# AMDCC

THE ANIMAL MODELS OF DIABETIC
COMPLICATIONS CONSORTIUM

# AMDCC Coordinating and Bioinformatics Unit

1) Web portal overview

2) IT enhancements and upgrades

3) New website features

4) Future work and enhancements

# Web Portal Overview

| AMDCC STATS | |
|---|---|
| **Experiments** | |
| In Progress | 27 |
| Public | 3 |
| Total | 30 |
| **Microarrays** | |
| Total | 0 |
| **Models** | |
| In Progress | 69 |
| Public | 2 |
| Total | 71 |
| **Protocols** | |
| Total | 29 |
| **Publications** | |
| In Press/Published | 15 |
| **Strains** | |
| Breeding complete | 1 |
| Breeding ongoing | 19 |
| Characterizing multiple lines | 3 |
| Embryonic rederivation | 1 |
| Not specified/Other | 1 |
| Phenotyping complete | 3 |
| Phenotyping final | 1 |
| Phenotyping ongoing | 17 |
| Total | 46 |

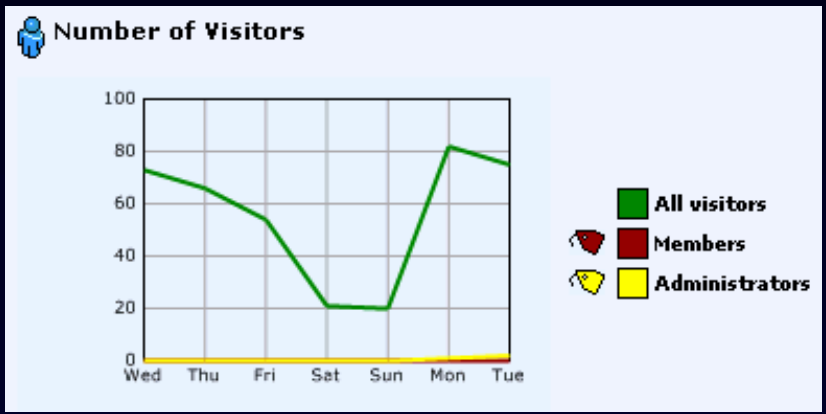
Since last Steering Committee meeting

Experiments: 16 (4295 measurements)
Models: 14
Strains: 4
Publications: 6

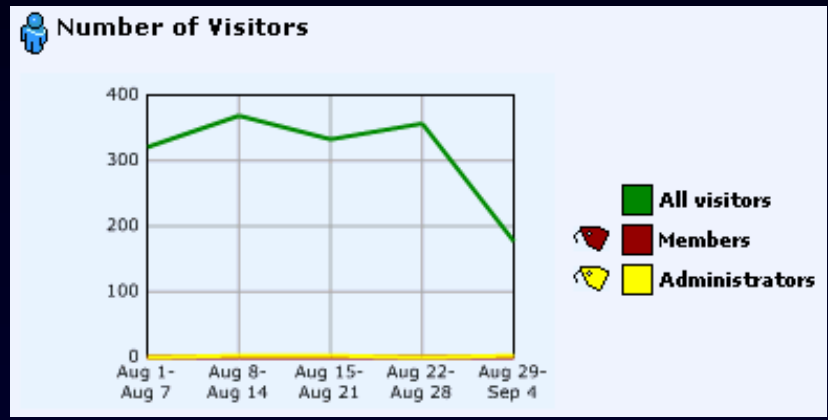
Average number of visitors per month: 1150

