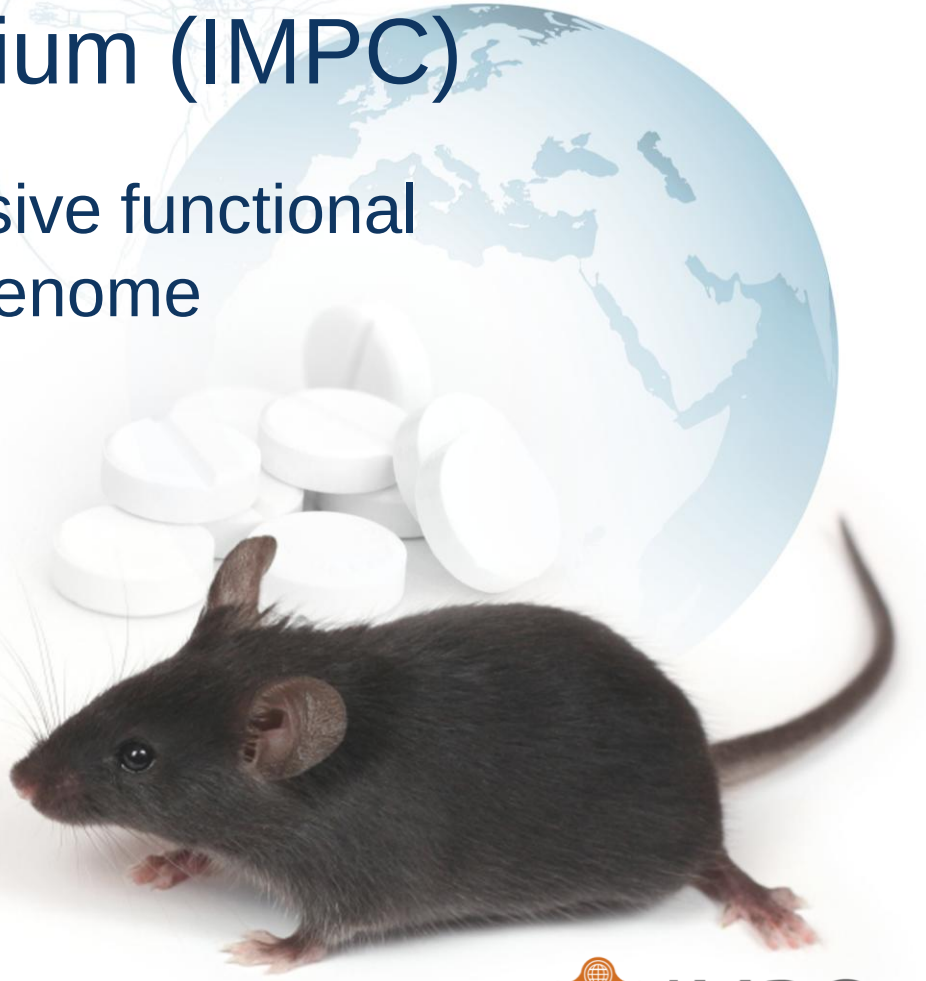
The International Mouse Phenotyping Consortium (IMPC)

Building the first comprehensive functional catalogue of a mammalian genome

Mark Moore, Ph.D.
Executive Director, IMPC

IRDiRC November 8, 2014

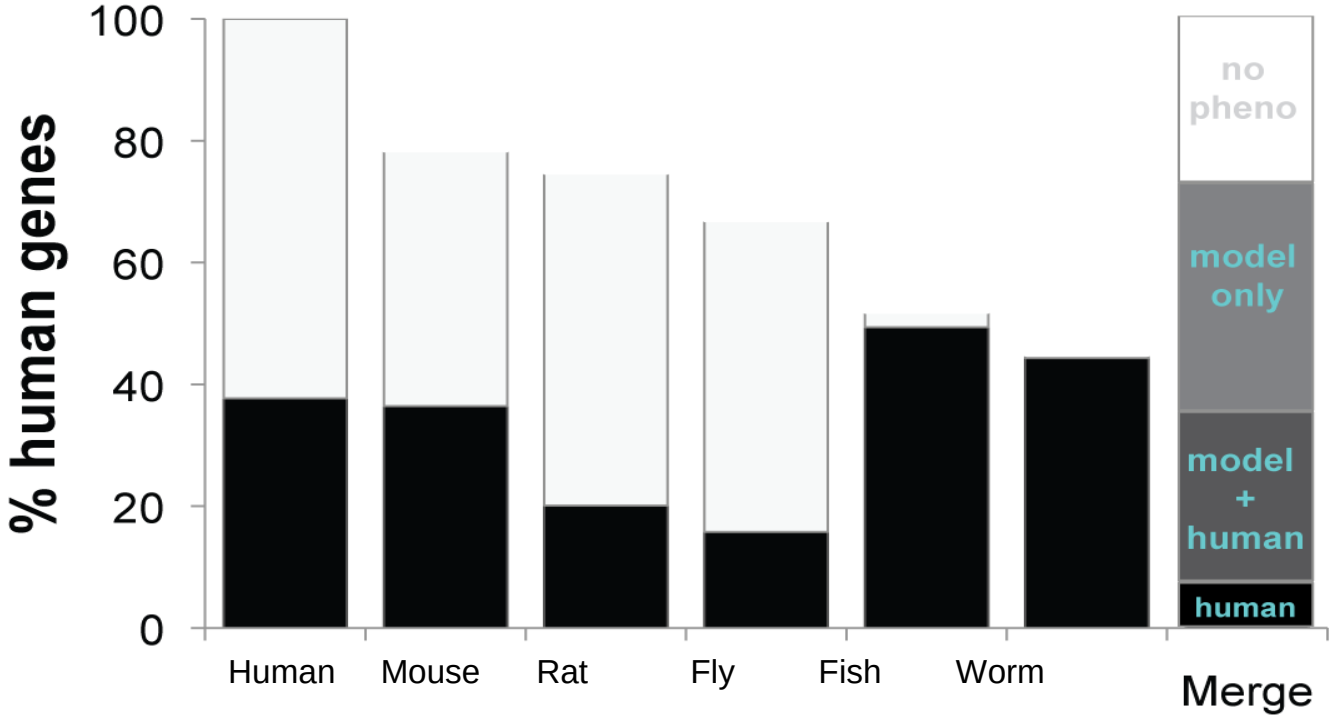
www.mousephenotype.org



IMPC

How much phenotype data?

- Human genes have poor phenotype coverate (~35%)
- Mouse models available for ~35% of human genes
- All animal models and human phenotypes linked to >75% human genes.



Orthology via PANTHER v9

IMPC

IMPC – the context

- The function of the majority of genes in the mouse (and human) genomes is unknown
- We are remarkably poor at predicting the function of genes – **pleiotropy** will be key to understanding systems
- KOs have been generated and analysed in only some 30% of mouse genes
- Data for these genes is patchy – dependent on the interests and experience of the investigator
- Develop approaches for broad based phenotyping, to provide a comprehensive picture of disease states and to integrate with human and clinical genetics

IMPC

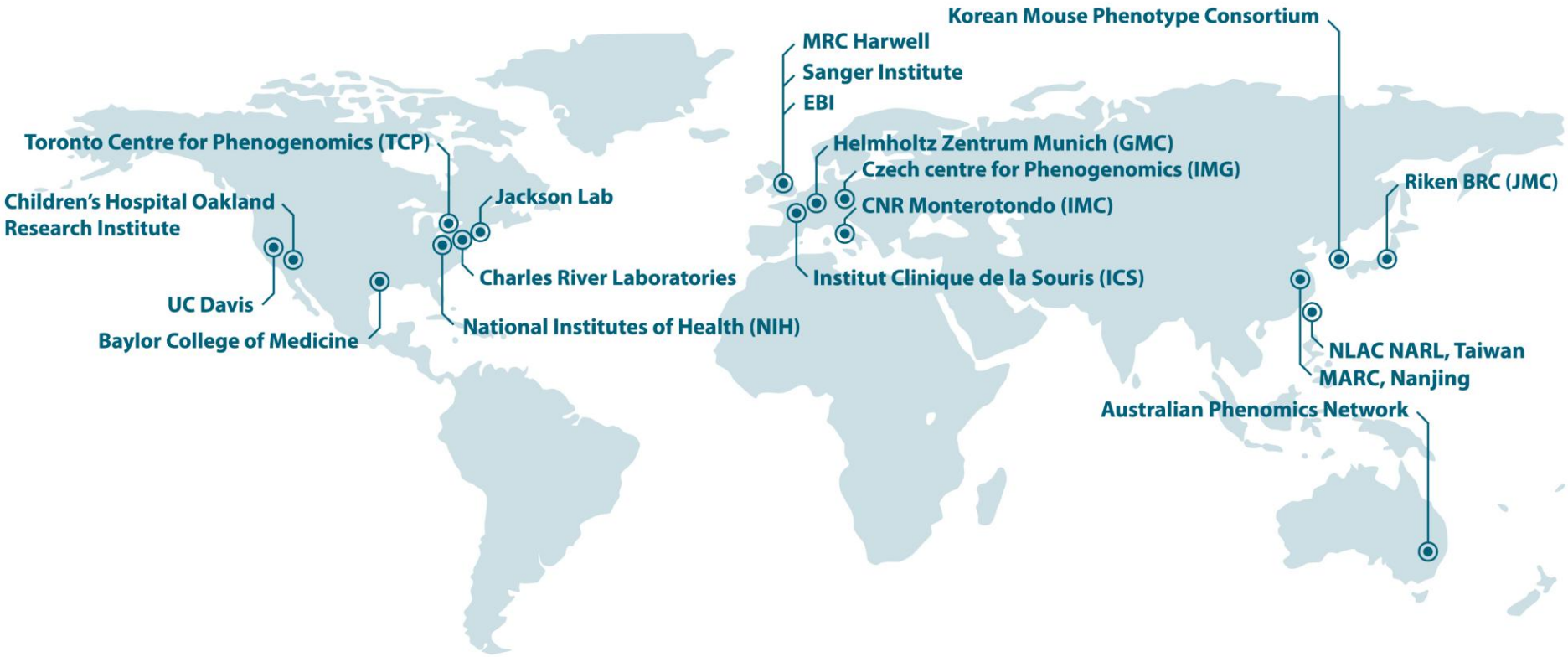
IMPC activities

- **Undertake broad-based phenotyping of 20,000 mutants from the IKMC resource**
  - A coordinated activity of mouse centres worldwide
- **Phase 1 (2011-2016): Phenotype up to 5,000 lines**
  - Pipeline development, logistics
  - Phenotype technology developments
  - Economies of scale
- **Phase 2 (2016-2021): Phenotype 15,000 mutants**
  - Business plan in preparation
- **Data freely available through a Data Coordination Centre**
- **Mice available through the global network of mouse repositories**

IMPC

IMPC

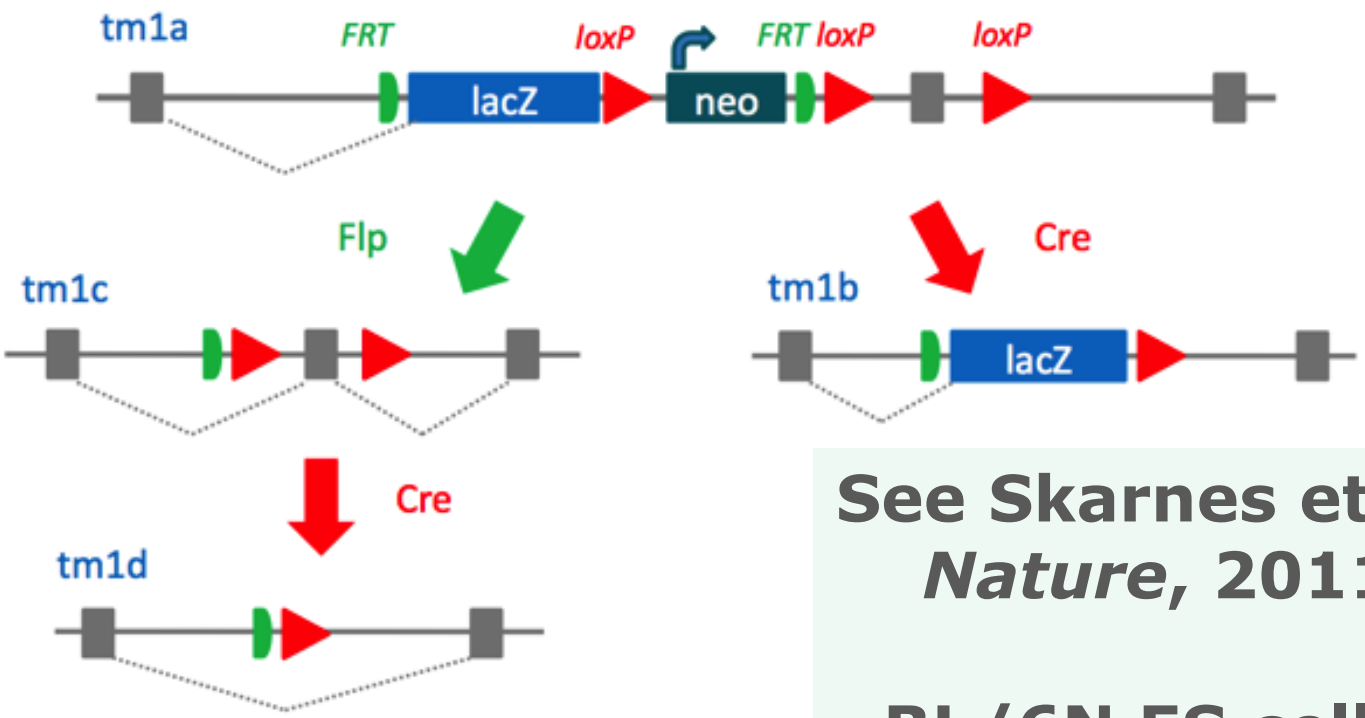
International Mouse Phenotyping Consortium



