Using iMits – the International Microinjection Tracking System

iMits is designed to coordinate the planning and tracking of Microinjections on IKMC Alleles for all members of the IMPC.

These notes accompany the 10th October iMits release. Note that we plan to make changes / new releases frequently in October, to account for known shortcomings and any feedback from users.

The production imits is here:
www.mousephenotype.org/imits
log in with your email address – you should have been issued this already
password: you should have been already issued this to your email address

The test system is here:
www.i-dcc.org/labs/imits
log in with your email address – you should have been issued this already
password: "password"

Contents

Consortia, Production Centres, MI Plans and actual microinjections

The data in iMits is organised by **Consortium** (e.g. BaSH, Phenomin) and **Production Centre** (e.g. MRC Harwell, WTSI, ICS France etc).

Each Consortium makes **Microinjections Plans** on nominated genes.

Those MI plans then result in actual **Microinjections**, which are tracked after the specification of

- a production centre (e.g. WTSI),
- an IKMC allele (e.g. EPD clone or Regeneron Allele etc) and
- a microinjection date.

MI Planning

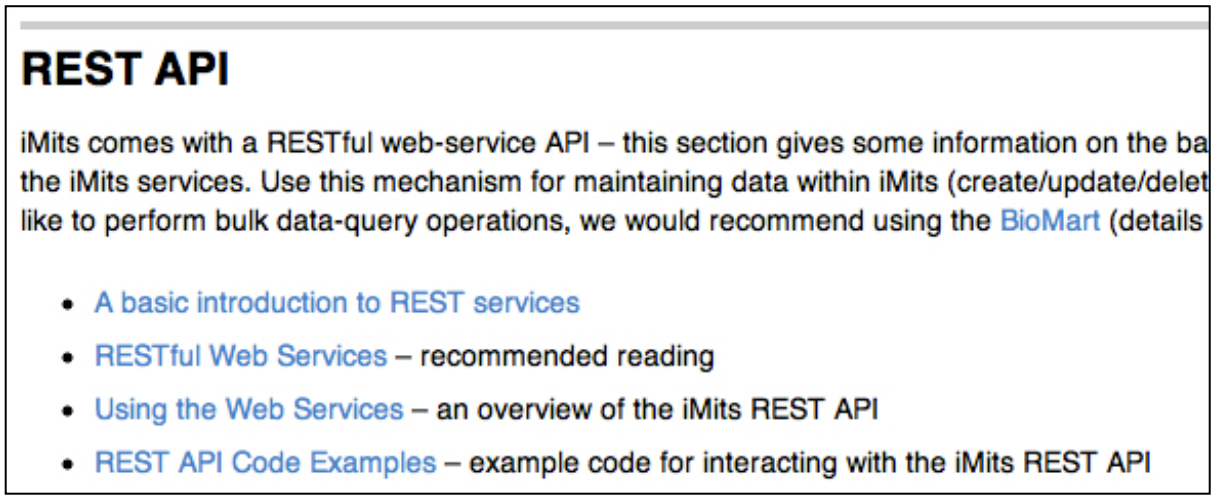
During August 2011, all IMPC members their next-year's production plans on IKMC alleles. These plans were loaded into iMits, and we proceeded to discover

- Conflicting Plans between different IMPC consortia which were unresolved
- Conflicting Plans between different IMPC consortia which were resolved in favour of one of the consortia
- Plans which conflicted with known GLT mice or microinjections recorded at other centres in iMits. These were
- Plans with no conflicts with other consortia. These were 'Assigned'.

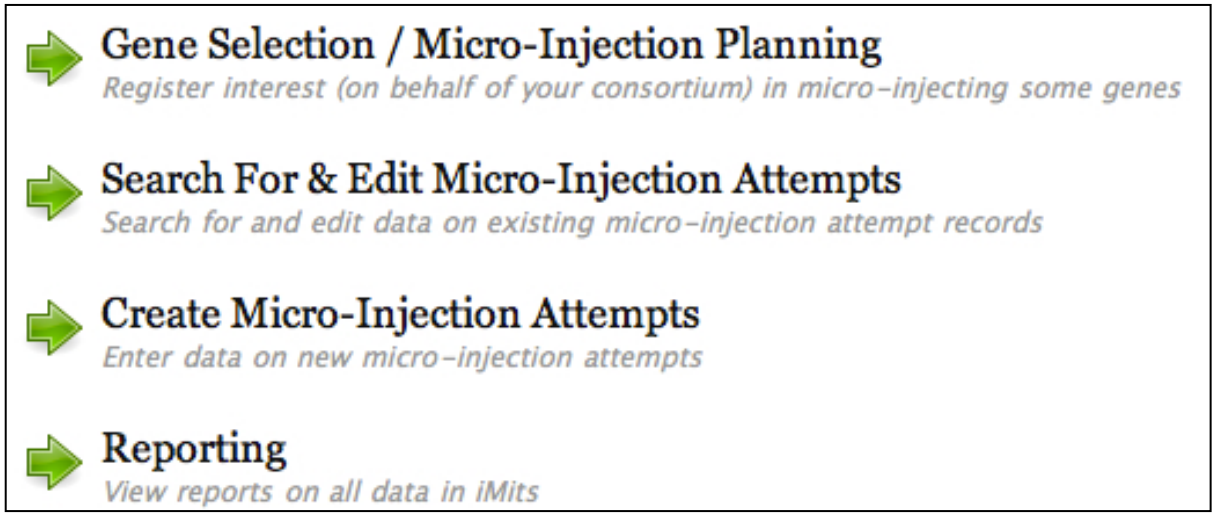
These discrepancies were recorded in iMits. You can interrogate and act on each of these cases.