Average number of visitors per day: 38

## Sample Week




## Sample Month




All numbers reflect non-AMDCC members

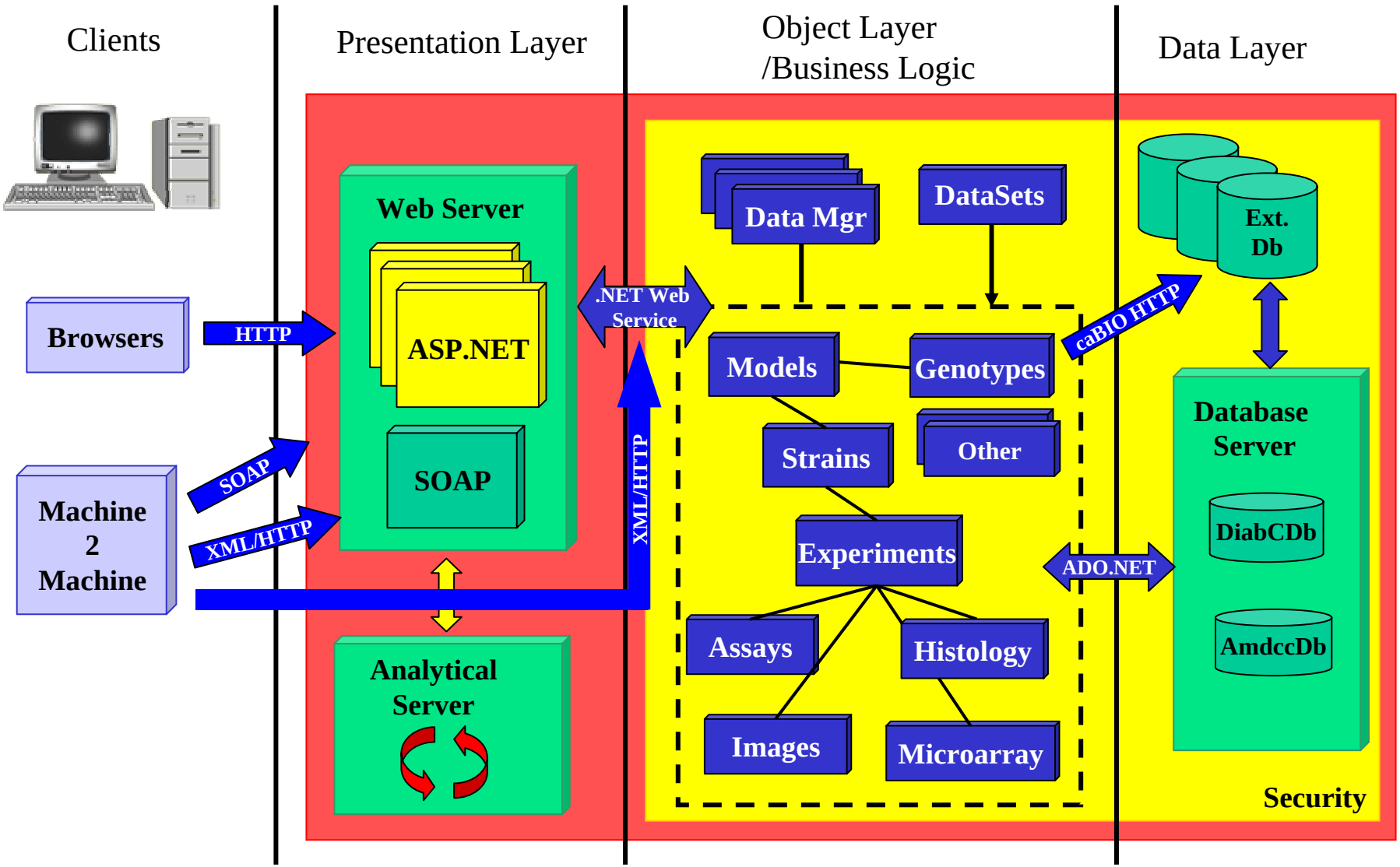
## Top Search Engine Referrers

| | |
|---|---|
| Google | 43.1% |
| MSN | 5.9% |
| Yahoo! | 5.6% |
| www.niddk.nih.gov | 1.9% |
| Netscape | 0.6% |
| www.cbqm.mcg.edu | 0.5% |
| AOL | 0.5% |
| dels.nas.edu | 0.3% |
| AltaVista | 0.2% |
| www.biotech.ufl.edu | 0.2% |
| *Other* | 4.4% |
| *None* | 36.9% |

## Top Search Terms

| | |
|---|---|
| glomerular filtration rate | 3.0% |
| mouse dissection | 1.6% |
| amdcc | 1.4% |
| diabetic complications | 0.6% |
| streptozotocin | 0.5% |
| ipgtt | 0.4% |
| glomerular filtration | 0.4% |
| h&e staining | 0.4% |
| glucose clamp | 0.3% |
| glomerular filtration rate calculation | 0.2% |
| *Other* | 46.2% |
| *None* | 45.0% |

# AMDCC IT Structure


Clients
Presentation Layer
Object Layer
/Business Logic
Data Layer
Browsers
HTTP
Machine
2
Machine
SOAP
XML/HTTP
Web Server
ASP.NET
SOAP
Analytical
Server
.NET Web
Service
XML/HTTP
Data Mgr
DataSets
Models
Genotypes
Strains
Other
Experiments
Assays
Histology
Images
Microarray
caBIO HTTP
ADO.NET
Ext.
Db
Database
Server
DiabCDb
AmdccDb
Security

## Ported the entire website and object model to .NET Framework

**.NET Framework provides robust scalable solution**
**Fully object oriented programming paradigm**
**- provides full inheritance and polymorphism**
**- code development is streamlined due to code reuse**

