc

IMPC Introduction

2024-05-20

Sharon Cheng Data Wrangler
IMPC Data Coordination Centre

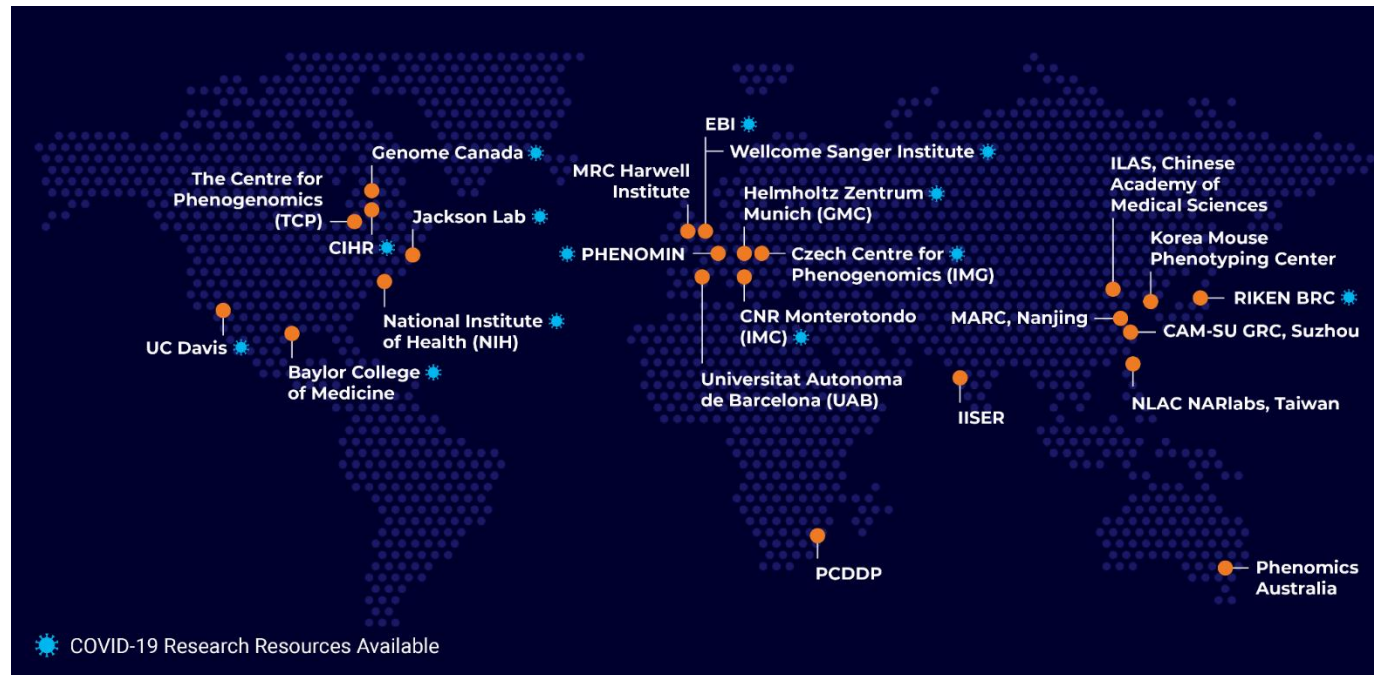


mousephenotype.org



International Mouse Phenotyping Consortium

- » IMPC aims to systematically knock out the protein coding genes in the mouse genome and carry out comprehensive characterisation of the mutant lines