www.mousephenotype.org

IMPC alleles from IKMC
>15,000 KO ES cell lines

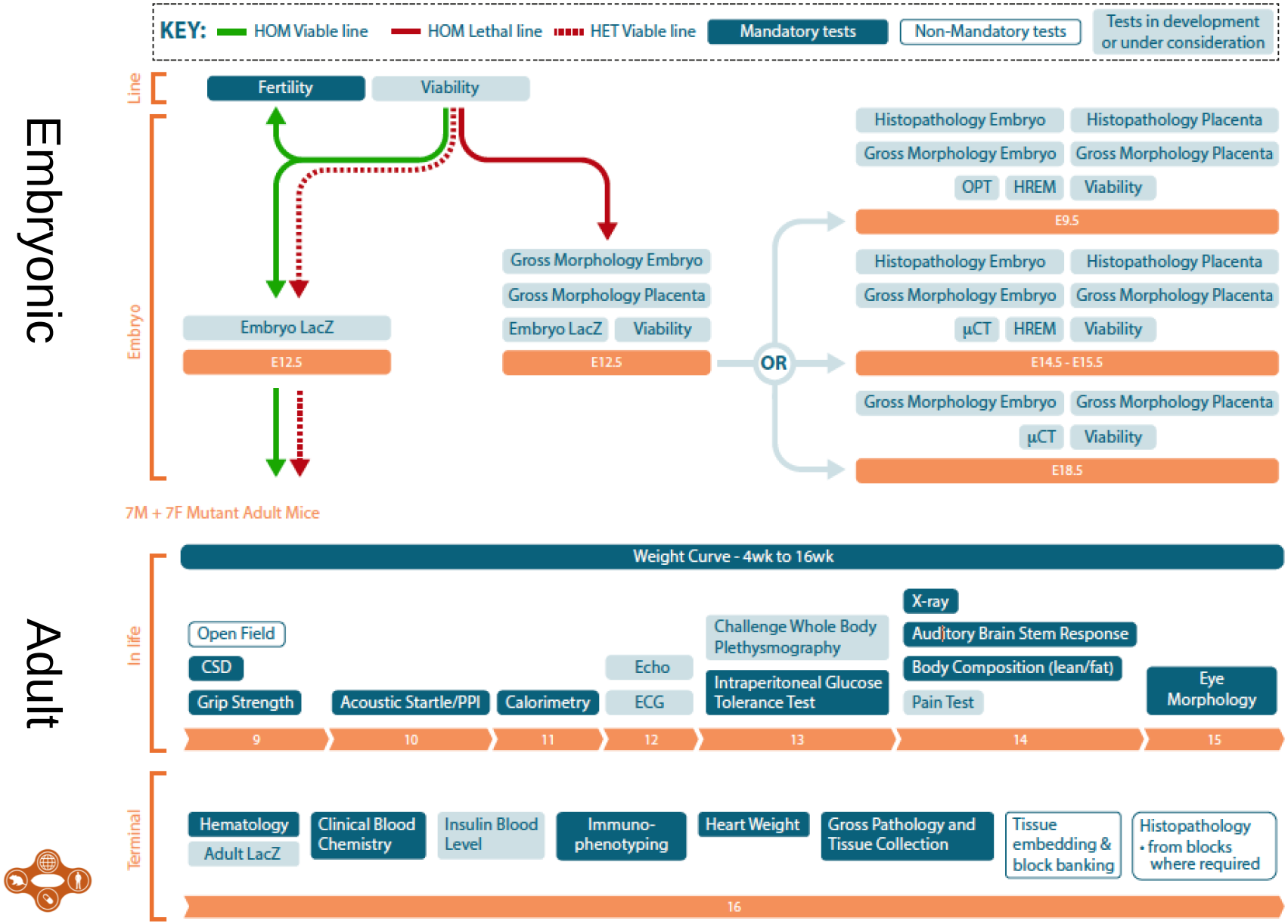
Knockout-first, conditional-ready allele:



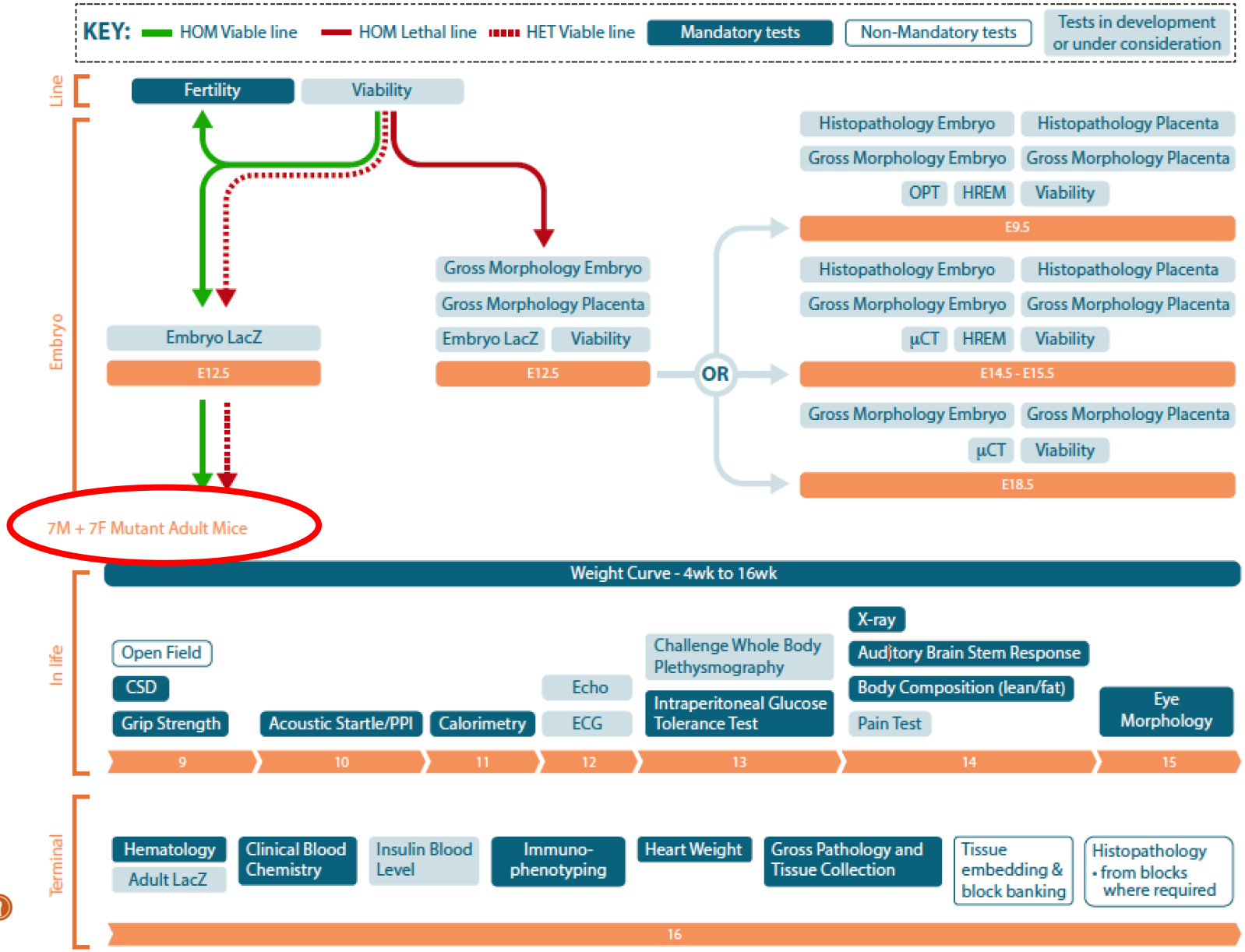
See Skarnes et al. *Nature*, 2011

BL/6N ES cells

IMPC phenotyping pipeline



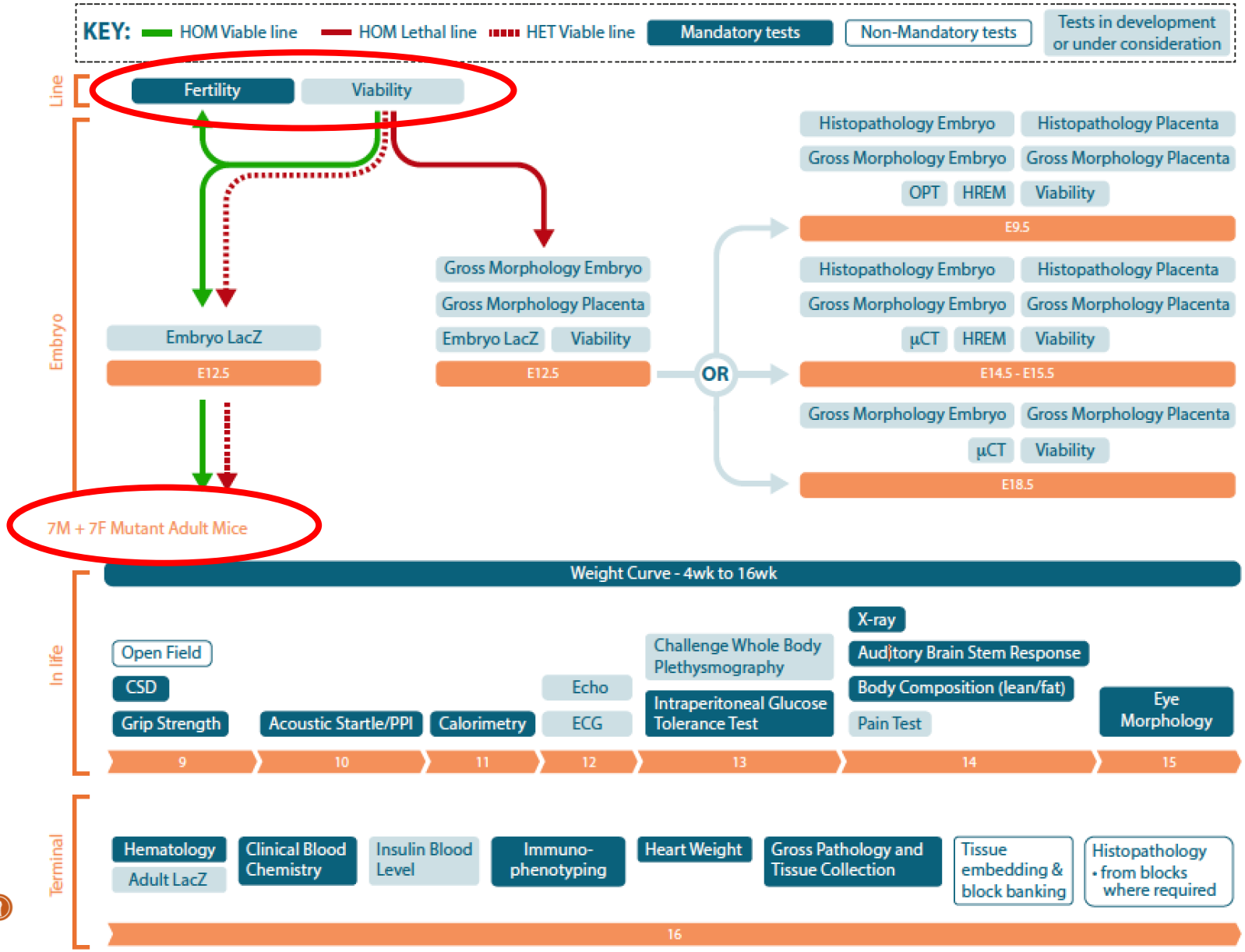
IMPC phenotyping pipeline



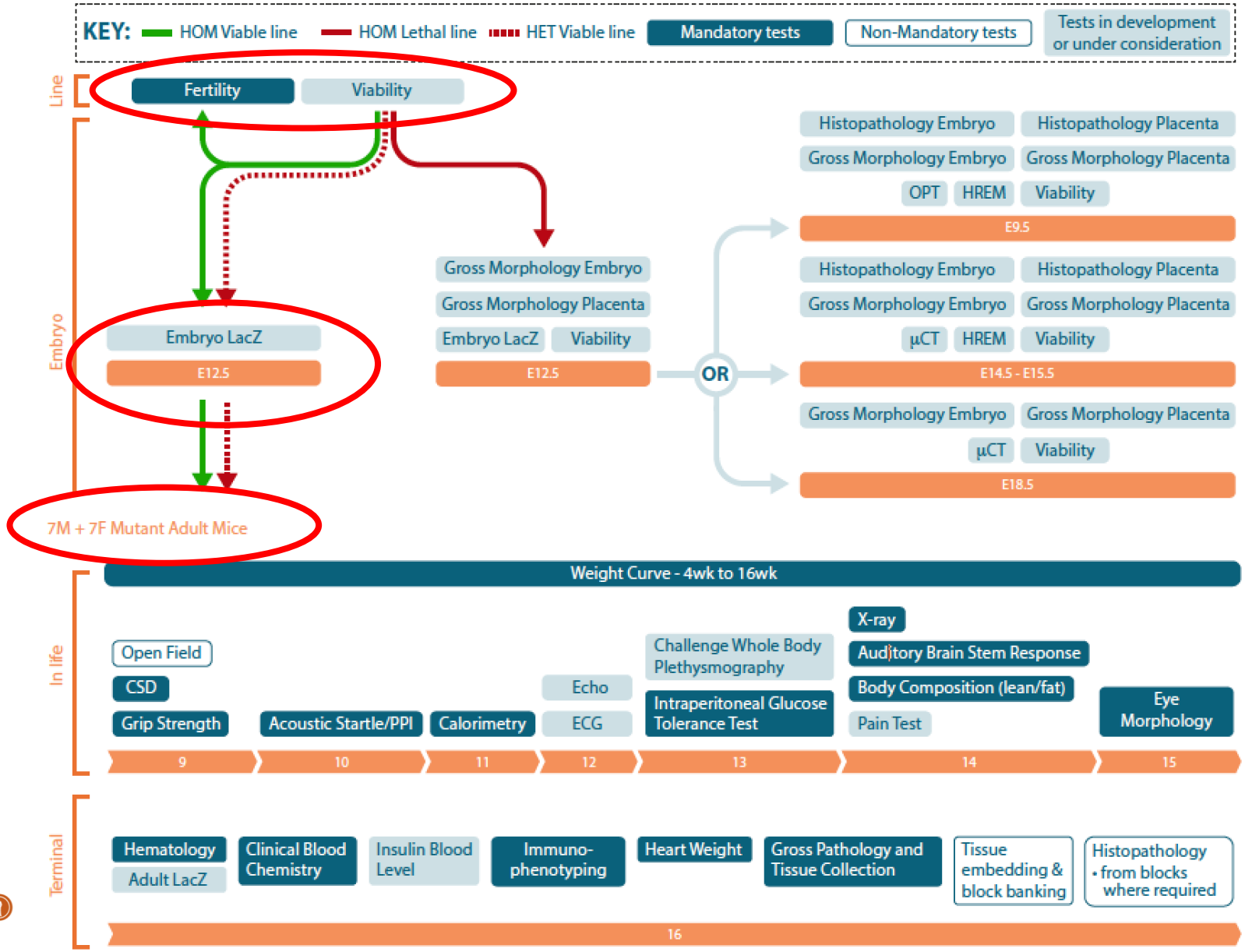
Embryonic

Adult

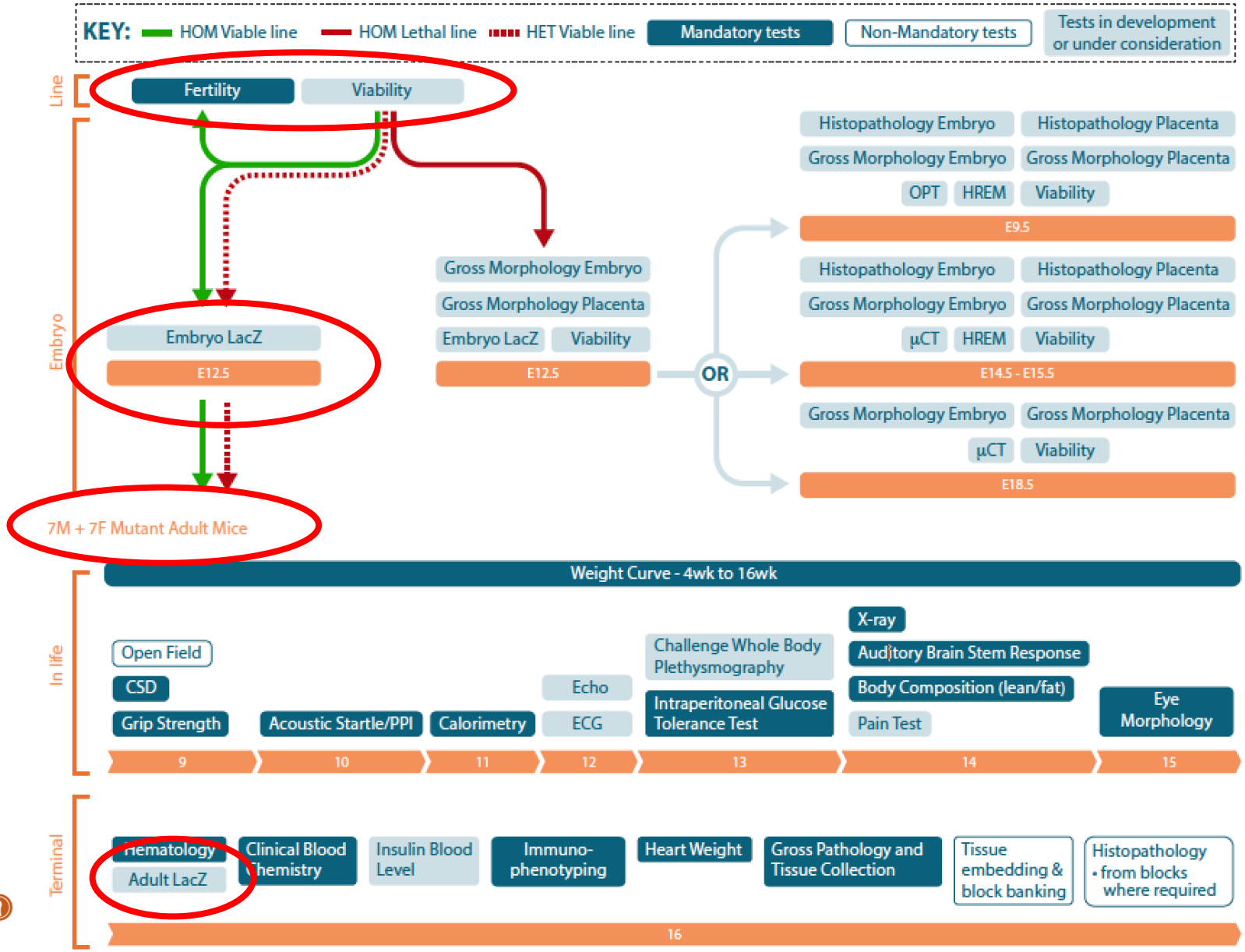
IMPC phenotyping pipeline



IMPC phenotyping pipeline



IMPC phenotyping pipeline



Mandatory tests

Non-mandatory tests

Tests in development or under consideration

Neurological/ Behaviour

- Open Field
- Modified SHIRPA/Dysmorphology
- Grip Strength
- Acoustic Startle/PPI
- Pain Test

Metabolism

- Weight
- Calorimetry
- Intraperitoneal Glucose Tolerance Test
- Body Composition (DEXA)
- Clinical Blood Chemistry
- Insulin Blood Level

Cardiovascular

- ECG / Echo
- Heart Weight

Pulmonary

- Challenge Whole Body Plethysmography

Reproduction

- Fertility

Sensory

- Auditory Brain Stem Response (2+2)
- Slit Lamp
- Opthalmoscope

Musculo-skeletal

- Grip Strength
- Body Composition (DEXA)
- X-ray (5 + 5)

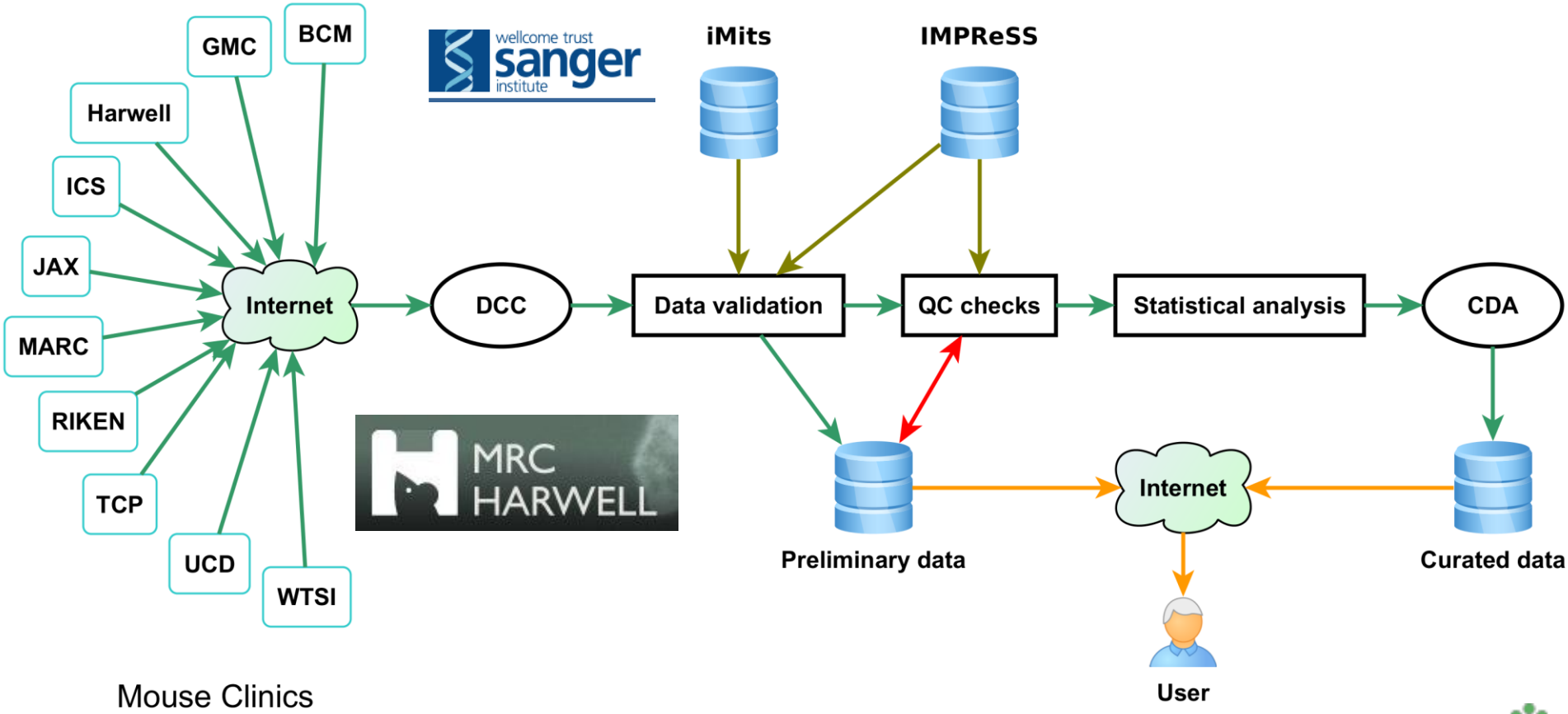
Immune

- Hematology
- FACS analysis – blood/spleen

General

- Modified SHIRPA/Dysmorphology
- Gross Pathology & Tissue Collection (2+2)
- Tissue embedding &Block Banking (2+2)
- Histopathology (2+2)
  - from blocks where required

IMPC Informatics Team

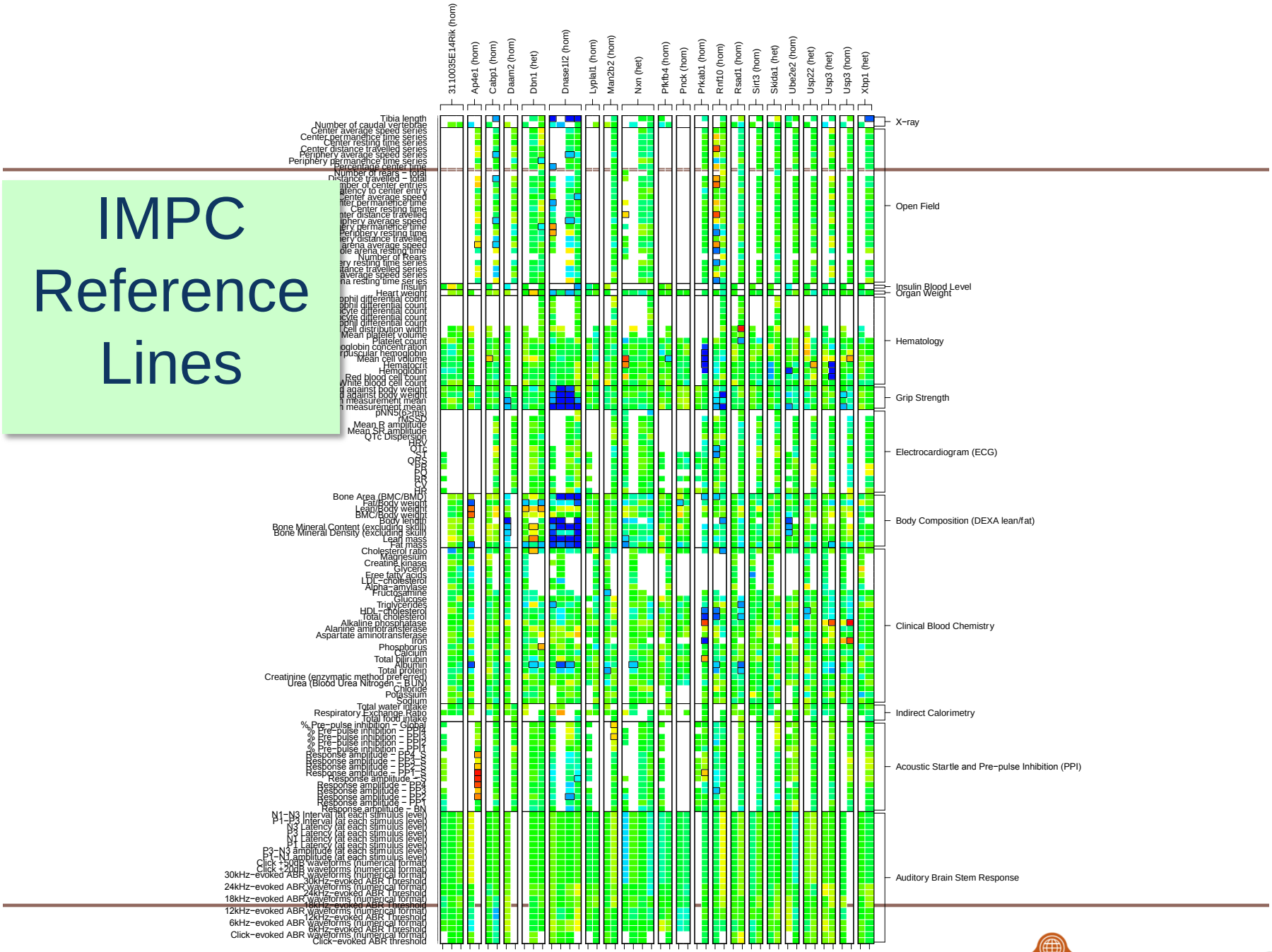


IMPC status:

Current iMits (October 2014)

Centre	Total Clones Injected	Genotype Confirmed	Cre excision	Phenotype started (Data in the DCC)
Baylor	769	371	127	52
Harwell	603	253	234	159
HMGU	541	177	117	71
ICS	128	106	74	59
JAX	1033	556	354	224
MARC	83	69	2	15
Monterotondo	37	17	4	0
RIKEN	73	34	21	7
TCP	402	173	78	159
UCD	1785	520	431	198
WTSI	1594	733	154	389
TOTAL	**7048**	**3009**	**1596**	**1333**

IMPC Reference Lines



www.mousephenotype.org

IMPC

IMPC portal impc.org mousephenotype.org

Login Register

IMPC
International Mouse Phenotyping Consortium

SEARCH ABOUT IMPC NEWS & EVENTS CONTACT MY IMPC

We are building the first truly comprehensive, functional catalogue of a mammalian genome.

Learn more

The Knockout Mouse

A powerful tool for precision medicine.

Read why

Search IMPC database

Search

Enter your favorite **gene, phenotype, anatomy** or **protocol** to find IMPC data important to your research.

Or browse

new gene-phenotype associations

News and Events

March 18, 2014
Successful IMPC Phenotyping Meeting held in San Francisco

Rare Disease Models

IMPC

MPI2

Filter your search

- Genes 49492
  - IMPC Phenotyping Status
    - Complete 438
    - Started 671
    - Attempt Registered 1485
    - Legacy 615
  - IMPC Mouse Production Status
  - IMPC Mouse Production Center
  - IMPC Mouse Phenotype Center
  - Subtype
- Phenotypes 607
- Diseases 7137
- Anatomy 382
- Procedures 4540
- Images 100126

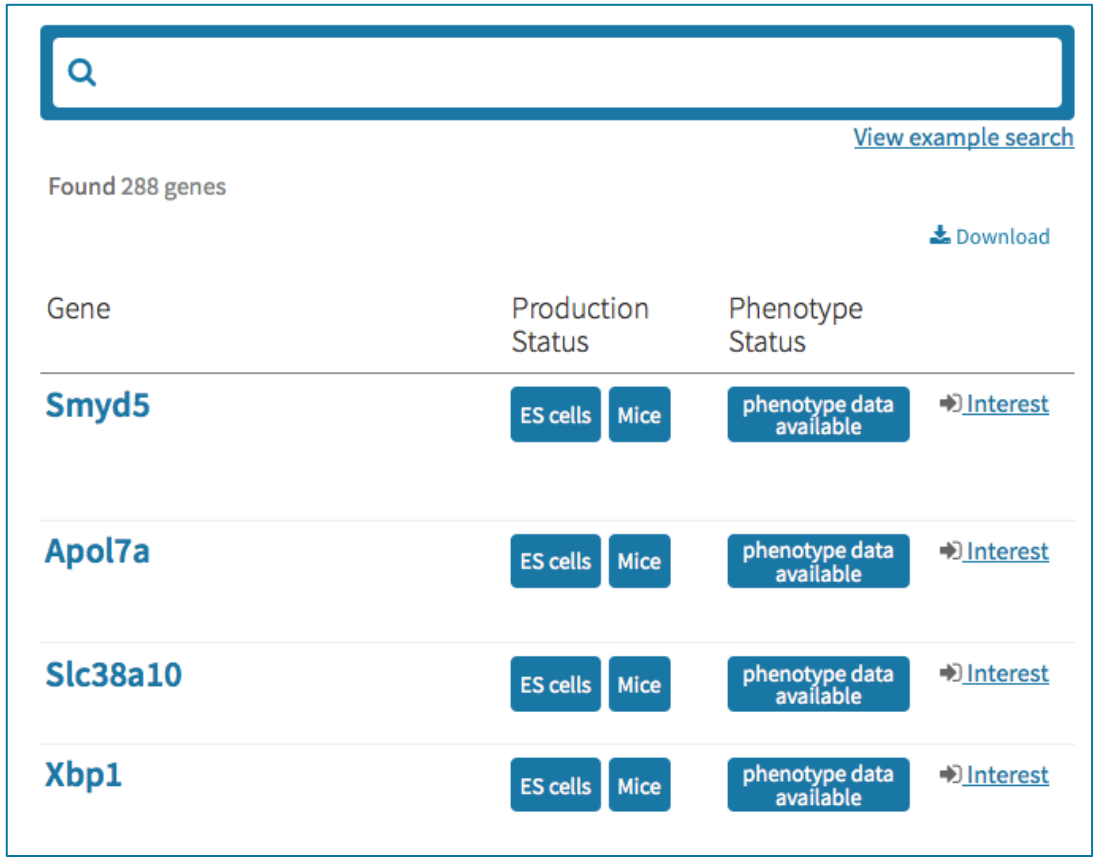
View example search

Found 49492 genes

Download

Gene	Production Status	Phenotype Status	
Rxfp2	ES Cells Mice	phenotype data available	Register interest
Dlg2	ES Cells Mice	phenotype data available	Register interest
1110059G10Rik	ES Cells Mice	phenotype data available	Register interest
Aff3	ES Cells Mice	phenotype data available	Register interest

Follow genes of interest



Follow genes you are interested in

IMPC will send an email when new data is published

- 1100 registrations
- 2867 genes
- Average 3 genes per person

IMPC

MPI2

The ignorome – annotating genes with no known function

OPEN ACCESS Freely available online

PLOS | ONE

Functionally Enigmatic Genes: A Case Study of the Brain Ignorome

Ashutosh K. Pandey[1]*, Lu Lu[1], Xusheng Wa

1 UT Center for Integrative and Translational Genomics and Departm
Tennessee, United States of America, 2 St. Jude Children's Research H
Bioinformatics Program, University of Memphis, Memphis, Tennessee, U

IMPC SEARCH ABOUT IMPC NEWS & EVENTS CONTACT MY IMPC PHENODCC

My IMPC Messages Log out

Home » Search » Genes » Elmod1

Gene: Elmod1

Name	ELMO/CED-12 domain containing 1
MGI Id	MGI:3583900
Status	ES Cells, Mice tm1b, Mice tm1a, phenotype data available
ENSEMBL Links	Gene View, Location View, Compara View
Gene Browser	ENU(12)

Register interest

Order

Phenotype associations for Elmod1

Phenotype Summary based on automated MP annotations supported by experiments on knockout mouse models.

In **homozygote** :

- **Both sexes** have the following phenotypic abnormalities
  - nervous system phenotype. Evidence from IMPC , EuroPhenome (16)
  - adipose tissue phenotype. Evidence from IMPC (4)
  - integument phenotype. Evidence from EuroPhenome (2)
  - immune system phenotype. Evidence from IMPC , EuroPhenome (6)
  - hearing/vestibular/ear phenotype. Evidence from IMPC (2)
  - behavior/neurological phenotype. Evidence from IMPC , EuroPhenome (69)
  - homeostasis/metabolism phenotype. Evidence from IMPC , EuroPhenome (22)
  - growth/size/body phenotype. Evidence from IMPC , EuroPhenome (50)
  - hematopoietic system phenotype. Evidence from IMPC , EuroPhenome (16)
- Following phenotypic abnormalities occured in **females** only
  - skeleton phenotype. Evidence from IMPC (3)

Elmod1

Belongs to the large class of genes expressed in the brain for which there is no functional information

IMPC

MPI2

Pre-QC phenotype heatmap

Caution

This is the results of a preliminary statistical analysis. Data are still in the process of being quality controlled and results may change.

#	Descriptor	Gene symbol	Background strain	Allele	Phenotyping center
1	Elmod1	Elmod1	C57BL/6NTac	Elmod1$^{tm1b(EUCOMM)Hmgu}$	MRC Harwell

Elmod1 Overview

Help | Procedural | **Ontological**

Significant | Insignificant | No data | Show gradient | p-value threshold: 0.0001 (0 – 1)

	Mouse anatomical entity	Pigmentation	Nervous system	Renal / urinary system	Limbs / digits / tail
Elmod1		1	0.0000017384	0.039729	3.9759e-8
	Adipose tissue	**Homeostasis / metabolism**	**Hearing / vestibular / ear**	**Growth / size**	**Craniofacial**
Elmod1	5.5511e-16	1.5464e-7	4.0034e-34	9.4939e-9	1.0000
	Cardiovascular system	**Behavior / neurological**	**Immune system**	**Respiratory system**	**Reproductive system**
Elmod1	0.000079829	0.0000	0.16766	0.10489	1
	Skeleton	**Vision / eye**	**Other**	**Hematopoietic system**	**Mortality / aging**
Elmod1	7.4044e-8	0.0020249	0.66540	6.1029e-8	1
	Integument				
Elmod1	1				

Gene: Elmod1

Name ELMO/CED-12 domain containing 1
MGI Id MGI:3583900

Register interest

Order

Status ES Cells | Mice tm1b | Mice tm1a | phenotype data available

ENSEMBL Links Gene View | Location View | Compara View

Gene Browser ENU(12)

Phenotype associations for Elmod1

Phenotype Summary based on automated MP annotations supported by experiments on knockout mouse models.

In **homozygote :**

- **Both sexes** have the following phenotypic abnormalities
  - nervous system phenotype. Evidence from IMPC , EuroPhenome (16)
  - adipose tissue phenotype. Evidence from IMPC (4)
  - integument phenotype. Evidence from EuroPhenome (2)
  - immune system phenotype. Evidence from IMPC , EuroPhenome (6)
  - hearing/vestibular/ear phenotype. Evidence from IMPC (2)
  - behavior/neurological phenotype. Evidence from IMPC , EuroPhenome (69)
  - homeostasis/metabolism phenotype. Evidence from IMPC , EuroPhenome (22)
  - growth/size/body phenotype. Evidence from IMPC , EuroPhenome (50)
  - hematopoietic system phenotype. Evidence from IMPC , EuroPhenome (16)
- Following phenotypic abnormalities occured in **females** only
  - skeleton phenotype. Evidence from IMPC (3)

Gene Page

Phenotype: abnormal glucose homeostasis

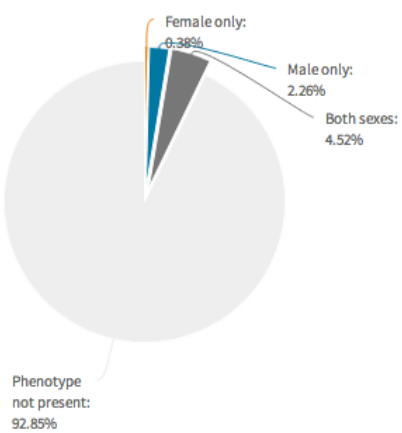
Definition	anomaly in the processes involved in the maintenance of an internal equilibrium of glucose in the fluids and tissues
Synonyms	abnormal glucose metabolism , metabolism: abnormal glucose homeostasis
Procedure	• Simplified IPGTT (EUMODIC Pipeline 1)
MGI MP browser	MP:0002078

Phenotype associations stats

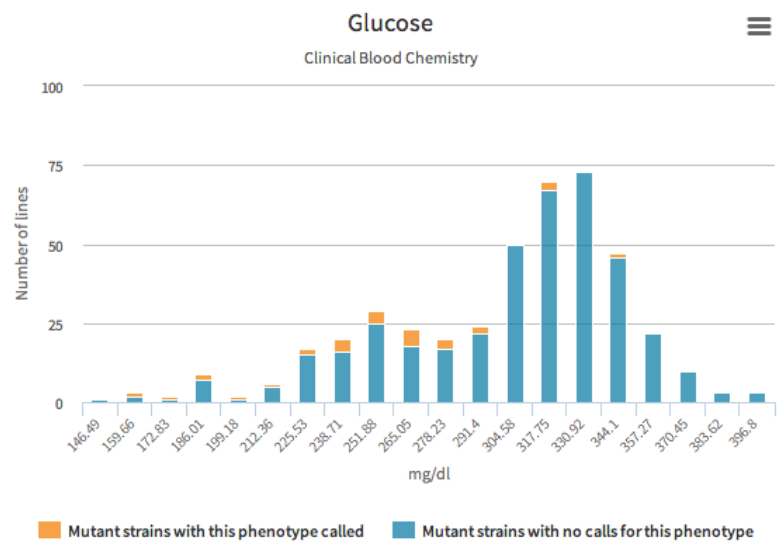
7.15% of tested genes with null mutations on a B6N genetic background have a phenotype association to abnormal glucose homeostasis (57/797)