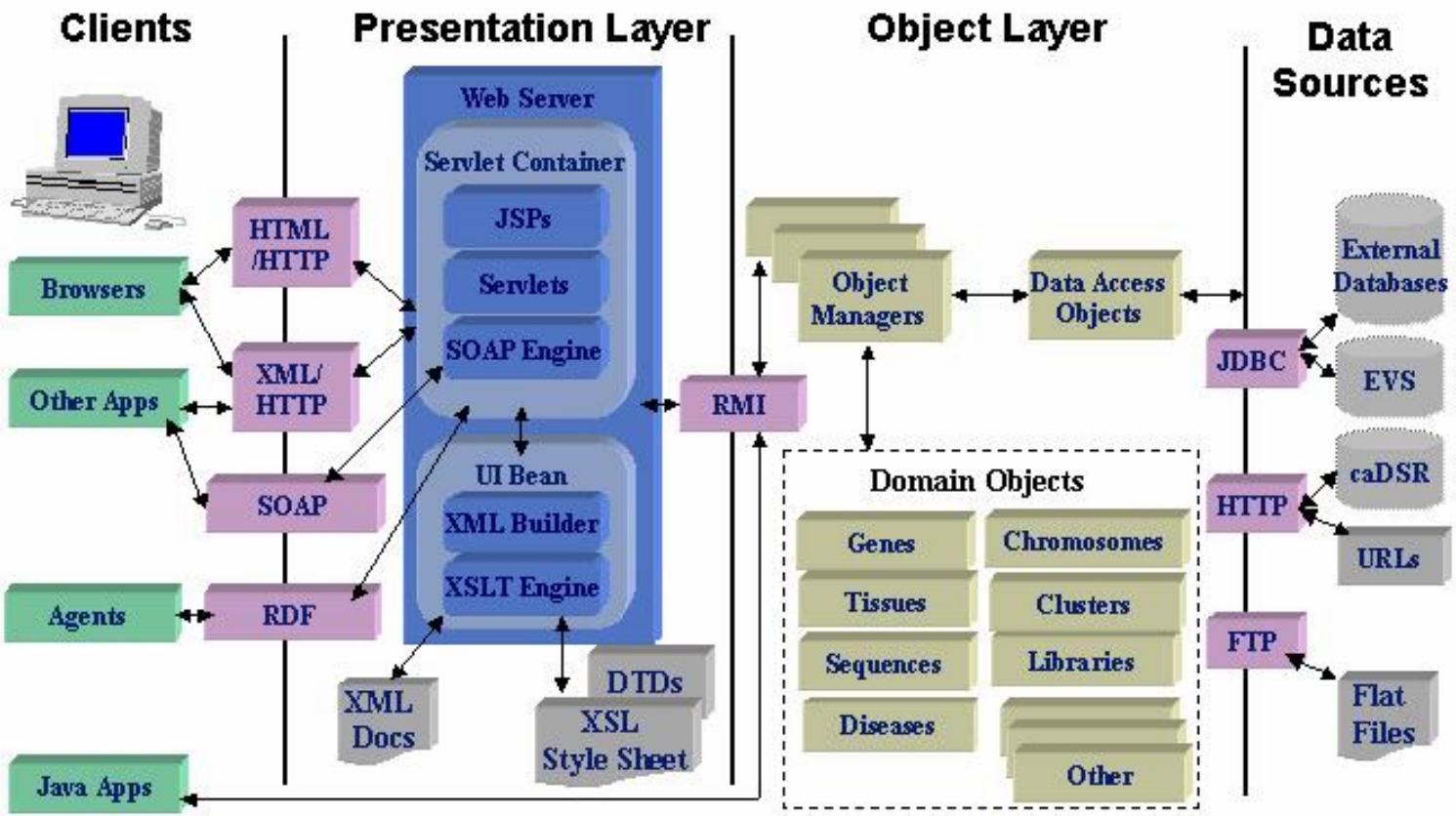
- Website: www.amdcc.org
  - required writing 193 pages
  - 50538 lines of code
- Object model: Amdcc.dll
  - required writing 126 object classes
  - 23346 lines of code

Lines - Summary

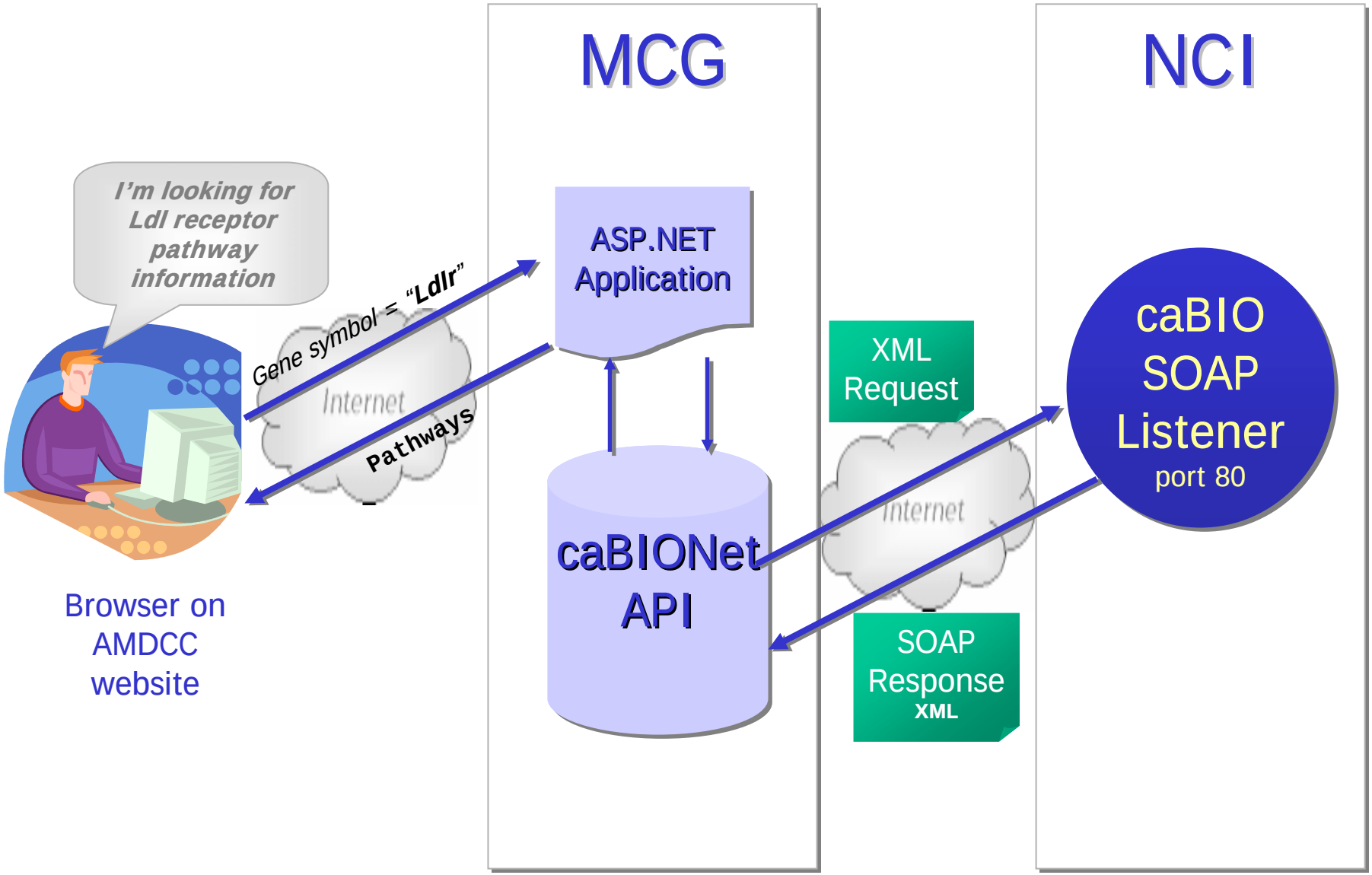
| File | Total | Source | Comments | Blank | Mixed | Type |
|---|---|---|---|---|---|---|
| Amdcc | 23346 | 16573 | 4413 | 2606 | 246 | C# Project |
| dev.amdcc.org | 50538 | 41037 | 5863 | 3953 | 315 | C# Project |
| SessionUtility | 337 | 239 | 49 | 49 | 0 | C# Project |
| ZoomifyReader | 593 | 323 | 194 | 80 | 4 | C# Project |
| ServerControls | 974 | 639 | 146 | 205 | 16 | C# Project |
| caBIONet | 4537 | 3434 | 335 | 794 | 26 | C# Project |
| Solution | 80325 (100%) | 62245 (77%) | 11000 (14%) | 7687 (10%) | 607 (1%) | |