» 12 phenotyping centres

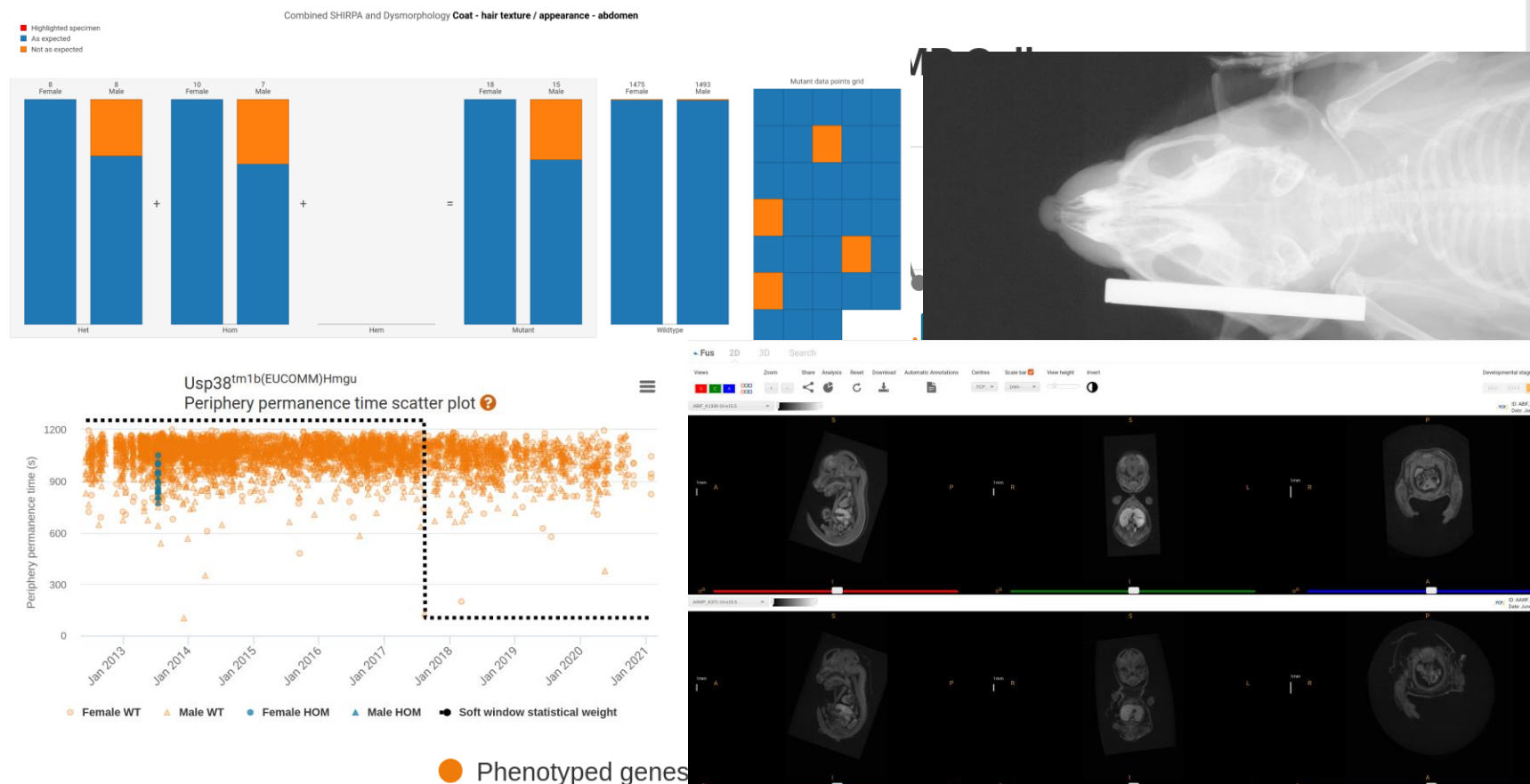
» 8,901 genes

» 9,594 mutant lines

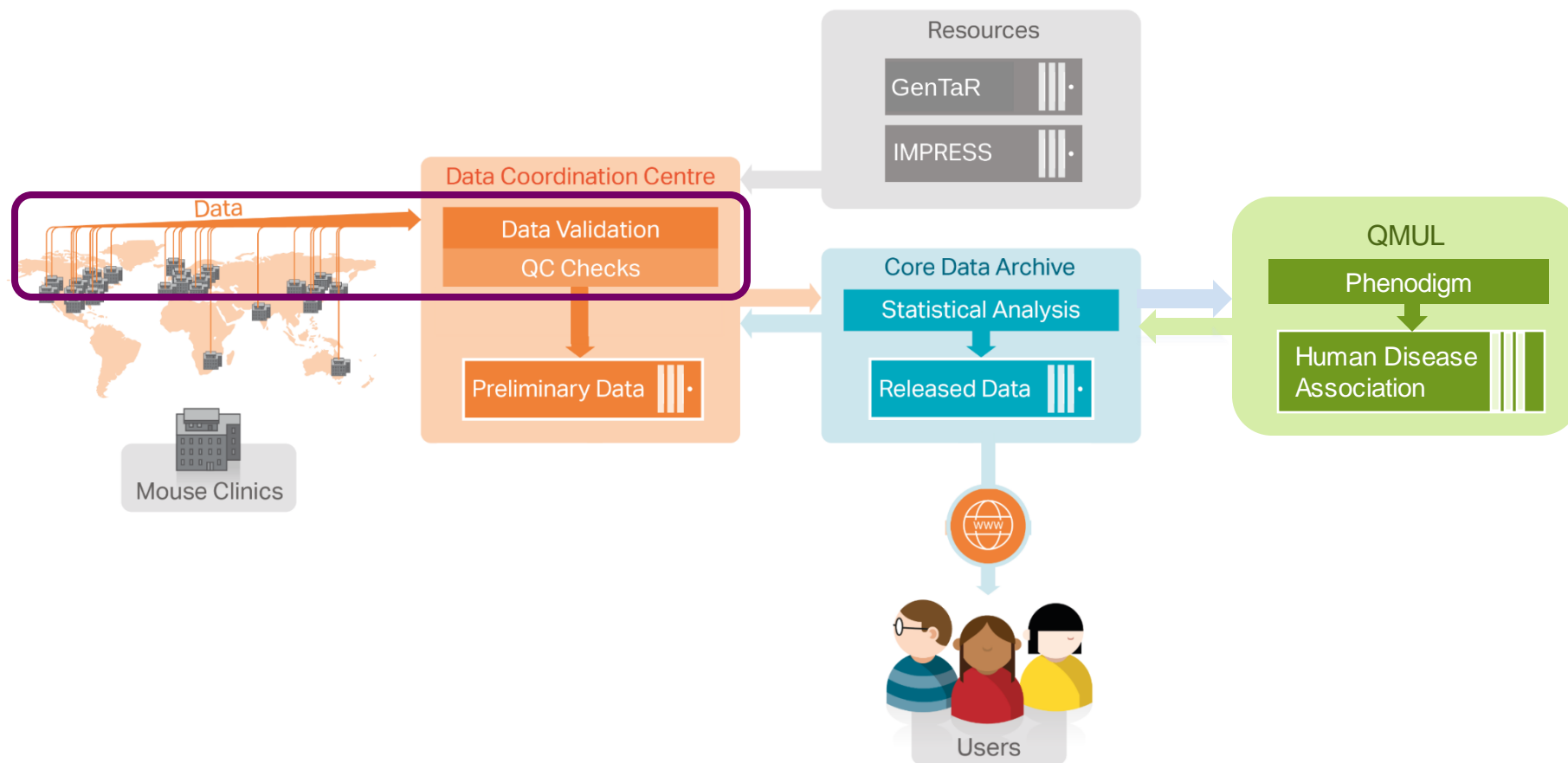