4.89% females (39/797)

6.78% males (54/796)



Select a parameter Glucose (IMPC_CBC_018_001)



Center Sex

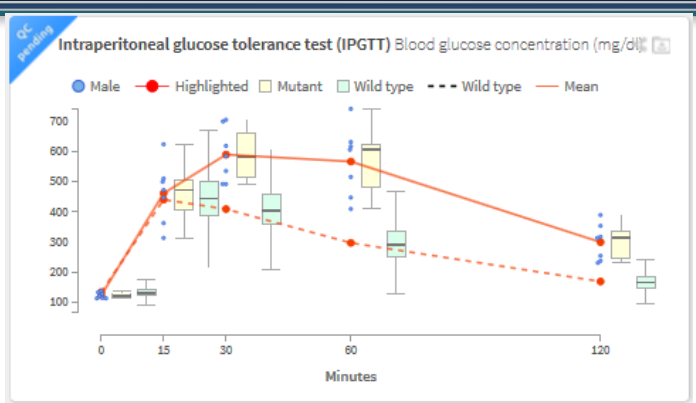
Gene variants with abnormal glucose homeostasis

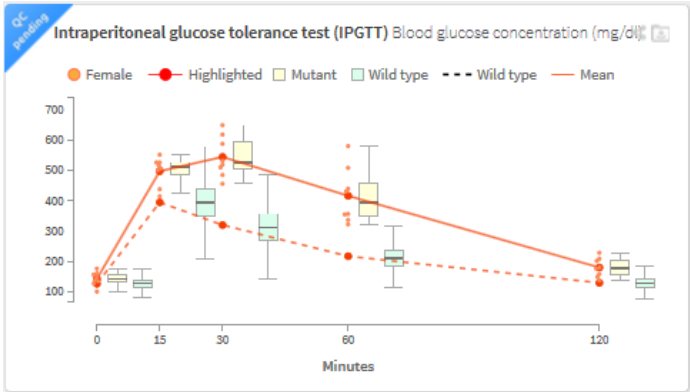
Phenotype: All | Gene: All | Procedure: All | Source: All

Total number of results: 132

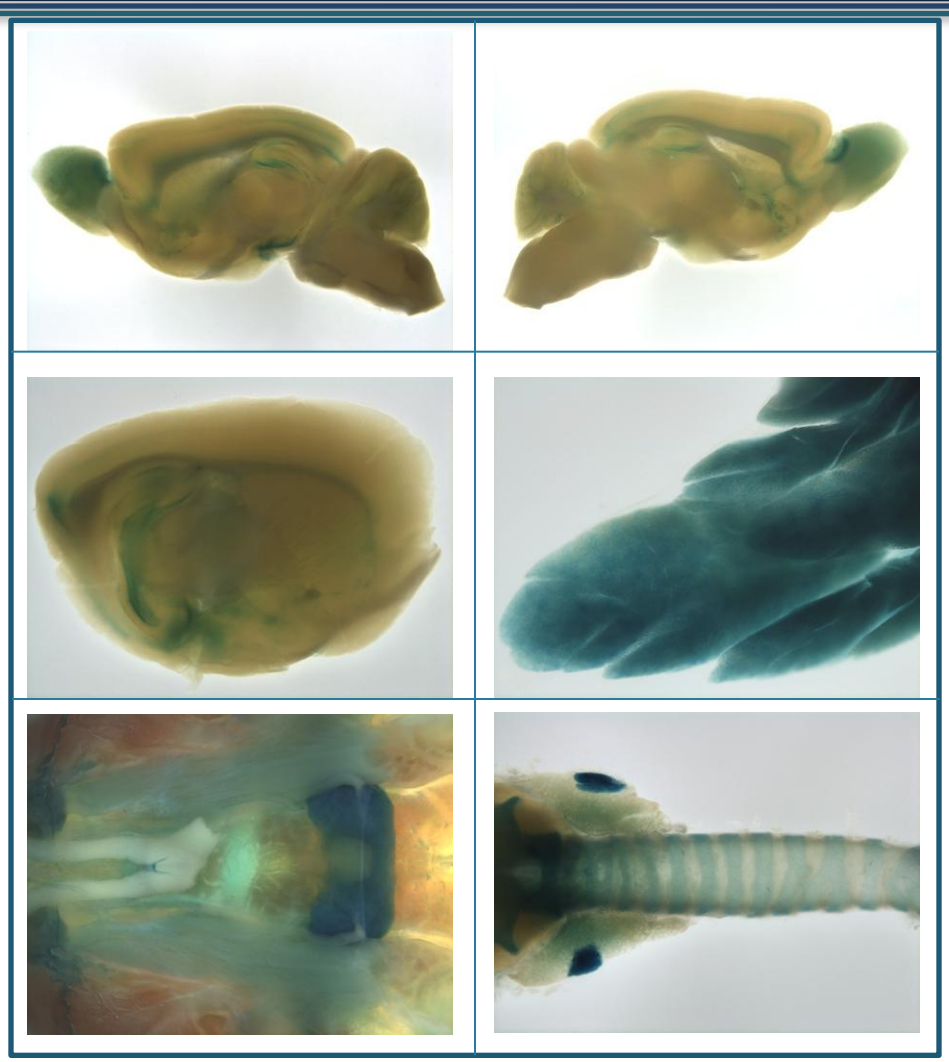
Gene / Allele	Zygosity	Sex	Phenotype	Procedure | Parameter	Phenotyping Center	Source	P Value	Graph
Agl $Agl^{tm1b(EUCOMM)Wtsi}$	homozygote	♀ ♂	decreased circulating glucose level	Clinical Blood Chemistry | Glucose	MRC Harwell	IMPC	0.0	
Gtpbp2 $Gtpbp2^{tm1b(KOMP)Mbp}$	homozygote	♀ ♂	increased circulating glucose level	Clinical Blood Chemistry | Glucose	TCP	IMPC	3.44E-15	
Gys2 $Gys2^{tm1a(KOMP)Wtsi}$	homozygote	♀ ♂	decreased circulating glucose level	Fasted Clinical Chemistry | Glucose	WTSI	EuroPhenome	1.04E-14	
Gys2 $Gys2^{tm1a(KOMP)Wtsi}$	homozygote	♀ ♂	decreased circulating glucose level	Clinical Chemistry | Glucose	WTSI	EuroPhenome	1.23E-14	
Macrod2 $Macrod2^{tm1.1(KOMP)Vlcg}$	homozygote	♀ ♂	decreased circulating glucose level	Clinical Blood Chemistry | Glucose	JAX	IMPC	1.99E-13	
Cbx6 $Cbx6^{tm1a(EUCOMM)Wtsi}$	homozygote	♀ ♂	decreased circulating glucose level	Clinical Blood Chemistry | Glucose	WTSI	IMPC	1.65E-12	
Ghrhr $Ghrhr^{tm1.1(KOMP)Vlcg}$	homozygote	♀ ♂	decreased circulating glucose level	Plasma Chemistry | Glucose	JAX	IMPC	9.13E-12	

Nbr1$^{tm1b/tm1b}$ Neighbour of Brca1 gene 1





Decreased ability to clear glucose (males and females). Expression seen in a broad range of organs, including brain, pancreas, pituitary, thyroid and parathyroid glands

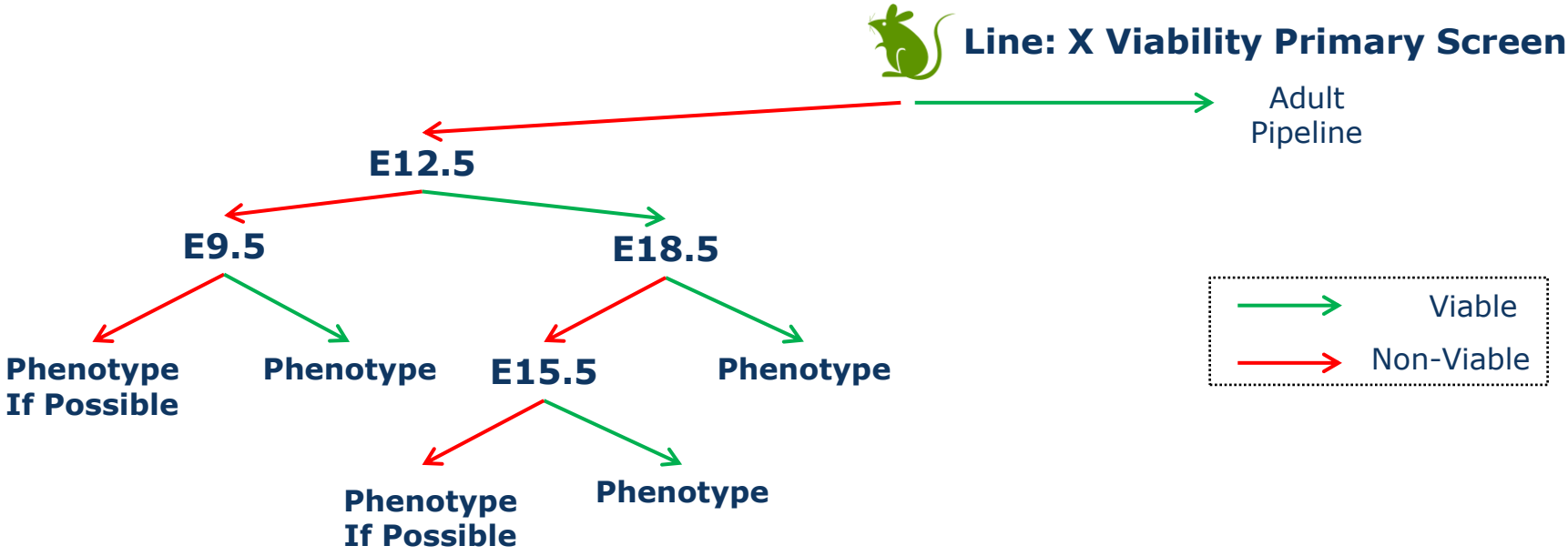


IMPC

MPI2

IMPC – Embryonic Lethal Triage Pipeline

- **Number of Lines : ~30%** to go through the Embryo Pipeline



IMPC

MPI2

Harwell: Triaging strategy for viability and morphology screen of embryonic lethal lines