www.amdcc.org/metrics/index.html

# caBIO Architecture




Source: http://ncicb.nci.nih.gov/core/caBIO/technical_resources/system_architecture/images/cabio_architecture.jpg


MCG
NCI
I'm looking for Ldl receptor pathway information
Gene symbol = "Ldlr"
Internet
Pathways
ASP.NET Application
caBIONet API
XML Request
Internet
caBIO SOAP Listener
port 80
SOAP Response
XML
Browser on AMDCC website

Animal Models of Diabetic Complications Consortium
MAIN
DATA SEARCH
DATA ANALYSIS
ABOUT AMDCC
CONTACT
MEMBER AREA
Show Gene Information
Powered By
caBIO
Gene Symbol
Ldlr
Gene Name
Low density lipoprotein receptor
Gene Aliases
Mm.ldlr
Ldlr
Gene Homologs
LDLR
Pathways
m_fxrPathway
m_s1pPathway
Chromosome
Map Location
Gene Ontologies
receptor activity
low-density lipoprotein receptor activity
lipid transporter activity
calcium ion binding
protein binding
endosome
coated pit
lipid transport
endocytosis
cholesterol metabolism
membrane
integral to membrane
cholesterol homeostasis
NIDDK
National Heart, Lung, and Blood Institute
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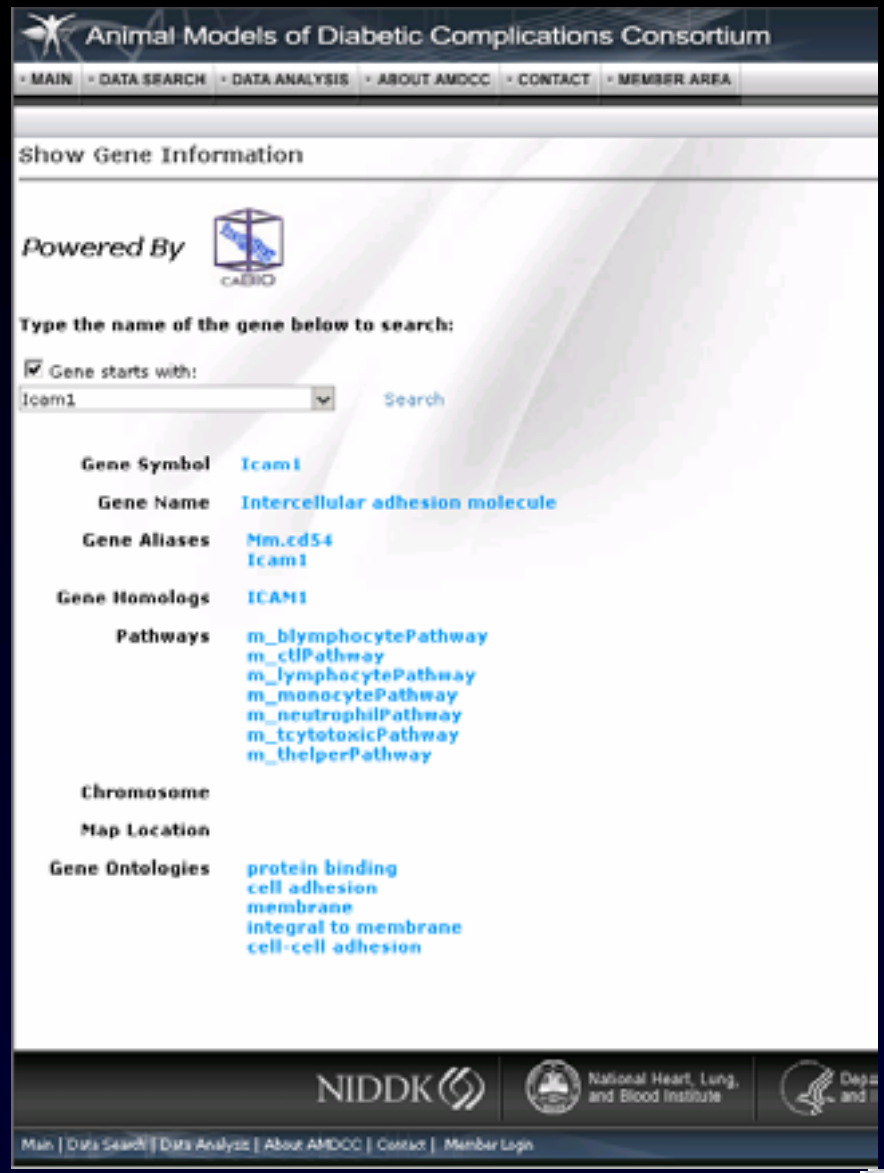
Animal Models of Diabetic Complications Consortium
MAIN
DATA SEARCH
DATA ANALYSIS
ABOUT AMDCC
CONTACT
MEMBER AREA
Show Gene Information
Powered By
caBIO
Type the name of the gene below to search:
Gene starts with:
Icam1
Search
Gene Symbol
Icam1
Gene Name
Intercellular adhesion molecule
Gene Aliases
Mm.cd54
Icam1
Gene Homologs
ICAM1
Pathways
m_blymphocytePathway
m_ctlPathway
m_lymphocytePathway
m_monocytePathway
m_neutrophilPathway
m_tcytotoxicPathway
m_thelperPathway
Chromosome
Map Location
Gene Ontologies
protein binding
cell adhesion
membrane
integral to membrane
cell-cell adhesion
NIDDK
National Heart, Lung, and Blood Institute
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AMDCC