» 95M data points

» 794K images

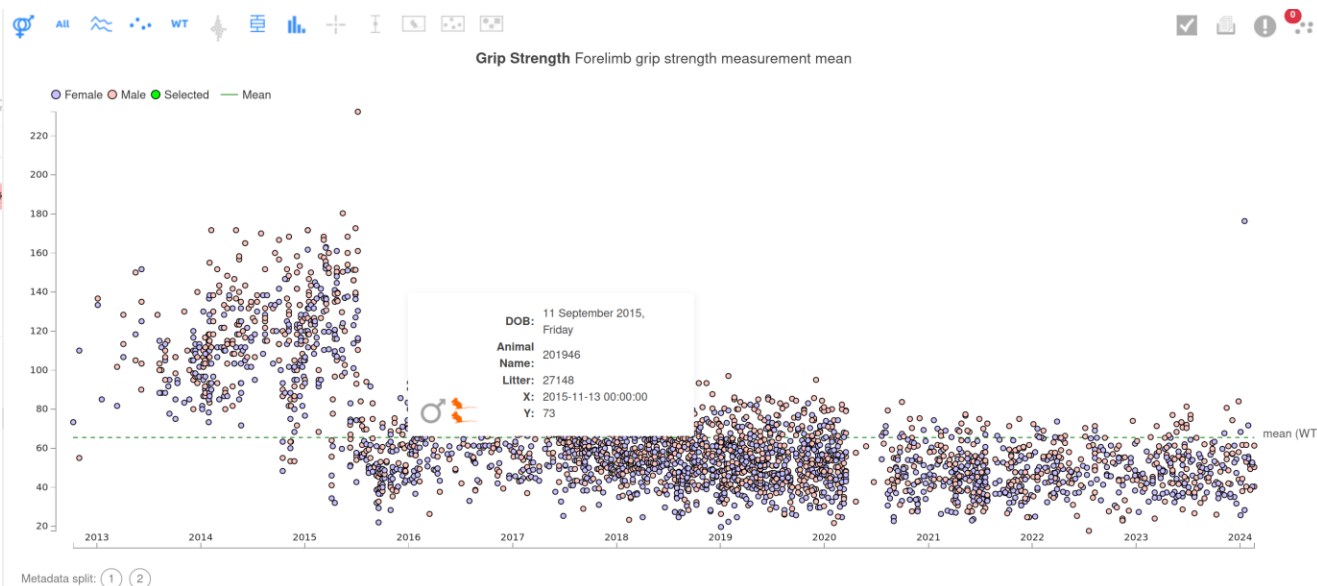
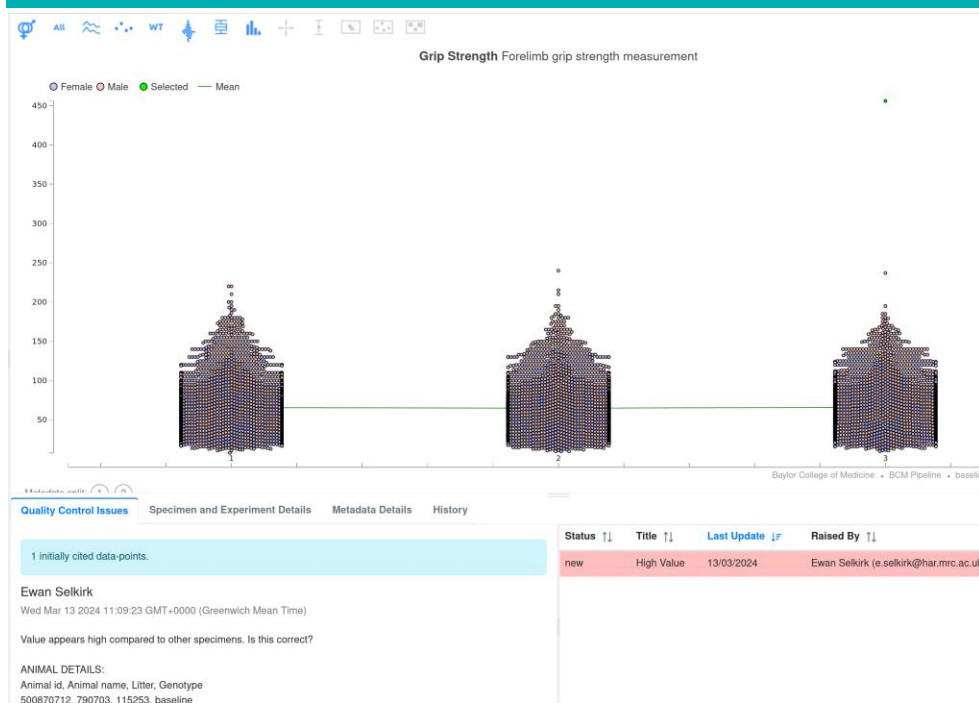
» 106K phenotype hits