Lydia Teboul
Sara Johnson
James Cleak
Zsombor Szoke-Kovacs

Viability & *LacZ* screen @ E12.5

Non-Viable @ E12.5

Viable @ E12.5

Viability & Morphology with OPT@ E9.5*

Viability & Morphology with microCT @ E14.5

* count reabsorptions

No obvious defect @ E14.5

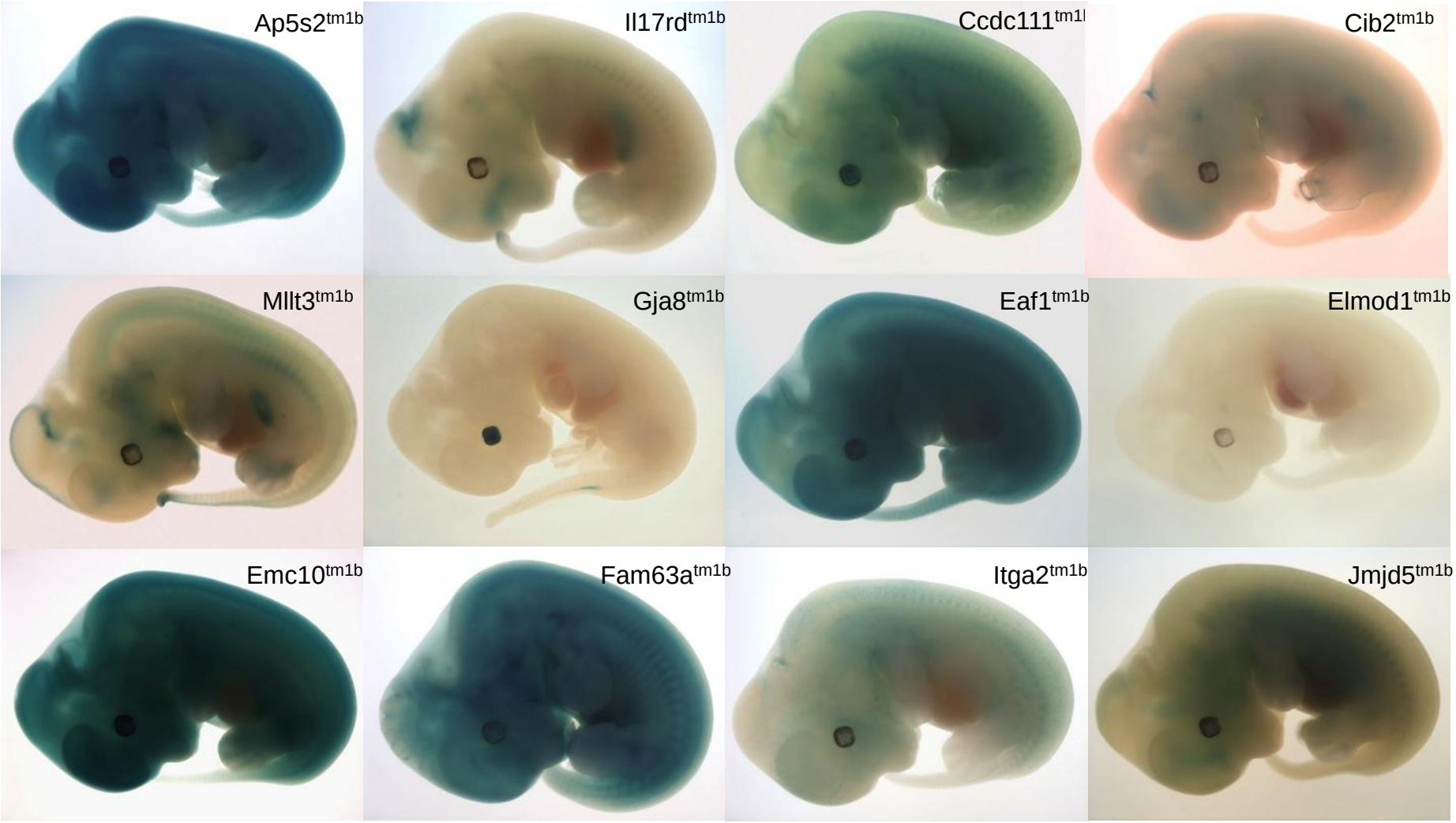
Perinatal lethal

Morphology with microCT @ E18.5

IMPC

MPI2

Analysis of expression patterns at E12.5
Over 130 lines characterised so far

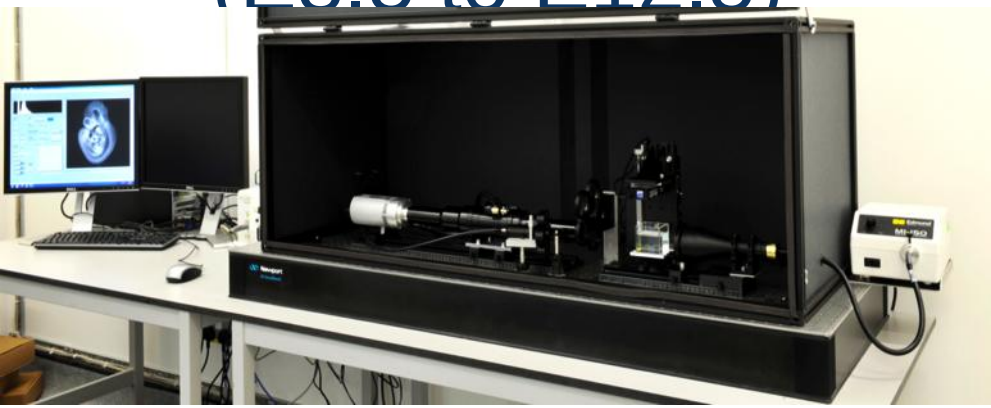


IMPC

MPI2

Two imaging platforms

OPT
Optical Projection Tomography
(E8.5 to E12.5)

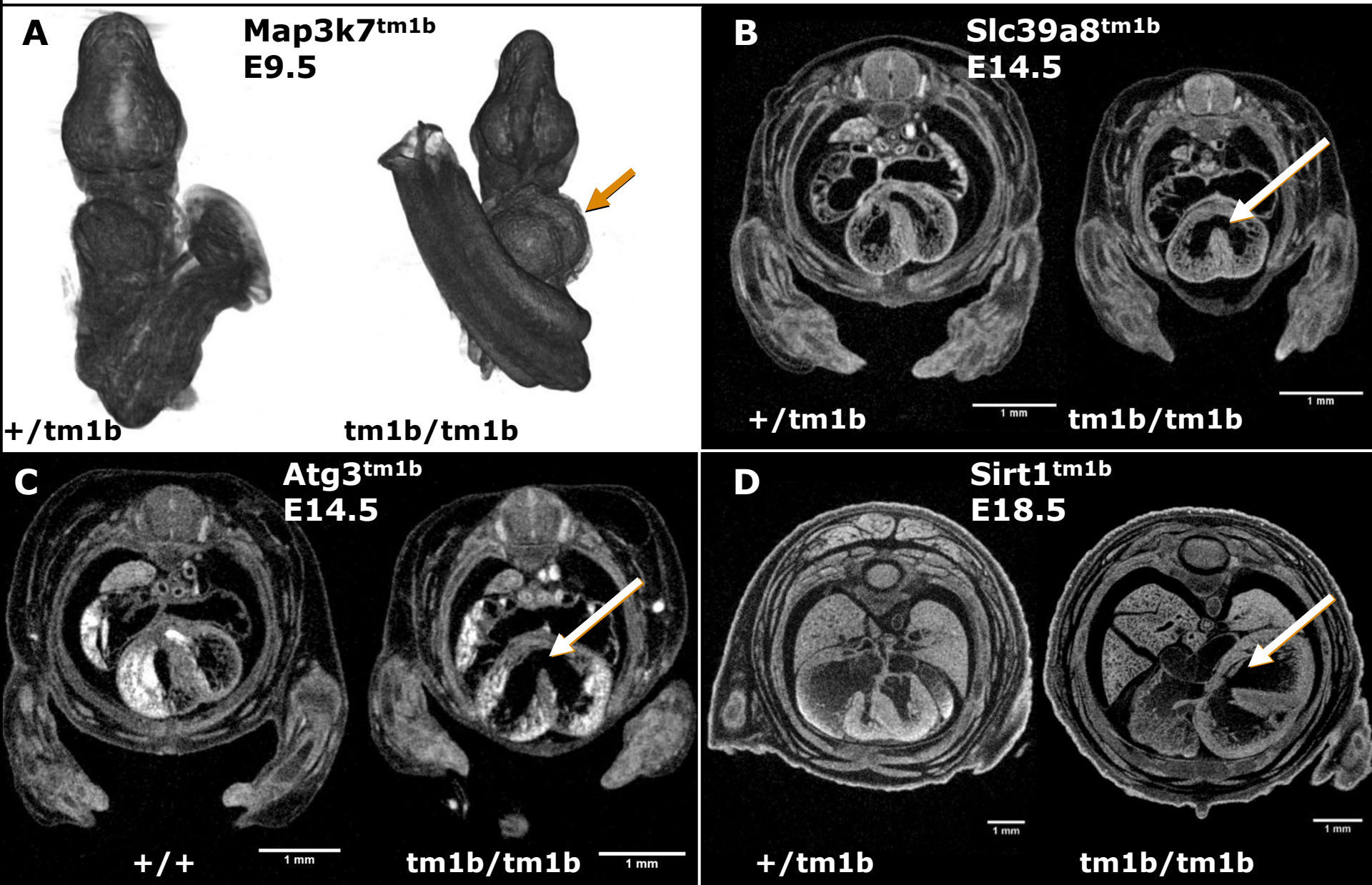


microCT
micro Computed Tomography
(E12.5 to E18.5)

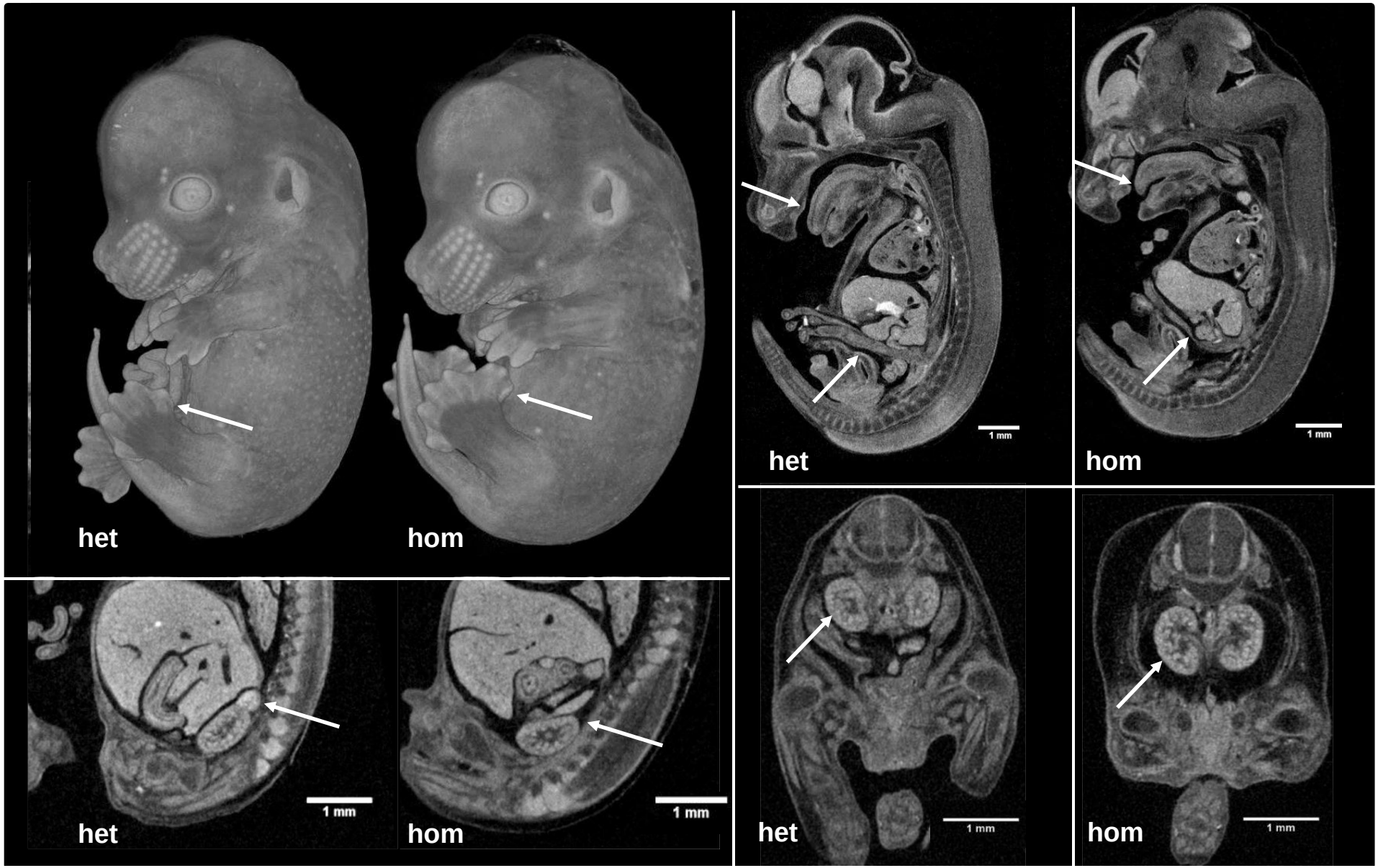
IMPC

MPI2

Examples of new phenotypes: Screen identified 4 mutants lines with abnormal cardiac morphology so far



Klhdc2: embryonic lethal with multiple defects



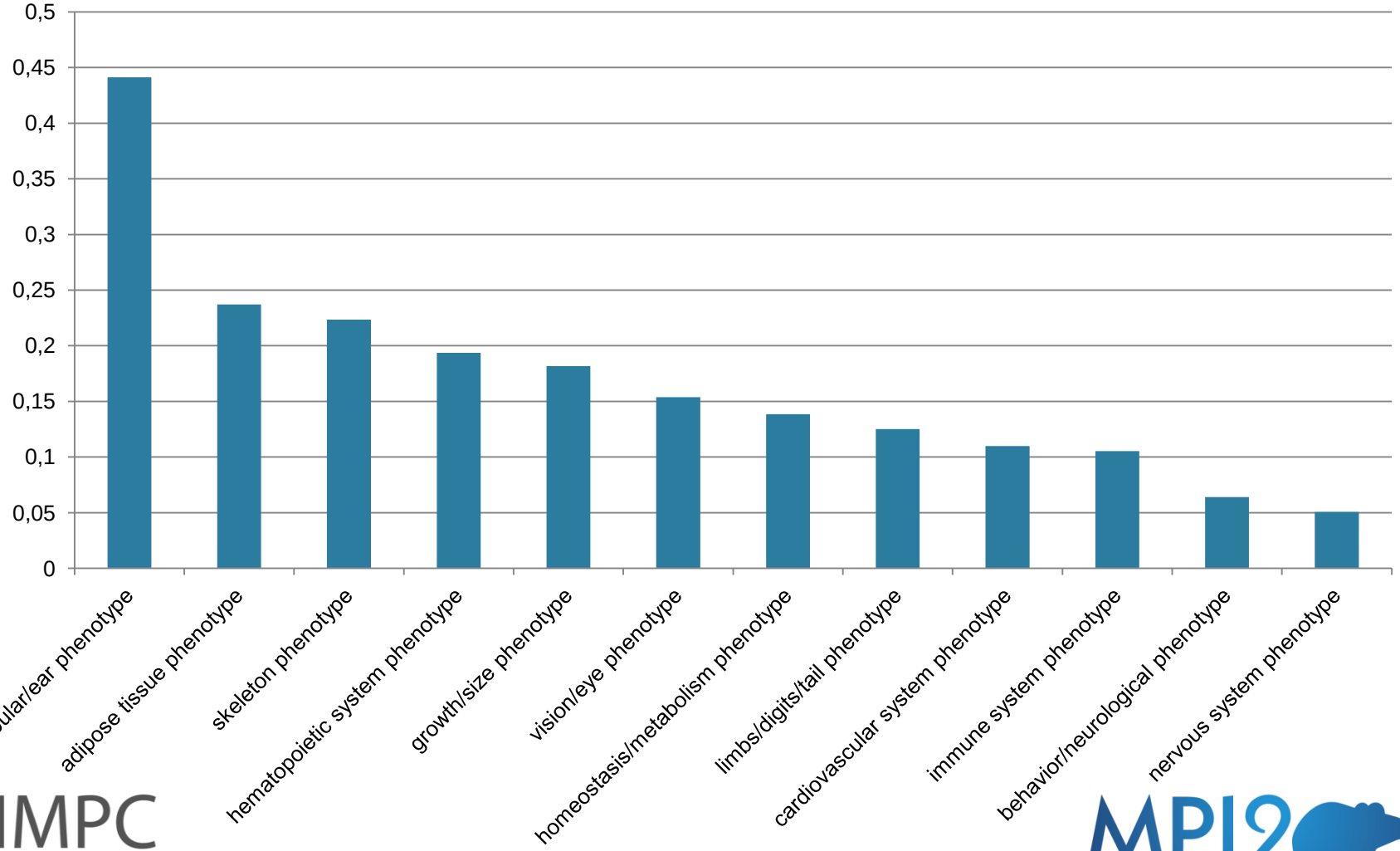
Numerical annotations by sexual dimorphism status, using p < 0.0001