# AmdccDb/DiabCDb Database Updates

Major change to database schema dealing with animals added to the system.

System now provides the ability for investigators to share animals across experiments.

Animals are associated with the investigator and can be added to any experiment.

- add animal to Data Tab in template file used to upload data
  externalanimalID [investigator@email.address.edu]

| | |
|---|---|
| Tables | 168 |
| Functions | 72 |
| Procedures | 547 |
| Views | 158 |
| Lines of code | 9165 |

# AMDCC New Features

- Phenotype Exploration
  - Basic Statistics
  - T Tests
  - Correlations
- Updated entire site with multidimensional datagrids
- Started microarray visualization tools
- Added new search features/external link information
- Activity Summaries – Dynamic PDF available

Data Browser

**Glucose Tolerance Testing in Laboratory Mice. [Dale Abel]**

Query

Group by
[None]

Select All

**Strains**
- B6.V-Lep$^{ob}$/J
- BKS.Cg-m +/+ Lepr$^{db}$/J
- C57BL/6J
- C57BLKS/J
- FVB-Tg(UCP1-DTA)
- FVB/NJ

**Assays**
- IPGTT t000 (mg/dL)
- IPGTT t005 (mg/dL)
- IPGTT t015 (mg/dL)
- IPGTT t030 (mg/dL)
- IPGTT t060 (mg/dL)
- IPGTT t120 (mg/dL)
- w rodent (g)

Sex
[both]

Age @ Sample Date
*leave blank for all*
from
to

Experimental Conditions

To display phenotype assay data, select at least one assay and strain using the checkboxes in the left pane.

Once the datagrid is returned, the results can be grouped by the various columns by dragging the column to the space indicated above the grid. You may drag as many as you like in any order. Columns can be sorted by clicking on the column header. Ascending and descending sorts are toggled by clicking the column. You may sort by multi columns by holding down the SHIFT key while clicking the column header. Finally, you can re-order the columns simple by dragging the column to the destination location.

Click the **Query** button to show the results in this pane.

**6 record(s)** match the filter criteria.

Export to Excel

Strain

Strain : B6.V-Lep$^{ob}$/J (19)

| Animal ID | Sex | Age | IPGTT t000 (mg/d | IPGTT t005 (mg/d | IPGTT t015 (mg/d | IPGTT t030 (mg/d | IPGTT t060 (r |
|---|---|---|---|---|---|---|---|
| GTT-ob/ob-001 | M | 4 | 114 | 158 | 236 | 195 | 179 |
| GTT-ob/ob-002 | M | 4 | 104 | 168 | 318 | 292 | 321 |
| GTT-ob/ob-003 | M | 4 | 101 | 169 | 293 | 291 | 319 |
| GTT-ob/ob-004 | M | 4 | 194 | 227 | 408 | 356 | 234 |
| GTT-ob/ob-005 | M | 4 | 114 | 191 | 303 | 233 | 242 |
| GTT-ob/ob-006 | M | 4 | 92 | 148 | 240 | 203 | 213 |
| GTT-ob/ob-007 | M | 4 | 193 | 203 | 332 | 344 | 406 |
| GTT-ob/ob-008 | M | 4 | 109 | 177 | 310 | 358 | 394 |
| GTT-ob/ob-009 | M | 4 | 148 | 164 | 359 | 330 | 376 |
| GTT-ob/ob-010 | M | 4 | 114 | 144 | 284 | 268 | 288 |
| GTT-ob/ob-011 | M | 8 | 150 | 208 | 317 | 410 | 337 |
| GTT-ob/ob-012 | M | 8 | 118 | 229 | 312 | 395 | 305 |
| GTT-ob/ob-013 | M | 8 | 121 | 201 | 305 | 344 | 301 |
| GTT-ob/ob-014 | M | 8 | 117 | 209 | 329 | 364 | 335 |
| GTT-ob/ob-015 | M | 8 | 100 | 153 | 319 | 418 | 375 |
| GTT-ob/ob-016 | M | 8 | 149 | 226 | 338 | 430 | 495 |
| GTT-ob/ob-017 | M | 8 | 102 | 149 | 253 | 267 | 299 |
| GTT-ob/ob-018 | M | 8 | 119 | 208 | 261 | 384 | 438 |
| GTT-ob/ob-019 | M | 8 | 107 | 165 | 307 | 333 | 309 |