MI Tracking

Once you have data on Microinjections you have started, in progress, iMits has a web interface to allow you to create a new MI record, as well as web services to accept MI data directly from your institutions' tracking systems - see here for code examples in Perl and Ruby, as well as a full list of the fields for the REST API:
https://github.com/i-dcc/imits/wiki



The iMits Home Page



The order of menu items you might visit could be:

1) Gene selection / Microinjection Planning. Here you can register *Interest* in a gene, and delete previous Interest, Assigned, or Conflict records. Note – genes remain in status 'Interest' until the system runs a reconcile. The time-to-reconcile is currently being decided.

2) Reports. Come here to look at which genes you've been Assigned (Go for it) and which are in Conflict (Chat) and which have been Declined (Look). First drive the "Planned Microinjection Summary and Conflicts" report to work out where you have conflicting plans

3) Search / Edit for MI Attempts. If you have registered interest for a Gene and have been Declined because of an existing GLT Mouse or MI Attempt, come here to work out what the existing Mouse line is, to see whether you need to stop or can go ahead.

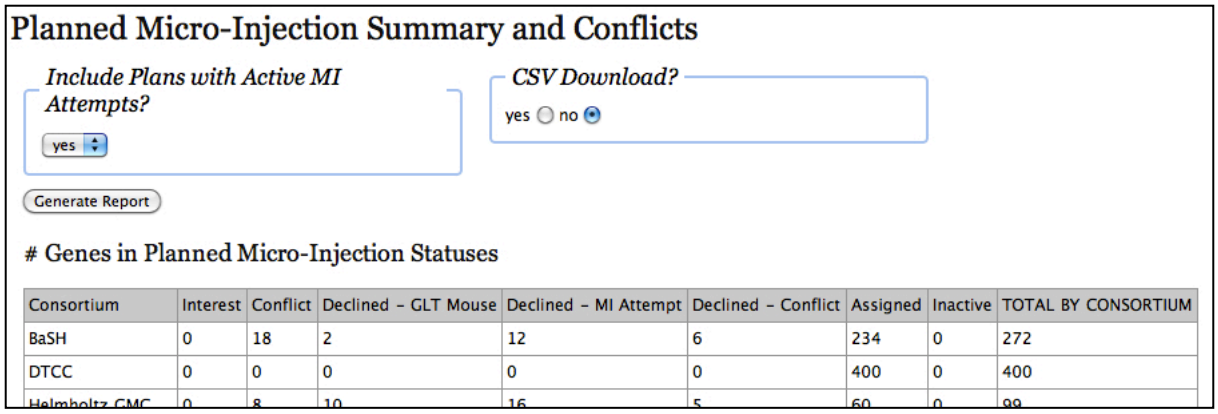
4) Gene selection / Microinjection Planning. If you decided to 'back down' from a conflict, then you may want to add extra interest records for new genes. You will need to come back here to do this. You may also want to delete your interest records on existing genes from this tab.

5) Create MI Attempt. When you have data on a new MI, come here to tell us.

6) Search / Edit for MI Attempts. As your assigned MI's progress, come here to update.

How do I find which of my plans were 'Assigned', 'Declined' or 'In conflict'? What do I do for each case?

Go to "Reports => Planned Micro-Injection Summary and Conflicts".
Select "Include Plans with Active MI Attempts => Yes". Then "Generate Report". Wait for the web page to refresh.