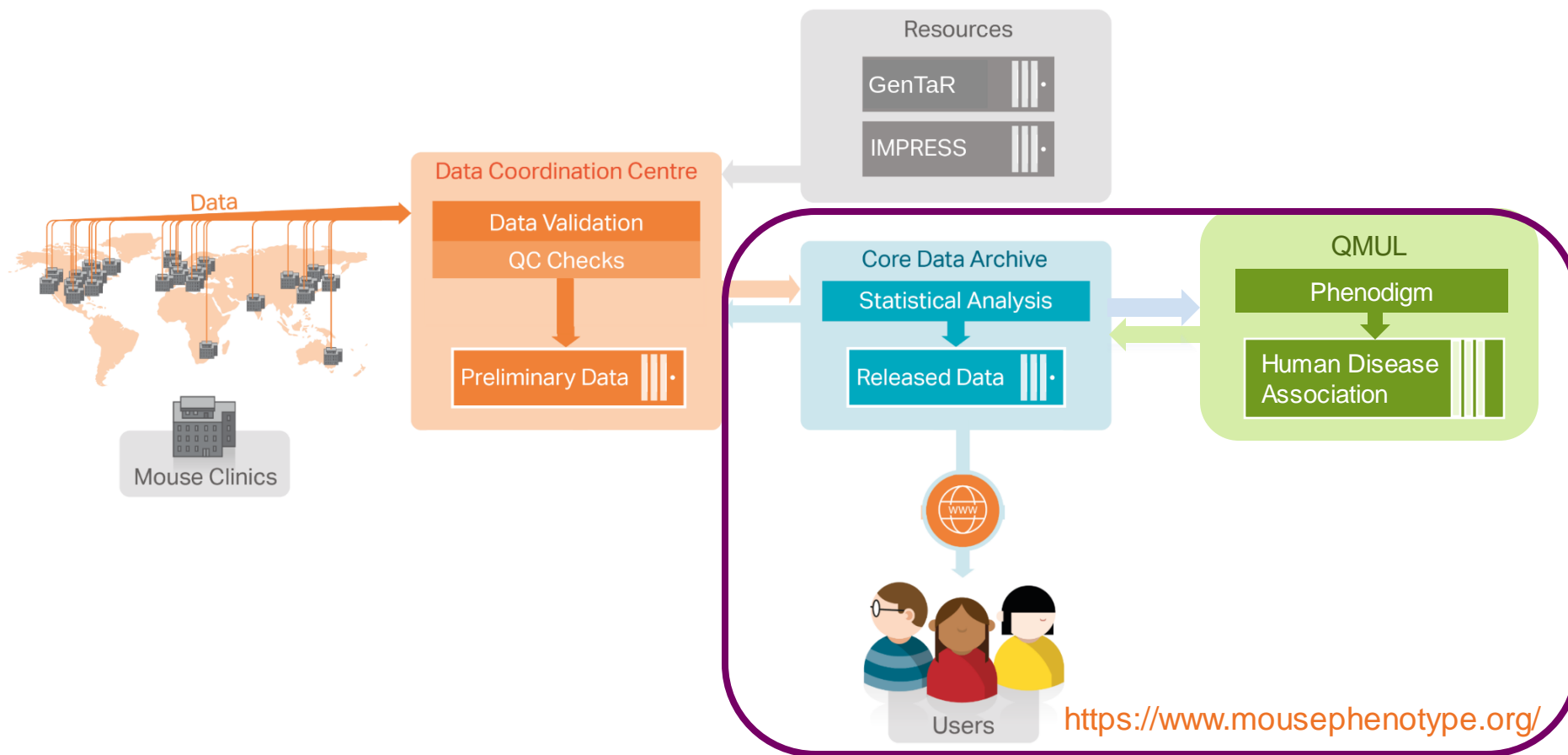
Data flow from collection to available results