Strain : BKS.Cg-m +/+ Lepr$^{db}$/J (20)
Strain : C57BL/6J (18)
Strain : C57BLKS/J (16)
Strain : FVB/NJ (28)
Strain : FVB-Tg(UCP1-DTA) (28)



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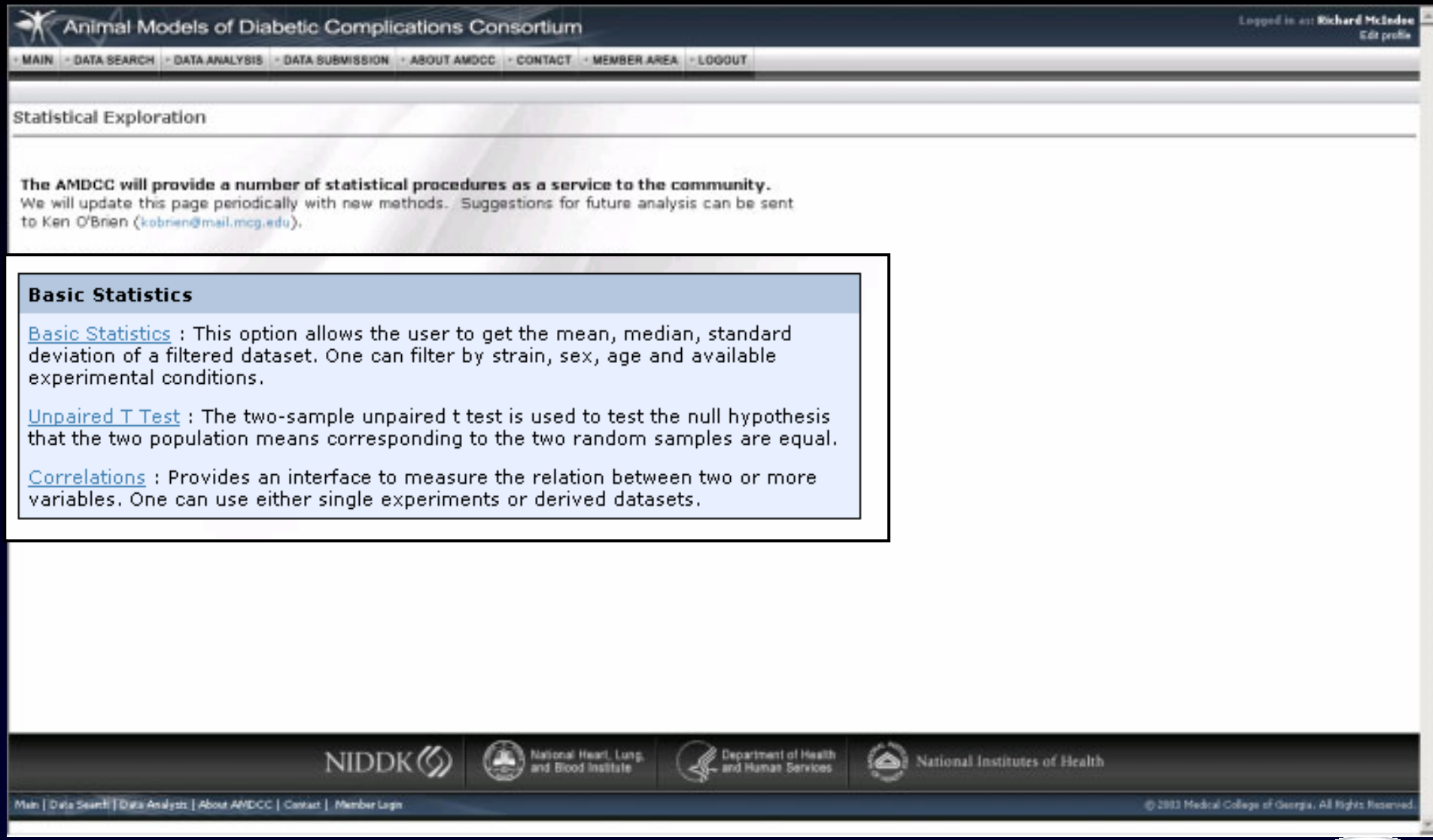
Animal Models of Diabetic Complications Consortium
Logged in as: Richard McIndoe
Edit profile
· MAIN · DATA SEARCH · DATA ANALYSIS · DATA SUBMISSION · ABOUT AMDCC · CONTACT · MEMBER AREA · LOGOUT
Statistical Exploration
The AMDCC will provide a number of statistical procedures as a service to the community.
We will update this page periodically with new methods. Suggestions for future analysis can be sent to Ken O'Brien (kobrien@mail.mcg.edu).
Basic Statistics
Basic Statistics : This option allows the user to get the mean, median, standard deviation of a filtered dataset. One can filter by strain, sex, age and available experimental conditions.
Unpaired T Test : The two-sample unpaired t test is used to test the null hypothesis that the two population means corresponding to the two random samples are equal.
Correlations : Provides an interface to measure the relation between two or more variables. One can use either single experiments or derived datasets.
NIDDK
National Heart, Lung, and Blood Institute
Department of Health and Human Services
National Institutes of Health
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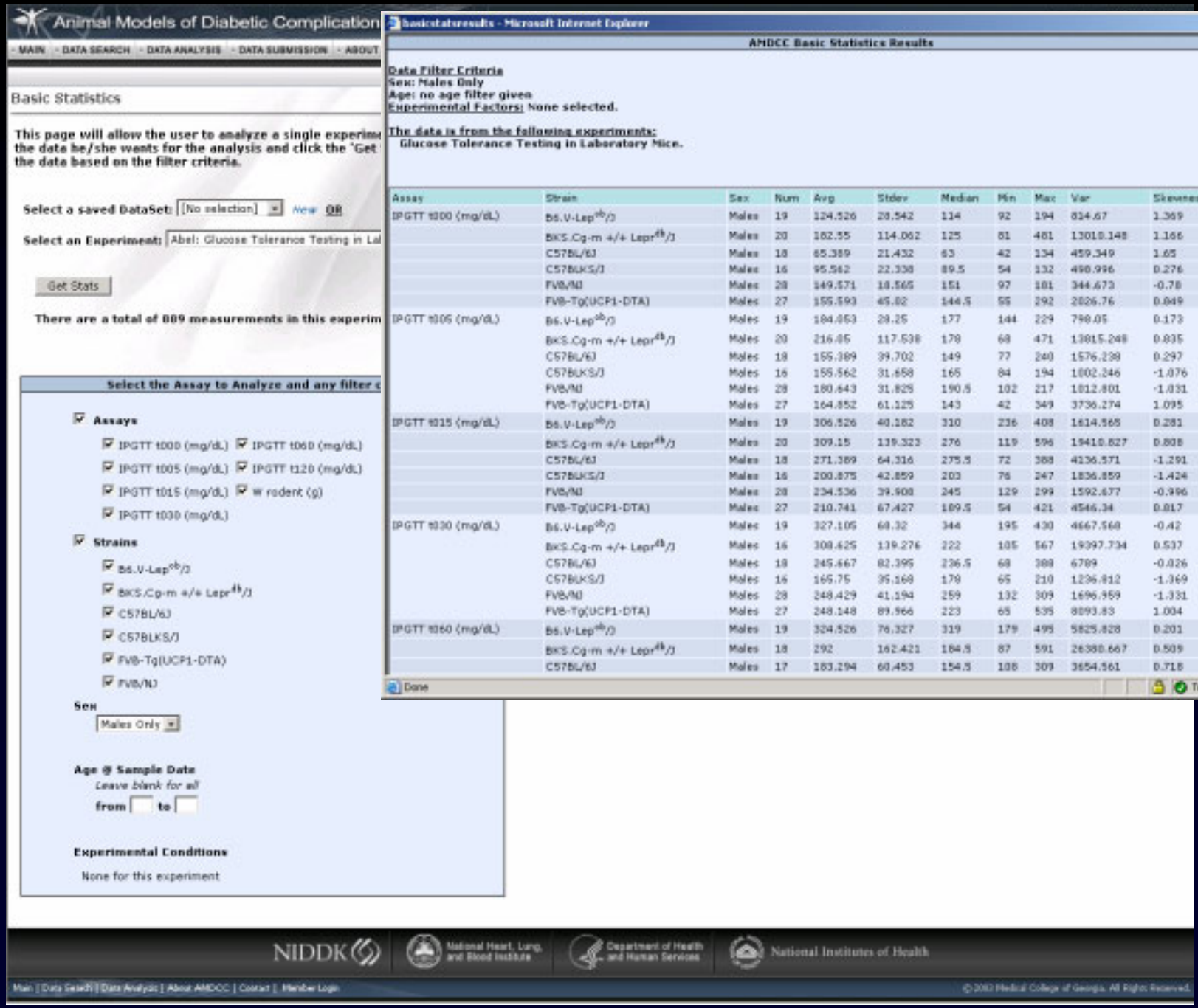
Animal Models of Diabetic Complication
MAIN
DATA SEARCH
DATA ANALYSIS
DATA SUBMISSION
ABOUT
Basic Statistics
This page will allow the user to analyze a single experim
the data he/she wants for the analysis and click the 'Get
the data based on the filter criteria.
Select a saved DataSet:
[No selection]
New
OR
Select an Experiment:
Abel: Glucose Tolerance Testing in Lal
Get Stats
There are a total of 889 measurements in this experim
Select the Assay to Analyze and any filter
Assays
IPGTT t000 (mg/dL)
IPGTT t060 (mg/dL)
IPGTT t005 (mg/dL)
IPGTT t120 (mg/dL)
IPGTT t015 (mg/dL)
W rodent (g)
IPGTT t030 (mg/dL)
Strains
B6.V-Lepob/J
BKS.Cg-m +/+ Leprdb/J
C57BL/6J
C57BLKS/J
FVB-Tg(UCP1-DTA)
FVB/NJ
Sex
Males Only
Age @ Sample Date
Leave blank for all
from
to
Experimental Conditions
None for this experiment
basicstatsresults - Microsoft Internet Explorer
AMDCC Basic Statistics Results
Data Filter Criteria
Sex: Males Only
Age: no age filter given