Planned Micro-Injection Summary and Conflicts

Include Plans with Active MI Attempts? yes

CSV Download? yes no

Generate Report

Genes in Planned Micro-Injection Statuses

Consortium	Interest	Conflict	Declined - GLT Mouse	Declined - MI Attempt	Declined - Conflict	Assigned	Inactive	TOTAL BY CONSORTIUM
BaSH	0	18	2	12	6	234	0	272
DTCC	0	0	0	0	0	400	0	400
Helmholtz GMC	0	8	10	16	5	60	0	99

The resulting web report has many sections. This first table is useful, because it tells you

1) How many interest records were submitted (e.g. 272 for BaSH)
2) How many simple conflicts were detected with other consortia's MI Plans (18)
3) How many submissions collided with a pre-existing GLT mouse (2)
4) How many submissions collided with a pre-existing MI Attempt (12)
5) How many submissions collided with another consortium's interest, where that consortium was deemed to have 'won' (6)

Conflicts Microinjection Plans

Scan down till you see the lists of genes starting with 'Conflicting Microinjection Plans':

Conflicting Micro-Injection Plans

Consortium	Production Centre	Marker Symbol	MGI Accession ID	Priority	Reason for Conflict
BaSH		Amz2	MGI:104837	Medium	Other MI plans for: MGP
BaSH		Anapc11	MGI:1913406	Medium	Other MI plans for: JAX
BaSH		Arhgap27	MGI:1916903	Low	Other MI plans for: Phenomin
BaSH		Atxn7l3	MGI:3036270	High	Other MI plans for: MGP
BaSH		Cyp2b10	MGI:88598	Medium	Other MI plans for: Helmholtz GMC
BaSH		Cyp4b1	MGI:103225	Low	Other MI plans for: Helmholtz GMC

In this case the BaSH consortium has conflicted with the JAX consortium for the gene Anapc11. Note that the JAX consortium has a similar printout, which also has the same row, showing a conflict with BaSH:

JAX	JAX	Anapc11	MGI:1913406	Low	Other MI plans for: BaSH
JAX	JAX	Cd2ap	MGI:1330281	High	Other MI plans for: MRC
JAX	JAX	Copg2	MGI:1858683	High	Other MI plans for: MRC
JAX	JAX	Dnmt3a	MGI:1261827	High	Other MI plans for: MRC
JAX	JAX	Epha1	MGI:107381	High	Other MI plans for: MRC, Phenomin
JAX	JAX	Fgf9	MGI:104723	High	Other MI plans for: MRC
JAX	JAX	Flnb	MGI:2446089	Medium	Other MI plans for: BaSH

WHAT TO DO FOR CONFLICT:
The consortia contacts should **CHAT** to work out who 'wins' in this case. Use the consortium – based contacts provided by Joerg Rossbacher, OR the email addresses of the other users inside iMits.

Once you've worked out who "won" for Anapc11:

- The losing consortium could go back to the 'Gene selection' tab to delete its Conflict record for Anapc11, or …

- The losing consortium *could* leave its "Conflict" record in place, to indicate a lasting interest in the gene. When the *winning* consortium creates a new MI on that gene its record will simply transition from 'Conflict' to "Assigned", and the losing consortium's Conflict record will be left in place.

- In either case, the losing consortium will most like enter a *new* interest record for a different gene (we'll cover this later) via the "Gene Selection" tab.

Declined – GLT Mouse

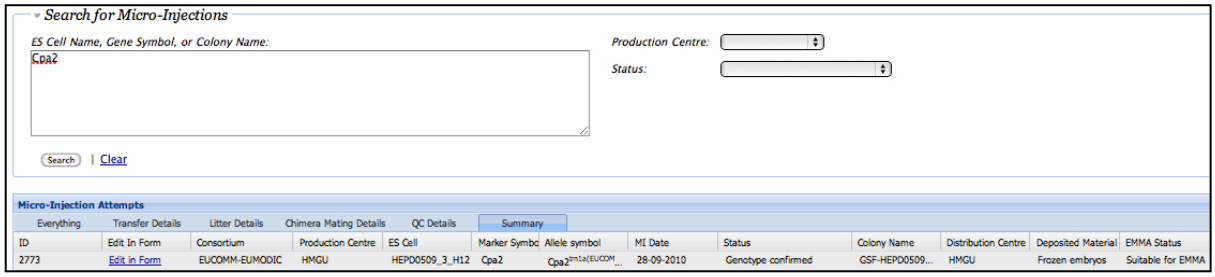
Scan further down the web page to the '**Declined – GLT Mouse**' section:

Declined - GLT Mouse

Consortium	Production Centre	Marker Symbol	MGI Accession ID	Priority	Reason for Decline
BaSH	BCM	Apoe	MGI:88057	Medium	GLT mouse produced at: WTSI (EUCOMM-EUMODIC)
BaSH	BCM	Gpr115	MGI:1925499	Low	GLT mouse produced at: UCD (DTCC-KOMP)
Helmholtz GMC		C4bp	MGI:88229	High	GLT mouse produced at: UCD (DTCC-KOMP)
Helmholtz GMC		Cpa2	MGI:3617840	High	GLT mouse produced at: HMGU (EUCOMM-EUMODIC)