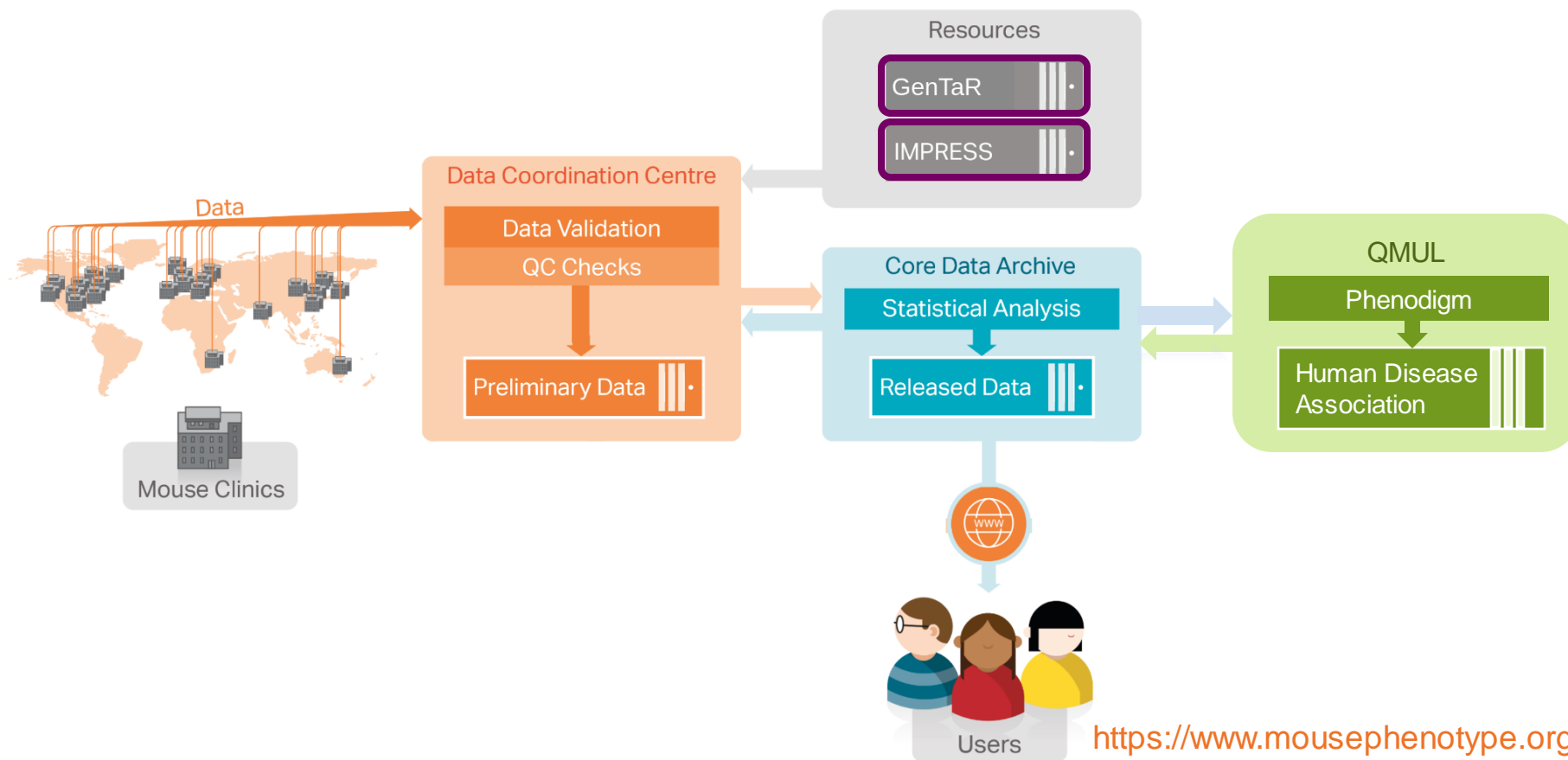
Data Quality Control



Data flow from collection to available results



Data flow from collection to available results



IMPreSS: International Mouse Phenotyping Resource for Standardised Screens

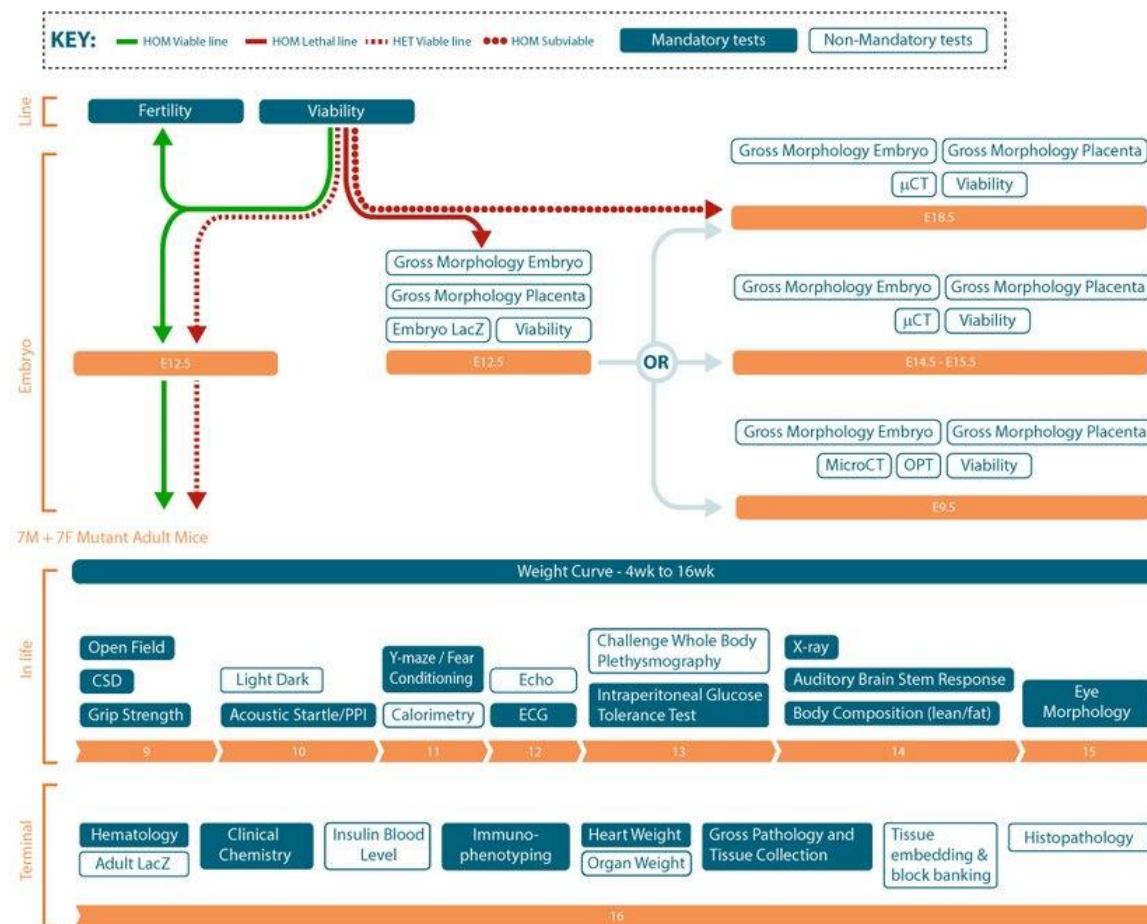
<https://www.mousephenotype.org/impress/>