Class	Number	% of Hits
Hits where 2 genders analysed	3378	100.00%
Which were classified a		
Hits equal across sexes	2874	85.08%
Hits with sexual dimorphism	504	14.92%
These could be classified as		
Hits 1 sex only	307	9.09%
Hits sex different magnitude	92	2.72%
Hits sex different direction	99	2.93%
Hits unclassified dimorphism	6	0.18%

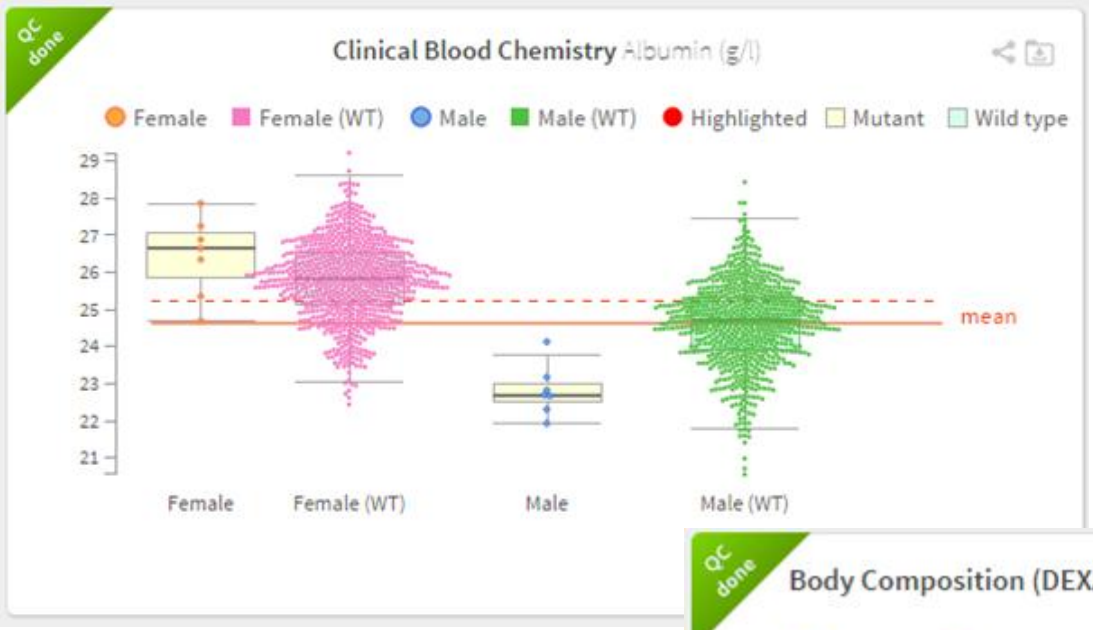
IMPC

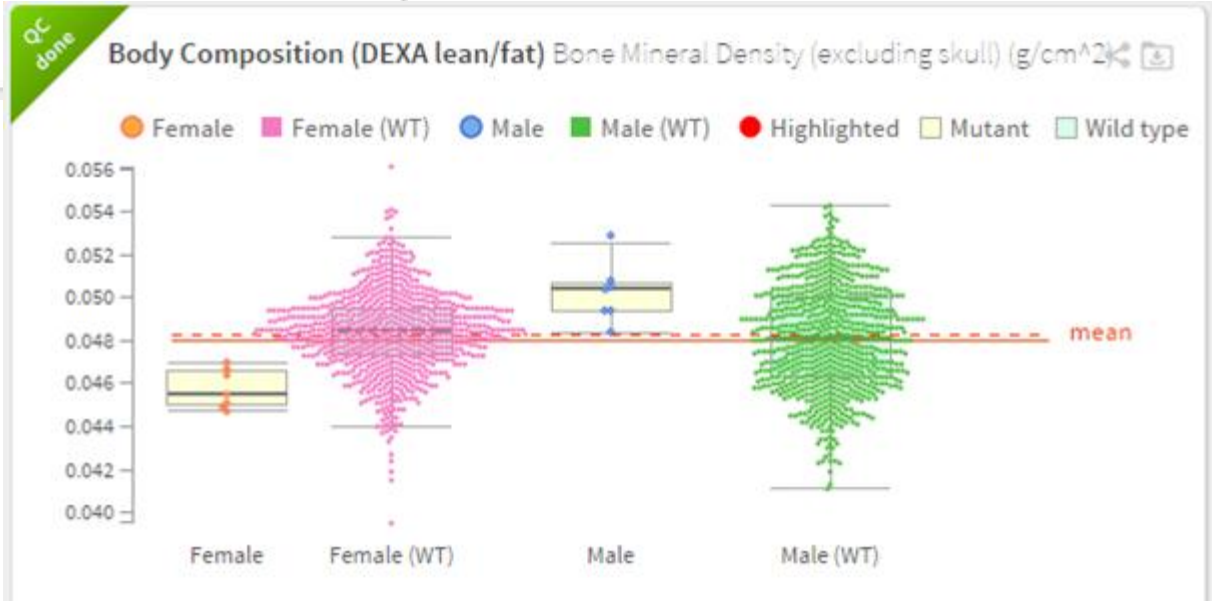
MPI2

Percentage of hits that are sexually dimorphic by top level term



Zfyve28 knockout show opposite direction of bone mineral density change (skeleton phenotype), and males only have significantly increased albumin concentration (homeostasis/metabolism phenotype)





IMPC

New Gene Heatmap – zygosity and sexual dimorphism illustrated

#	Descriptor	Gene symbol	Background strain	Allele	Phenotyping center
1	Elmod1	Elmod1	C57BL/6NTac	Elmod1$^{tm1b(EUCOMM)Hmgu}$	MRC Harwell

Elmod1 | Overview | Help | Procedural | **Ontological**

A hit | No hit | Hom Homozygous | Het Heterozygous | Hem Hemizygous | Sexual dimorphism

Significant | Insignificant | No data | Zygosity hit | No zygosity hit | Sexual dimorphism hit | No sexual dimorphism hit

Show gradient | p-value threshold: 0.0001 (0 – 1)

	Mouse anatomical entity	Pigmentation	Nervous system	Renal / urinary system	Limbs / digits / tail
Elmod1		Hom	Hom	Hom	Hom
	Adipose tissue	**Homeostasis / metabolism**	**Hearing / vestibular / ear**	**Growth / size / body**	**Craniofacial**
Elmod1	Hom	Hom	Hom	Hom	Hom
	Cardiovascular system	**Behavior / neurological**	**Immune system**	**Respiratory system**	**Reproductive system**
Elmod1	Hom	Hom	Hom	Hom	Hom
	Skeleton	**Vision / eye**	**Other**	**Hematopoietic system**	**Mortality / aging**
Elmod1	Hom	Hom	Hom	Hom	Hom
	Integument	**Abnormal eye posterior chamber depth**	**Abnormal eye anterior chamber depth**	**Abnormal cornea thickness**	**Increased cornea thickness**
Elmod1	Hom				

IMPC

MPI2

CONNECT- Disease pages

Disease: Hermansky-Pudlak Syndrome

Name	Hermansky-Pudlak Syndrome 7
Synonyms	-
Locus	6p22.3
Associated Human Genes	DTNBP1
Mouse Orthologs	Dtnbp1
Source	OMIM:614076

OMIM:614076 Disease Phenotype Terms

- Bruising susceptibility
- Albinism
- Ocular albinism
- Impaired platelet aggregation

Associated Mouse Models (PhenoDigm predicted)

78.96: Dtnbp1^{sdy}/Dtnbp1^{sdy} involves: DBA/2J (Source: MGI)
- diluted coat color
- abnormal eye pigmentation
- abnormal kidney physiology
- abnormal blood coagulation
- decreased platelet cell number
- abnormal platelet dense granule number
- decreased platelet serotonin level
- abnormal choroid morphology
- abnormal choroid pigmentation
- abnormal retinal pigment epithelium morphology
- abnormal platelet physiology
- decreased platelet aggregation

73.61: Dtnbp1^{sdy}/Dtnbp1^{sdy} DBA/2J-Dtnbp1/J (Source: MGI)
- diluted coat color
- decreased eye pigmentation
- increased bleeding time

66.52: Dtnbp1$^{tm1b(EUCOMM)Hmgu}$/Dtnbp1$^{tm1b(EUCOMM)Hmgu}$ C5
- increased circulating calcium level
- increased leukocyte cell number
- increased circulating phosphate level
- abnormal skin morphology
- abnormal coat/hair pigmentation
- abnormal iris pigmentation
- abnormal retinal pigmentation
- increased circulating cholesterol level
- decreased circulating serum albumin level
- increased circulating glucose level
- decreased mean corpuscular hemoglobin concentration

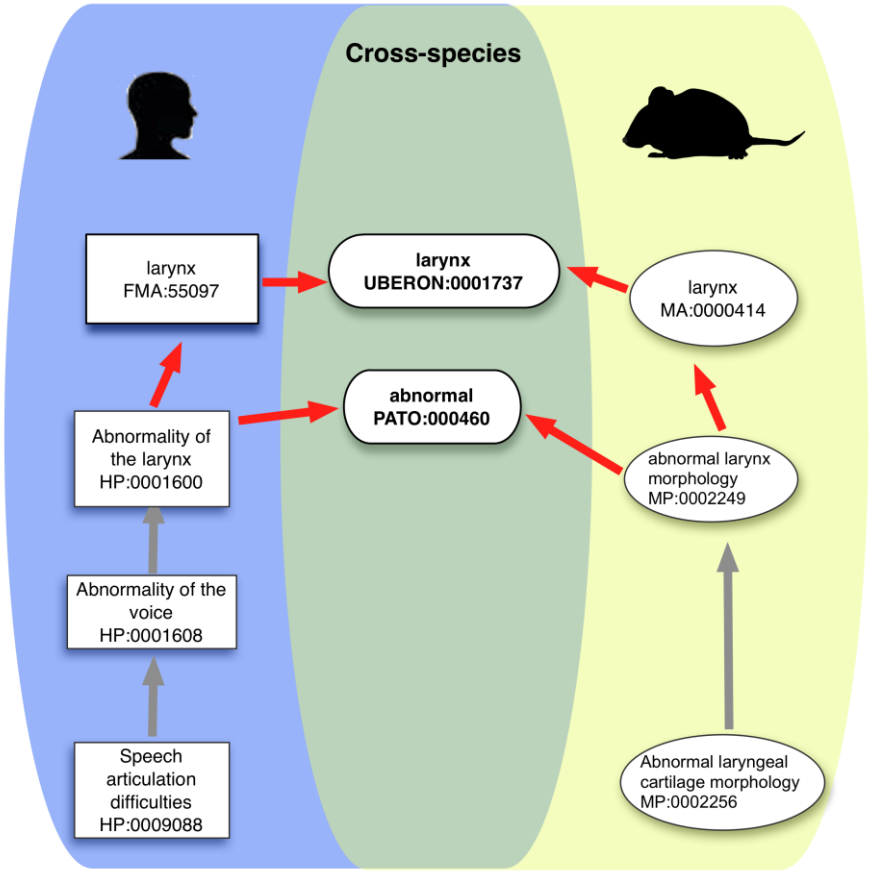
Potential Mouse Models

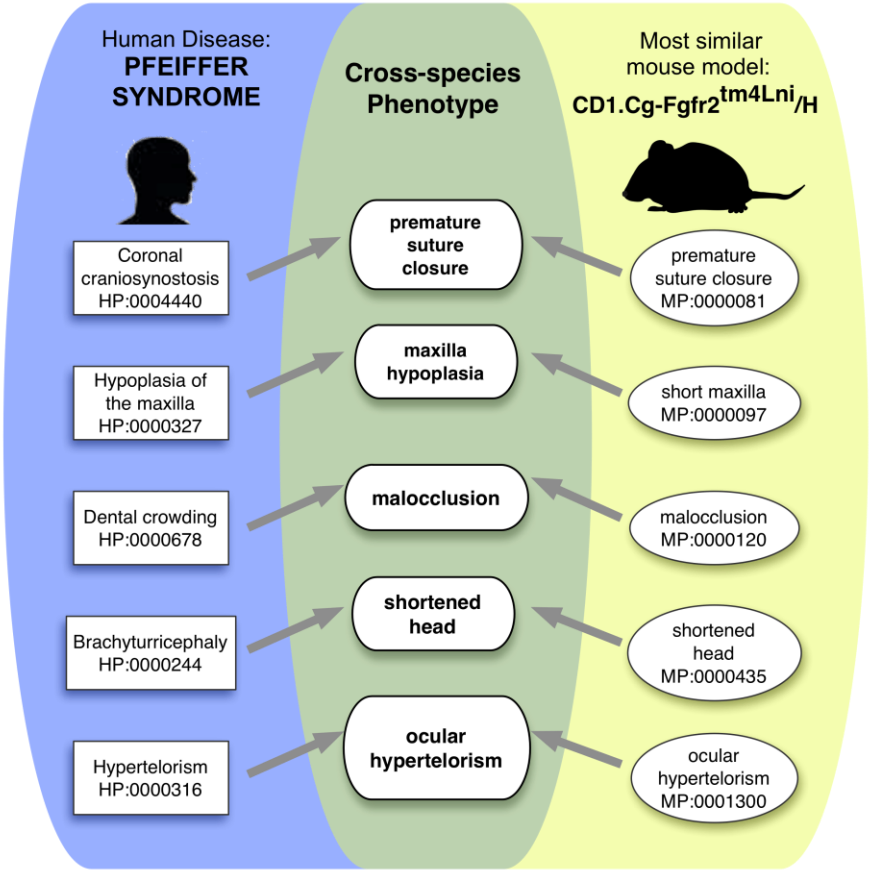
Mouse Gene Symbol	Disease Gene Ortholog	Syntenic Disease Locus	Mouse Literature Evidence (MGI)	MGI Mouse Phenotype Evidence (Phenodigm)	IMPC Mouse Phenotype Evidence (Phenodigm)	
Dtnbp1	Yes	Yes	Yes	78.96	66.52	+
Hps3				88.9		+
Tyr				87.95		+