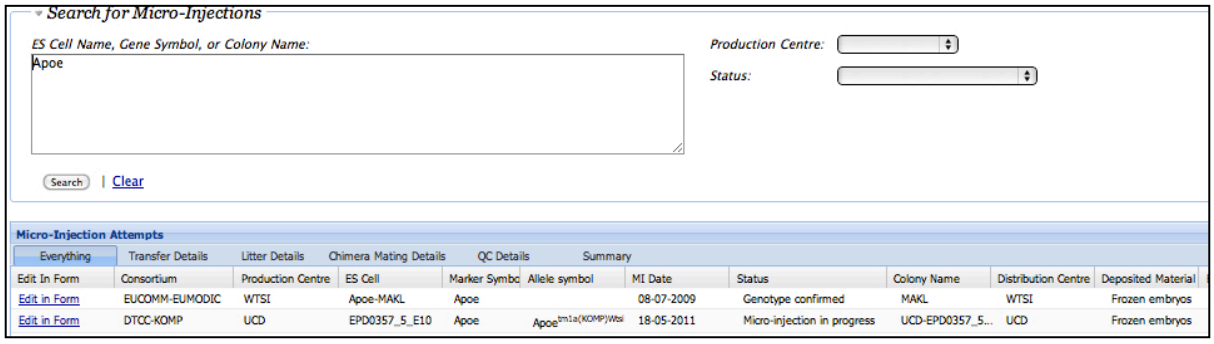
Note there are two rows for the BaSH consortium, suggesting that there are existing GLT mice for Apoe and Gpr115.

WHAT TO DO FOR DECLINED – GLT MOUSE:
Each consortium needs to **LOOK** at the existing MIs in iMits. Go to the "Search and Edit MI Attempts" tab, and type in the Marker symbol for the gene. Here's the result for the Helmholtz GMC record for Cpa2:



This indicates there is a good existing GLT line – also bred at HMGU – based on an IKMC ES Cell. This would suggest that breeding another copy of the same allele should be pondered carefully.

Here is the search for the Apoe gene:



Which shows two MIs for Apoe: one in progress at UCD, and the other Genotype confirmed at WTSI. Note carefully that the ES-cell for the WTSI mouse is *not* of the known form for an IKMC allele. Again, this impacts whether the consortium goes ahead with mouse production.

Once you've decided what to do for Apoe:

- If you decide to proceed with the MI, then you can create a new MI. We will notice the double-targeting, but we won't stop it.
- If you decide not to proceed, go back to the 'Gene selection' tab to delete the Declined-Conflict record for Apoe, or …
- The losing consortium *could* leave its "Conflict" record in place, to indicate a lasting interest in the gene. When the *winning* consortium creates a new MI on that gene its record will simply transition from 'Conflict' to "Assigned", and the losing consortium's Conflict record will be left in place.

Declined – MI Attempt

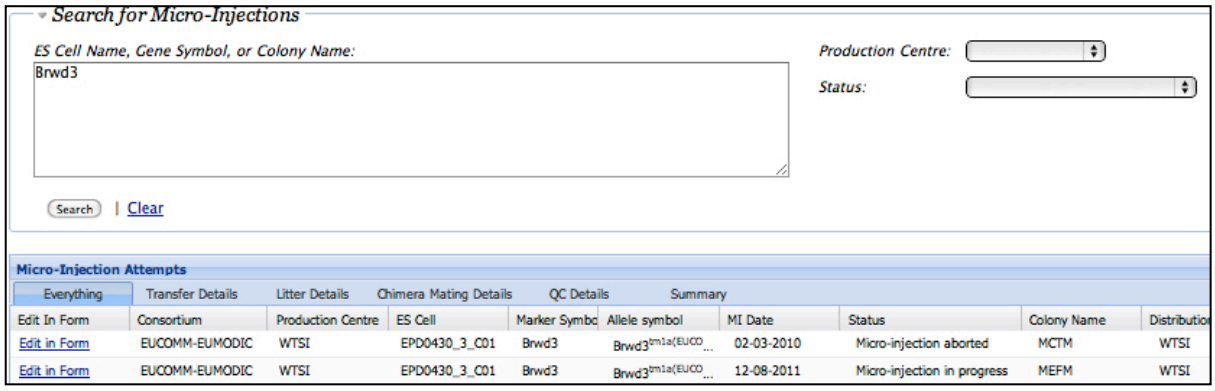
Scroll down till the Declined-MI Attempt section. These are cases where your gene interest records have been declined because we detected a running MI attempt at a different centre.