Experimental Factors: None selected.
The data is from the following experiments:
Glucose Tolerance Testing in Laboratory Mice.
Assay
Strain
Sex
Num
Avg
Stdev
Median
Min
Max
Var
Skewness
Kurtosis
IPGTT t000 (mg/dL)
B6.V-Lepob/J
Males
19
124.526
28.542
114
92
194
814.67
1.369
0.868
BKS.Cg-m +/+ Leprdb/J
Males
20
182.55
114.062
125
81
481
13010.148
1.166
0.237
C57BL/6J
Males
18
85.389
21.432
83
42
134
459.349
1.65
3.162
C57BLKS/J
Males
16
95.562
22.338
89.5
54
132
498.996
0.276
-0.852
FVB/NJ
Males
28
149.571
18.565
151
97
181
344.673
-0.78
0.512
FVB-Tg(UCP1-DTA)
Males
27
155.593
45.82
144.5
95
292
2026.76
0.949
1.715
IPGTT t005 (mg/dL)
B6.V-Lepob/J
Males
19
184.053
28.25
177
144
229
798.05
0.173
-1.396
BKS.Cg-m +/+ Leprdb/J
Males
20
216.85
117.538
178
68
471
13815.248
0.835
-0.496
C57BL/6J
Males
18
155.389
39.702
149
77
240
1576.238
0.297
-0.201
C57BLKS/J
Males
16
155.562
31.658
165
84
194
1002.246
-1.076
0.299
FVB/NJ
Males
28
180.643
31.825
190.5
102
217
1012.801
-1.031
0.096
FVB-Tg(UCP1-DTA)
Males
27
164.852
61.125
143
42
349
3736.274
1.095
1.534
IPGTT t015 (mg/dL)
B6.V-Lepob/J
Males
19
306.526
40.182
310
236
408
1614.565
0.281
0.462
BKS.Cg-m +/+ Leprdb/J
Males
20
309.15
139.323
276
119
596
19410.627
0.808
-0.513
C57BL/6J
Males
18
271.389
64.316
275.5
72
388
4136.571
-1.291
2.97
C57BLKS/J
Males
16
200.875
42.859
203
76
247
1836.859
-1.424
2.016
FVB/NJ
Males
28
234.536
39.908
245
129
299
1592.677
-0.996
0.894
FVB-Tg(UCP1-DTA)
Males
27
210.741
67.427
189.5
54
421
4546.34
0.817
2.034
IPGTT t030 (mg/dL)
B6.V-Lepob/J
Males
19
327.105
68.32
344
195
430
4667.568
-0.42
-0.798
BKS.Cg-m +/+ Leprdb/J
Males
16
308.625
139.276
222
105
567
19397.734
0.537
-1.034
C57BL/6J
Males
18
245.667
82.395
236.5
68
388
6789
-0.026
-0.433
C57BLKS/J
Males
16
165.75
35.168
178
65
210
1236.812
-1.369
1.691
FVB/NJ
Males
28
248.429
41.194
259
132
309
1696.959
-1.331
1.368
FVB-Tg(UCP1-DTA)
Males
27
248.148
89.966
223
65
535
8093.83
1.004
1.978
IPGTT t060 (mg/dL)
B6.V-Lepob/J
Males
19
324.526
76.327
319
179
495
5825.828
0.201
-0.192
BKS.Cg-m +/+ Leprdb/J
Males
18
292
162.421
184.5
87
591
26380.667
0.509
-1.207
C57BL/6J
Males
17
183.294
60.453
154.5
108
309
3654.561
0.718
-0.45
Done
Trusted sites
NIDDK
National Heart, Lung, and Blood Institute
Department of Health and Human Services
National Institutes of Health
Main | Data Search | Data Analysis | About AMDCC | Contact | Member Login
AMDCC