Pipelines
(IMPC_001)

Procedures
(IMPC_GRS_001)

Parameters
(IMPC_GRS_001_001)

Ontologies
(increased grip strength)



IMPreSS Pipelines



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Centre Pipelines

IMPC Pipeline
 Harwell
 TCP Pipeline
 ICS
 JAX Pipeline
 UCD Pipeline

German Mouse
 Clinic
 MGP Select Pipeline
 BCM Pipeline
 CCP Pipeline

Interval Late Adult Legacy and Specialist

Pipelines
(IMPC_001)

Procedures
(IMPC_GRS_001)

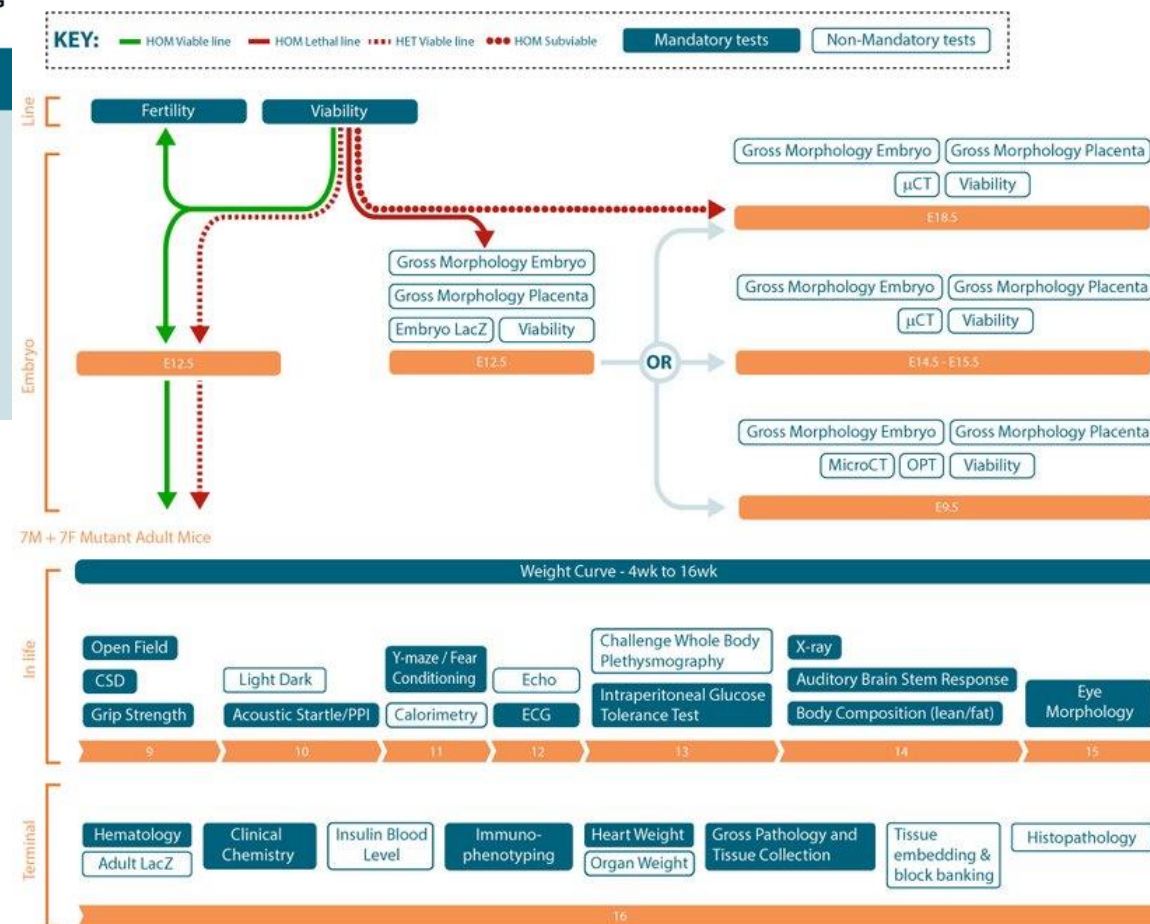
Parameters
(IMPC_GRS_001_001)

Ontologies
(increased grip strength)




Creating a comprehensive catalogue of mammalian gene function.