Declined - MI Attempt

Consortium	Production Centre	Marker Symbol	MGI Accession ID	Priority	Reason for Decline
BaSH	BCM	Brwd3	MGI:3029414	High	MI already in progress at: WTSI (EUCOMM-EUMODIC)
BaSH		Cyp2c39	MGI:1306818	Medium	MI already in progress at: WTSI (MGP-KOMP)
BaSH		Dip2a	MGI:2385920	Low	MI already in progress at: UCD (DTCC-KOMP)
BaSH		Erg	MGI:95415	Low	MI already in progress at: UCD (DTCC-KOMP)
BaSH	BCM	Fam122c	MGI:1921116	High	MI already in progress at: WTSI (EUCOMM-EUMODIC)
BaSH	BCM	Foxr2	MGI:3511682	High	MI already in progress at: WTSI (MGP-KOMP)

WHAT TO DO FOR DECLINED – MI Attempt

Each consortium needs to **LOOK** at the existing MIs in iMits. Go to the "Search and Edit MI Attempts" tab, and type in the Marker symbol for the gene. Here's the result for the BaSH record for Brwd3:



You can see there is an active MI attempt at WTSI, begun on 12 August. If the allele is the same as desired, then BaSH should carefully consider duplicating effort.

Once you've decided what to do for Brwd3:

- If you decide to proceed with the MI, then you can create a new MI. We will notice the double-targeting, but we won't stop it.
- If you decide not to proceed, go back to the 'Gene selection' tab to delete the Declined-MI Attempt record for Brwd3, or …
- The losing consortium *could* leave its "Conflict" record in place, to indicate a lasting interest in the gene. If the consortium making the MI Attempt falters, the losing consortium could start an MI.

Declined – Conflict

Look at the Declined – Conflict section: These are cases where your consortium has collided with another consortiums interest, and that other consortium won (e.g. because it told us that it had already QC-ed ES Cells, or it already had an MI or a mouse in progress).

Declined - Conflict - 35 declined micro-injection plans found

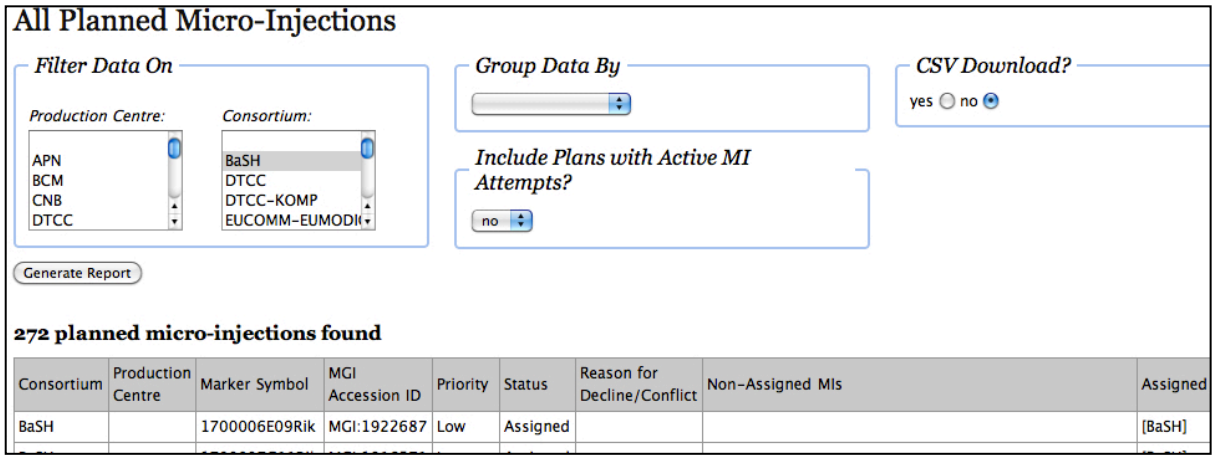
Consortium	Production Centre	Marker Symbol	MGI Accession ID	Priority	Reason for Decline
BaSH		Aspscr1	MGI:1916188	Low	Other 'Assigned' MI plans for: DTCC
BaSH		Emp2	MGI:1098726	Low	Other 'Assigned' MI plans for: DTCC
BaSH		Fam103a1	MGI:1914398	Low	Other 'Assigned' MI plans for: DTCC
BaSH	BCM	Ptchd3	MGI:1921925	Low	Other 'Assigned' MI plans for: DTCC
BaSH	BCM	Wnt10a	MGI:108071	Medium	Other 'Assigned' MI plans for: DTCC
BaSH	BCM	Zfp111	MGI:1929114	High	Other 'Assigned' MI plans for: DTCC
Helmholtz GMC		Agmo	MGI:2442495	High	Other 'Assigned' MI plans for: DTCC

Here you can see a number of cases where BaSH was declined because DTCC told us it already had ES Cells with QC being done on them.

WHAT TO DO FOR DECLINED – CONFLICT
In this case another consortium has 'won' so there shouldn't be anything to do.