IMPC

MPI2

PHENODIGM - Cross-species phenotype comparisons by semantic similarity





IMPC

Damien Smedley, Sanger

MPI2

IMPC and the Rare Disease Community

Number of RDGenes with any phenotype data on portal: 248
Number of RDGenes with a cre-ex (tm1b) mouse or better: 417
Number of RDGenes with a genotype confirmed (tm1a) mouse or better: 877
Number of RDGenes with any mouse production or better: 1151
Number of RDGenes with any intention of mouse production via IMPC: **2185**

IMPC

MPI2

uilding the first truly comprehensive, l catalogue of a mammalian genome.

se Phenotyping Resource of Standardised Screens.

onal Mouse Phenotype Consortium

e International Mouse Phenotyping Consortium (IMPC) is to onal insight for every gene by generating and systematically 0,000 knockout mouse strains

Search IMPC database

Search

Enter your favorite gene, pheno or protocol to find IMPC data im your research.

Or browse

new gene-phenotype associa

Rare Disease Models

Find mouse models of rare disea shared gene or shared phenotyp

Visit Disease Models

IMPReSS

earch

Remove all facet filters

624

es 0

786

734

50

2

s

l Gene Associations

data (OMIM, Orphanet) 472

data (MGI) 168

ed Gene Associations by

ta 786

ta in linkage locus 24

a 786

a in linkage locus 263

Found 786 diseases

Disease	Source	Curated Genes	Candidate by phenotyp
Aniridia	OMIM	human mice	IMPC MGI
Aniridia, Microcornea, And Spontaneously Reabsorbed Cataract	OMIM		IMPC MGI
Tooth Agenesis, Selective, 1	OMIM	human mice	IMPC MGI
Anterior Segment Mesenchymal Dysgenesis	OMIM	human mice	IMPC MGI
Antiphospholipid Syndrome, Familial	OMIM		IMPC MGI
Atelosteogenesis, Type I	OMIM	human	IMPC MGI
Atherosclerosis Susceptibility	OMIM		IMPC MGI
Axial Osteomalacia	OMIM		IMPC MGI

Where do we go from here?

- *"Phase 2" (2016-2021)…'completing' the mouse genome*
  - *~12,000 new mutant mouse lines over 5 years*
  - *Less costly per mutant than Phase 1*

- *Significant, fully-validated resource for research community…*
  - *reagents, tools, SOP's, data, information, expertise*
  - *highly quality controlled (e.g., gender balance) processes*
  - *ensures reliability and reproducibility throughout*
  - *foundation of infrastructure, capacity, and capability*

- *Metabolomics profiling of select KOMP2 lines by KOMP2-BaSH*

- *Adopt CRISPR/Cas9 genome editing technology*

- *New, data-rich, intense phenotyping platforms*

IMPC

MPI2

Launchpads

- *Technology development*

  2i media, Permeable Cre, "Prefect Host" blastocyst

Transgenic Res (2014) 23:177–185
DOI 10.1007/s11248-013-9764-x

TECHNICAL REPORT

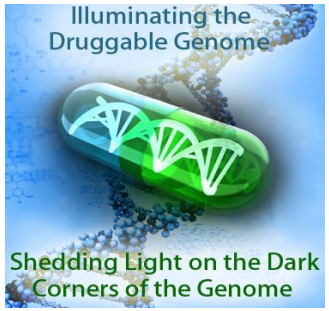
Rapid conversion of EUCOMM/KOMP-CSD alleles in mouse embryos using a cell-permeable Cre recombinase

Edward Ryder · Brendan Doe · Diane Gleeson · Richard Houghton · Priya Dalvi · Evelyn Grau · Bishoy Habib · Evelina Miklejewska · Stuart Newman · Debarati Sethi · Caroline Sinclair · Sapna Vyas · Hannah Wardle-Jones · Sanger Mouse Genetics Project · Joanna Bottomley · James Bussell · Antonella Galli · Jennifer Salisbury · Ramiro Ramirez-Solis

- *Leveraging NIH programs*

  Phenotyping Embryonic Lethal Knockout Mice (R01)
  (PAR-13-231)
  Eunice Kennedy Shriver National Institute of Child Health and Human Development

- *Rare, Undiagnosed Disease Models*



MRC

Consortium	Nominated Genes	Mutant lines made	Assay development	Data enquiry	Mouse line sent	Outstandi
Accelerated Drug Discovery					1	
Disorders of Bone and Cartilage					1	
Cardiovascular Trait Consortium					1	5
Developmental Disorders					5	5
Diabetes and Obesity					3	3
Vision Research Consortium					2	
Tissue Remodelling and Fibrosis						
Haematopoiesis						
Ion Channels					2	1
Liver Disease Consortium						
Processes of Ageing					1	2
Neuromouse					5	13
Kidney and Urogenital System					2	
Respiratory					1	3
Macrophages					2	
immune system					1	1
Total for MMN					27	33
Rest if the community					80	41

- *Coordinating with other CF Projects*

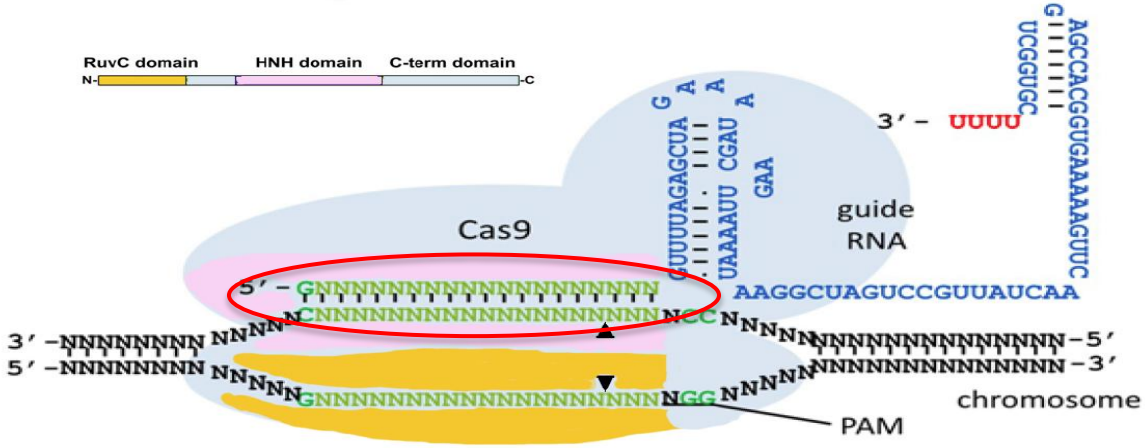
- *Mouse "Networks" for follow-up phenotyping*

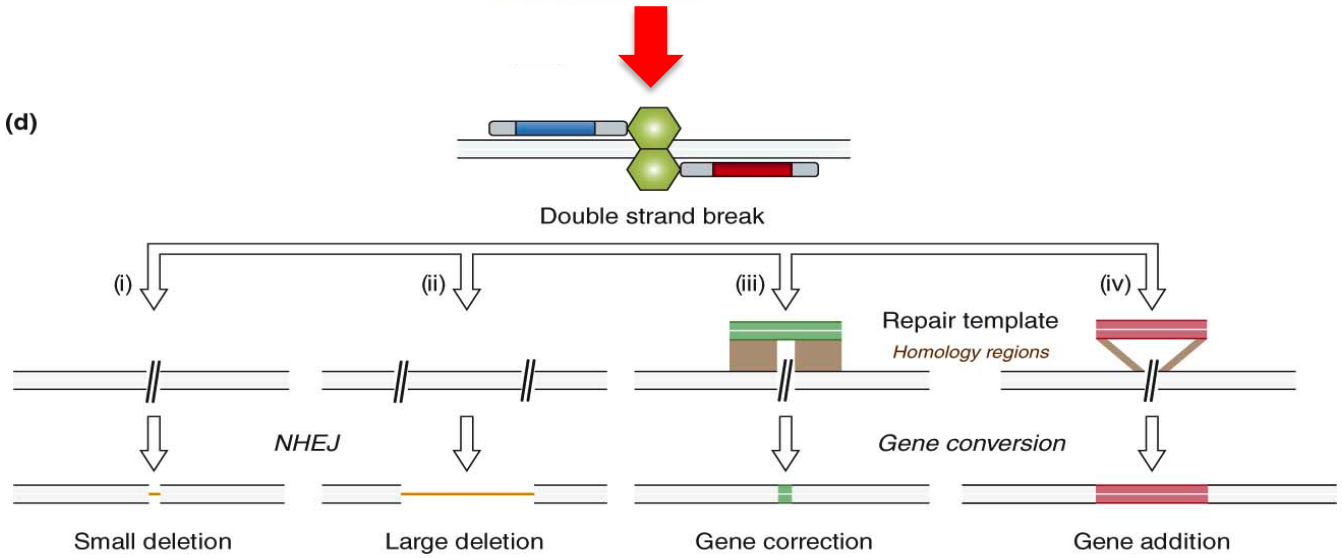
- *"Innovation at the edge"…annotating unannotated genes*

National Institutes of Health
Office of Research Infrastructure Programs
IMPC

The NIH Common Fund
MPI2

CRISPR Cas9





Slide courtesy KOMP2-JAX

National Institutes of Health
Office of Research Infrastructure Programs
IMPC

The NIH Common Fund
MPI2

IMPC Future Developments

- Future Developments: CRISPR/Cas9
  - Pilots underway at IMPC centres to inform future planning
  - Pronuclear/cytoplasmic injection; breeding of F0
  - Exon deletions; introduction of loxP sites
  - **Development of a STANDARDISED, HIGH QUALITY ALLELE**

- Future Developments: Phenotyping
  - A step change in phenotyping for Phase 2
  - More data per animal, complex longitudinal data, lower cost
  - Use of home cage monitoring, telemetry, biomarkers, imaging approaches, histopathology, ageing

IMPC

MPI2

IMPC Conclusions

- IMPC is set to deliver 5,000 mouse lines and associated phenotype information by 2016
- Phenotype data from the first 1300 phenotyped lines is available at www.impc.org
- Plans for Phase 2 of IMPC, to finish the genome, are being developed
- The Catalogue of Mammalian Gene Function, developed by IMPC, and the associated mouse resources will be truly transformative for biology and biomedical sciences

IMPC

MPI2

IMPC

International Mouse Phenotyping Consortium

- National Institutes of Health (USA)
- Toronto Centre for Phenogenomics (Canada)
- Medical Research Council & MRC Harwell (UK)
- The Wellcome Trust Sanger Institute (UK)
- Wellcome Trust
- Helmholtz Zentrum Munich (Germany)
- Institute Clinique de la Souris (France)
- UC Davis
- European Bioinformatics Institute
- The Jackson Laboratory
- Children's Hospital Oakland Research Institute
- Consiglio Nazionale delle Ricerche (Italy)
- European Commission (EU)
- Infrafrontier (EU)
- Australian Phenomics Network (Australia)
- RIKEN BioResource Center (Japan)
- Genome Canada
- Model Animal Research Center (Nanjing)
- Baylor College of Medicine
- Charles River Laboratories
- Korean Mouse Phenotyping Centre

IMPC

MPI2

MPI2 Informatics Group

- **MRC Harwell**
  - Andrew Blake
  - Armida Di Fenza
  - Duncan Sneddon
  - Gagarine Yaikhom
  - Henrik Westerberg
  - Luis Santos
  - Hugh Morgan
  - Natalie Ring
  - Tanja Fiegel
  - Hilary Gates
  - Ann-Marie Mallon
- **Welcome Trust Sanger Institute:**
  - Natasha Karp
  - Richard Easty
  - Robert Wilson
  - Peter Matthews
  - David Melvin
  - Vivek Iyer
  - Bill Skarnes
  - Damian Smedley
  - Anika Oellrich
  - Jules Jacobsen
- **European Bioinformatics Institute:**
  - Chao-Kung Chen
  - Jeremy Mason
  - Jonathan W.G. Warren
  - Natalja Kurbatova
  - Ilinca Tudose
  - Terry Meehan
  - Phil Wilkinson
  - Helen Parkinson
  - Paul Flicek