<https://www.mousephenotype.org/impress/>



IMPreSS Standard Operating Procedures


IMPC
 International Mouse Phenotyping Consortium

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Centre Pipelines

IMPC Pipeline	German Mouse
Harwell	Clinic
TCP Pipeline	MGP Select Pipeline
ICS	BCM Pipeline
JAX Pipeline	CCP Pipeline
UCD Pipeline	

Grip Strength [IMPC_GRS_001]

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[Parameters & Metadata](#)
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Purpose

The grip strength test is used to measure the neuromuscular function as maximal muscle strength of forelimbs and combined forelimbs and hind limbs. These are assessed by the grasping applied by the mouse on a grid that is connected to a sensor. Three trials are carried out in succession measuring forelimb-strength only, followed by three successive trials measuring the combined forelimb/hindlimb grip strength. All grip strength values obtained are normalized against mouse body weight.

Ontological description: MP:0001515 - abnormal grip strength.

Experimental Design

- **Minimum number of animals** : 7M + 7F
- **Age at test**: Week 9
- **Sex**: We would expect the results of this test to show sexual dimorphism















IMPreSS Parameters

Pipelines
(IMPC_001)

Procedures
(IMPC_GRS_001)

Parameters
(IMPC_GRS_001_001)

Ontologies
(increased grip strength)

Name	Req. Upload	Req. Analysis	Annotation	Increment	Options	Unit	Data Type
+ Forelimb grip strength measurement [IMPC_GRS_001_001] seriesParameter				1		g	FLOAT
				2			
				3			
+ Forelimb grip strength measurement mean [IMPC_GRS_008_001] simpleParameter						g	FLOAT
⌋ Equipment manufacturer [IMPC_GRS_006_001] procedureMetadata					Chatillon		TEXT
					Bioseb		
					Columbus Instruments		
⌋ Grid model [IMPC_GRS_007_001] procedureMetadata					HMGU plate		TEXT
					Not HMGU plate		
					45 Degree cross wired		



IMPreSS Ontologies

Pipelines
(IMPC_001)

Procedures
(IMPC_GRS_001)

Parameters
(IMPC_GRS_001_001)

Ontologies
(increased grip strength)

simpleParameter:

Forelimb grip strength measurement mean [IMPC_GRS_008_001]

	Option	Increment	Ontology Term	Ontology ID
	INCREASED		increased grip strength	MP:0010052
	DECREASED		decreased grip strength	MP:0010053
	ABNORMAL		abnormal grip strength	MP:0001515



Ways to access data <https://www.mousephenotype.org/>

» Data available in different ways

- **Non-programmatic: gene pages, FTP site**
- Programmatic: SOLR API

Human diseases caused by Plod1 mutations ?




The analysis uses data from IMPC, along with published data on other mouse mutants, in comparison to human disease reports in OMIM, Orphanet, and DECIPHER.

Phenotype comparisons summarize the similarity of mouse phenotypes with human disease phenotypes.

Human diseases associated with Plod1 (2 diseases)

Human diseases predicted to be associated with Plod1 (236 diseases)


The table below shows human diseases predicted to be associated to Plod1 by **phenotypic similarity**.

Disease	Similarity of phenotypes	Matching phenotypes	Source
Pleocoelal Myopathy With Salt Craving		Neonatal hypotonia, Paralysis, Myopathy, Proximal amyotrophy	OMIM:262900 +
Aortic Aneurysm, Familial Thoracic 9		Atrial fibrillation, Aortic tortuosity, Ascending aortic dissection, Thoracic aortic aneurysm	OMIM:616166 +
Neuronopathy, Distal Hereditary Motor, Type VIIa		Tremor, Vocal cord paralysis, Vocal cord paresis, Distal amyotrophy	OMIM:158580 +

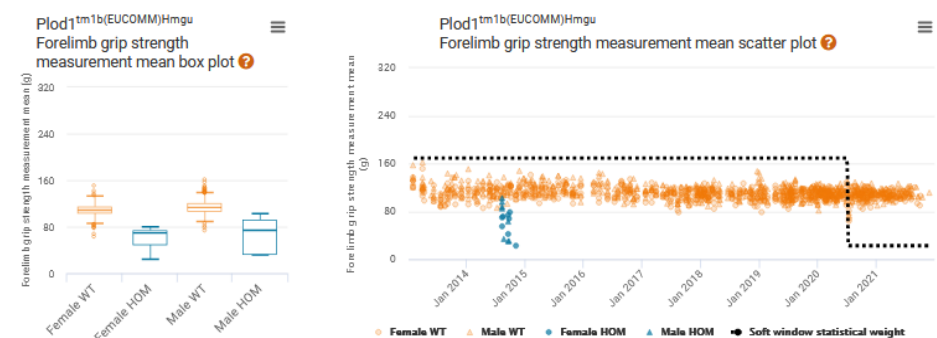
Phenotypes ?

The IMPC applies a panel of phenotyping screens to characterise single-gene knockout mice by comparison to wild types. Click on the different tabs to visualise significant phenotypes identified by the IMPC, as well as all data that was measured.