Reviewing all MI Plans for a consortium

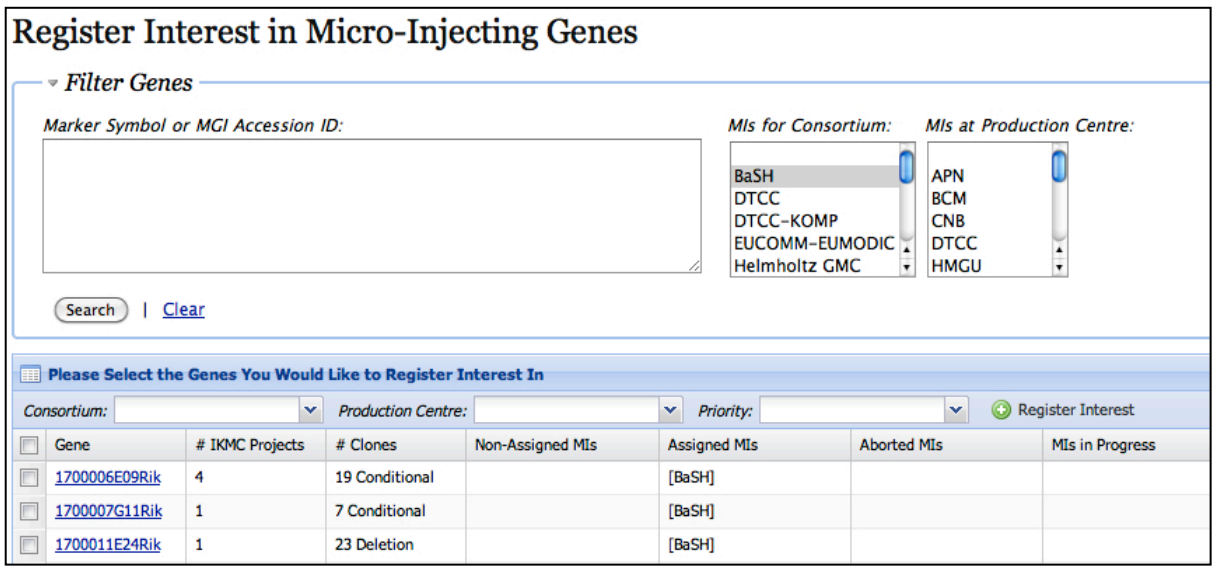
Go to Reports => All microinjections plans. You will have to choose the consortium. Select "yes" for the choice of "Generate Plans with Active MI Attempts": I have run the report below for the BaSH consortium.



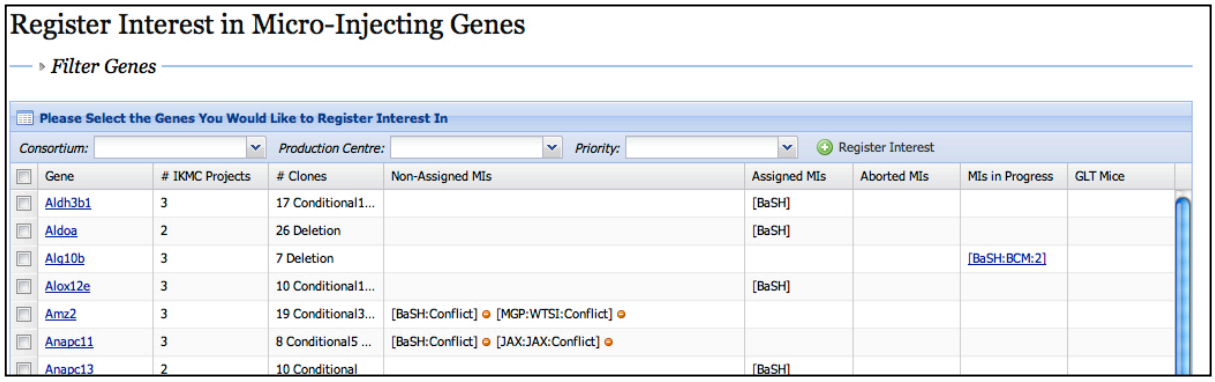
This is a summary of all MI Plans submitted by the BaSH consortium, including whether they were assigned, and whether other plans, MIs or Mice exist for those genes. If an MIPlan was not assigned, the report tells you why (e.g. if there were other GLT Mice, or if there was a conflict with the plans of a different consortium).