Significant phenotypes (2/2) Measurements chart (218/218) All data table (656/656)

Phenotype	System	Allele	Zyg	Sex	Life Stage	P Value
decreased grip strength		Plod1 ^{tm1b(EUCOMM)Hmgu}	HOM	♀♂	Early adult	4.13×10 ⁻³²
<p>A Grip Strength phenotypic assay was performed on 1393 mice. The charts show the results of measuring Forelimb grip strength measurement mean in 8 female, 8 male mutants compared to 709 female, 668 male controls. The mutants are for the Plod1^{tm1b(EUCOMM)Hmgu} allele.</p> <p>* The high throughput nature of the IMPC means that large control sample sizes may accumulate over a long period of time. See the animal welfare guidelines for more information.</p>						
Testing protocol		Grip Strength				
Testing environment		Lab conditions and equipment				
Measured value		Forelimb grip strength measurement mean				
Life stage		Early adult				
Background Strain		involves: C57BL/6NCrl				
Phenotyping center		TCP				
Associated Phenotype		decreased grip strength				

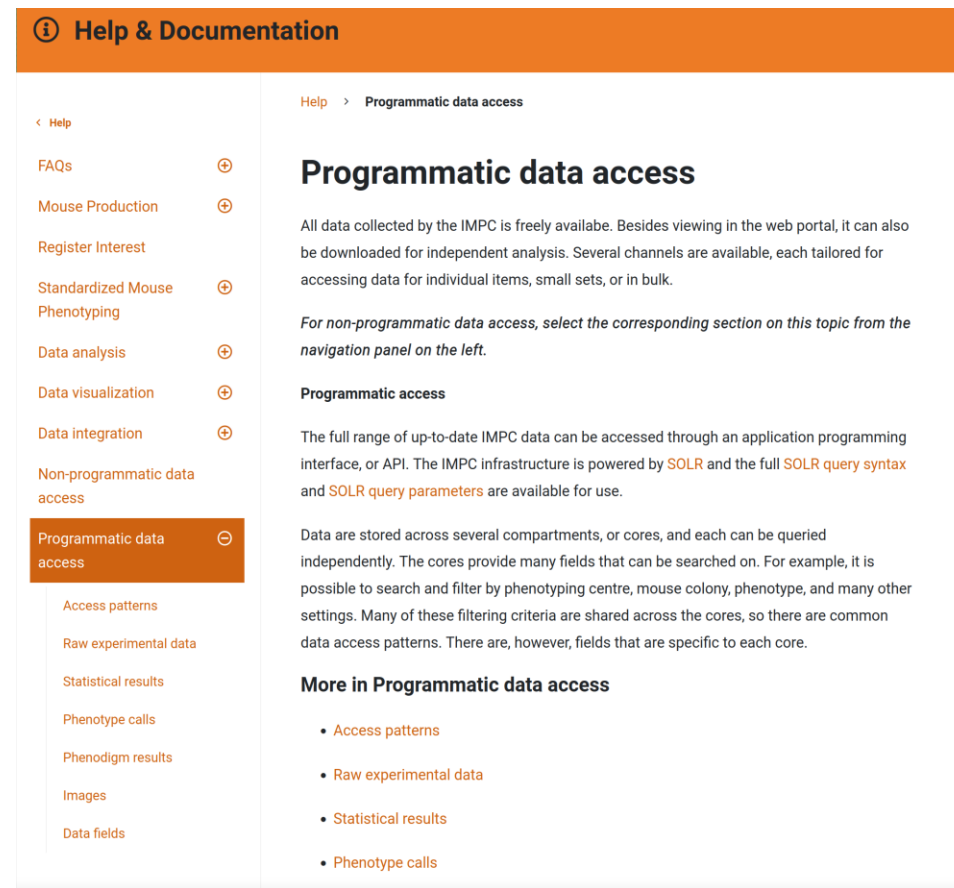
Mouseover the charts for more information. Click and drag to zoom the chart. Click on the legends to disable/enable data.



Ways to access data <https://www.mousephenotype.org/help/programmatic-data-access/>

» Data available in different ways

- Non-programmatic: gene pages, FTP site
- **Programmatic: SOLR API**



Help & Documentation

Help > Programmatic data access

Programmatic data access

All data collected by the IMPC is freely available. Besides viewing in the web portal, it can also be downloaded for independent analysis. Several channels are available, each tailored for accessing data for individual items, small sets, or in bulk.

For non-programmatic data access, select the corresponding section on this topic from the navigation panel on the left.

Programmatic access

The full range of up-to-date IMPC data can be accessed through an application programming interface, or API. The IMPC infrastructure is powered by **SOLR** and the full **SOLR query syntax** and **SOLR query parameters** are available for use.

Data are stored across several compartments, or cores, and each can be queried independently. The cores provide many fields that can be searched on. For example, it is possible to search and filter by phenotyping centre, mouse colony, phenotype, and many other settings. Many of these filtering criteria are shared across the cores, so there are common data access patterns. There are, however, fields that are specific to each core.

More in Programmatic data access

- Access patterns
- Raw experimental data
- Statistical results
- Phenotype calls

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How to get help <https://www.mousephenotype.org/contact-us/>

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Creating a comprehensive catalogue of mammalian gene function.

Please refer to our [Help & Documentation](#) pages for additional FAQs.

I have a question about:

Your Name

Your Email Address

Subject

Message

Attachment

No file selected.