Adding new interest records, deleting old conflict records

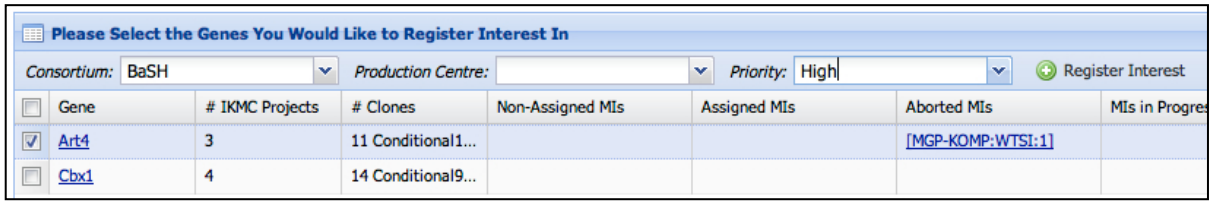
Go to the Gene selection tab: here you can create new Interest records for a gene, and delete records in conflict. In the picture below I have loaded all the BaSH gene-interest records. Each record will show whether it was assigned, it is in conflict etc.



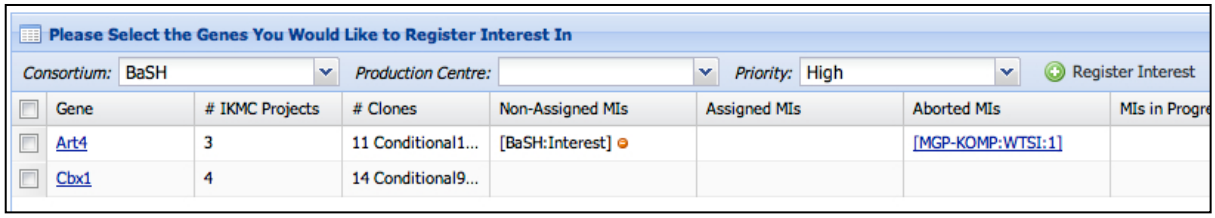
Records in conflict can be deleted by clicking the small "-" symbol next to the record (see the Amz2 gene in the picture below). However, you may wish to simply leave the record in place, to indicate you are interested in the gene if the other consortium's attempt were to fail:



You can add new interest records for genes by pasting the marker symbol in to the list box. In the picture below I have pasted in "Cbx1" and "Art4". The two gene records returned indicate that Cbx1 has a GLT mouse for EUCOMM, and Art4 has an old (aborted) Microinjection for KOMP. In order to create an interest record for Art4 for the BaSH consortium, I *select* the Art4 record with the checkbox on the far left, and select the Consortium as BaSH and a priority (e.g. High) and push the "+ Register interest" button:



The resulting interest record will be displayed on the Art4 row:



At a resolution time, this interest record will be compared with other expressions of interest for the gene, and set to status "Assigned" if no other consortia are interested in the gene.

Production Tracking: starting Microinjections

iMits production tracking is currently very simple: we intend to improve this in the near future.

To record the start of a microinjection,

- Go to the 'Create' tab, and
- Choose a specific ES Cell clone or a gene (and a list of ES Cell clones), and
- A consortium and production centre
- A microinjection date, and any other pertinent information you have, and
- Push the 'Create' button

You will be warned if your consortium has not been assigned the gene for mouse production, but you will not be stopped, even if you haven't been assigned the gene.

The new microinjection will (currently) be created in status 'Microinjection in progress'.

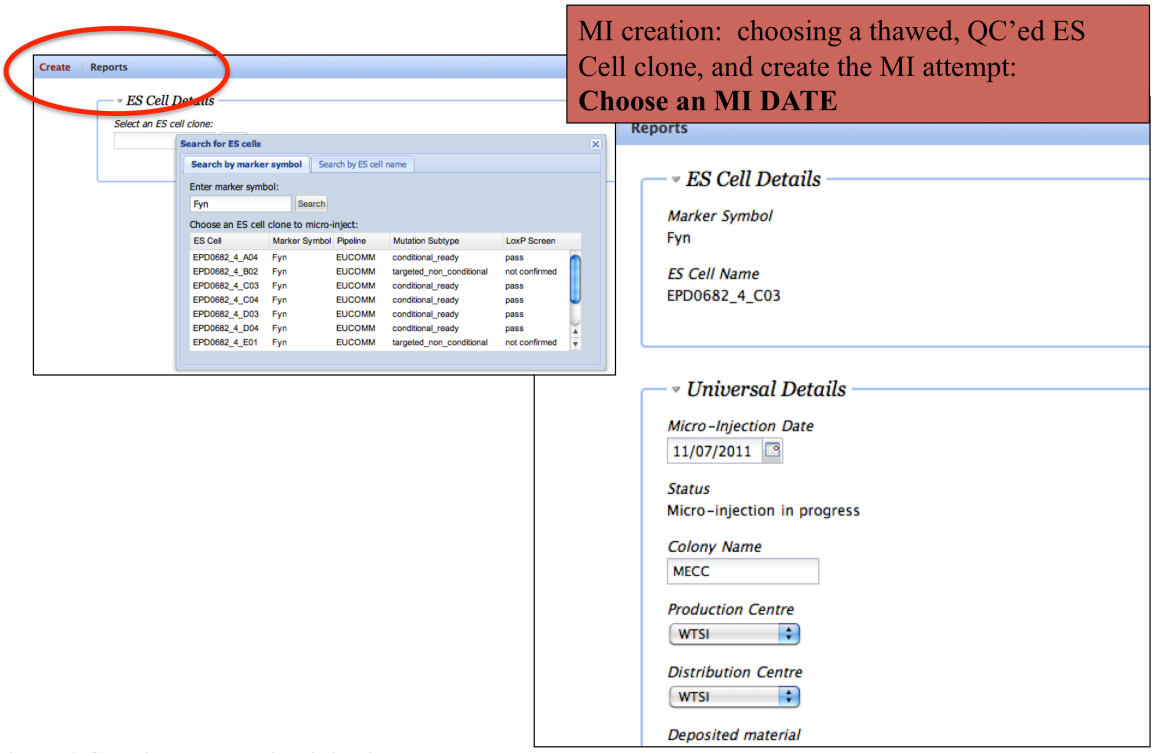
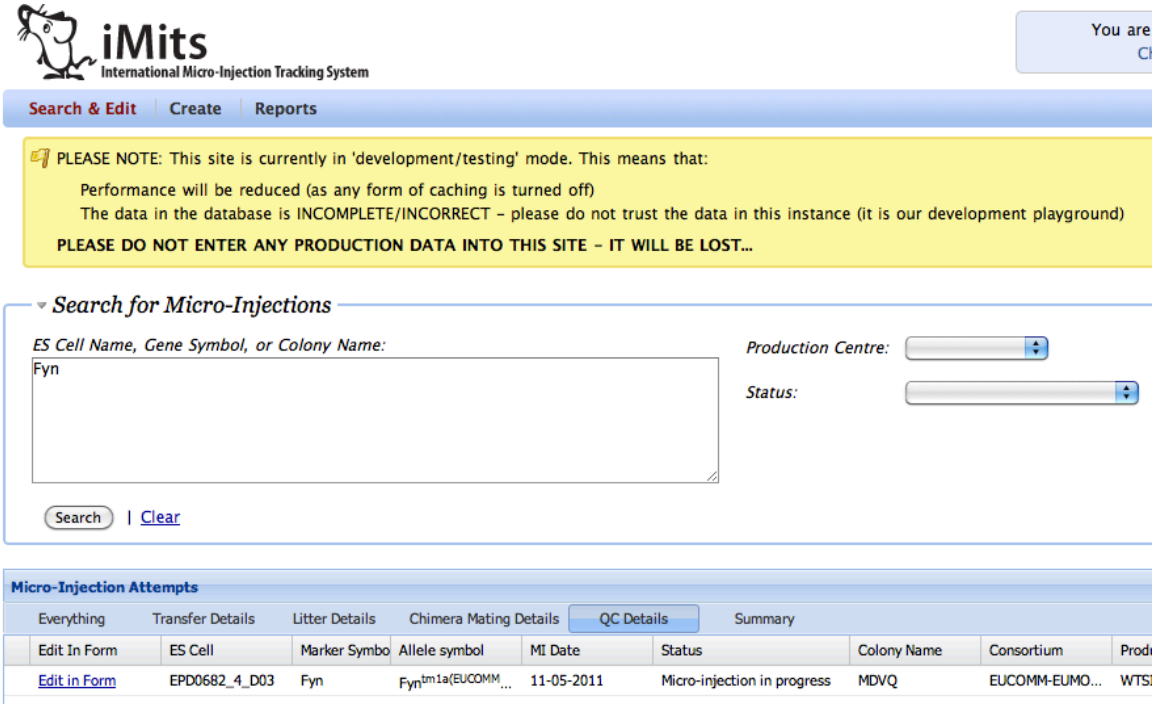


Figure 1 Creating a new Microinjection

COMING SOON: you will be able to track the start and finish of ES Cell QC for a gene, prior to the actual microinjection starting.

Production Tracking: Updating Microinjection data

Go to the Search & Edit MI Attemps tab. Find your MI's using the production centre, and status dropdowns and / or directly entering the marker symbol, Colony Name or ES Cell name into the listbox. The resulting grid of MI's is editable, and should be familiar.



COMING IN A LITTLE WHILE:

- **The chimera data you enter will result in statuses like 'Chimeras produced'**
- **You will be able to track the production of the cre-excised allele, and the start / end of phenotyping.**

Production Reports

iMits currently has a limited production report capability – go to the reports tab, and look under "Microinjection Production": you will see reports showing gene counts, month-by-month production summaries and detailing all microinjection attempts for each centre.

COMING IN A LITTLE WHILE:

We plan to add reports which will show

- **Genes which have are showing assignment / production for two different consortia**
- **Status-transition times for individual microinjections, and as summaries**