## Statistical Comparisons

**This page will allow the user to statistically compare various datasets and/or experiments. The user will select the filter criteria for the data he/she wants for each group and click the 'Get Stats' button. Basic statistical information as well as an Unpaired T Test will be performed.**

**Select a saved DataSet:** [No selection] New OR

**Select an Experiment:** Abel: Glucose Tolerance Testing in Laboratory Mice.

Get Stats

**Summary Statistics:**
**p = 0.77076827**
**Test Statistic = -0.294**
**Upper confidence limit = 2.616**

**Group 1: N=18, Mean=19.428, SD=4.191**
**Group 2: N=16, Mean=19.869, SD=4.559**

**Select the Assay to Analyze**

○ IPGTT t000 (mg/dL) ○ IPGTT t030 (mg/dL) ○ IPGTT t120 (mg/dL)
○ IPGTT t005 (mg/dL) ○ IPGTT t060 (mg/dL) ◉ W rodent (g)
○ IPGTT t015 (mg/dL)

| Select Group 1 Filter criteria | Select Group 2 Filter criteria |
|---|---|
| ☐ **Strains** | ☐ **Strains** |
| ☐ B6.V-Lep$^{ob}$/J | ☐ B6.V-Lep$^{ob}$/J |
| ☐ BKS.Cg-m +/+ Lepr$^{db}$/J | ☐ BKS.Cg-m +/+ Lepr$^{db}$/J |
| ☑ C57BL/6J | ☐ C57BL/6J |
| ☐ C57BLKS/J | ☑ C57BLKS/J |
| ☐ FVB-Tg(UCP1-DTA) | ☐ FVB-Tg(UCP1-DTA) |
| ☐ FVB/NJ | ☐ FVB/NJ |
| **Sex** Males Only | **Sex** Males Only |
| **Age @ Sample Date** *Leave blank for all* from to | **Age @ Sample Date** *Leave blank for all* from to |
| **Experimental Conditions** None for this experiment | **Experimental Conditions** None for this experiment |



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## Statistical Correlations

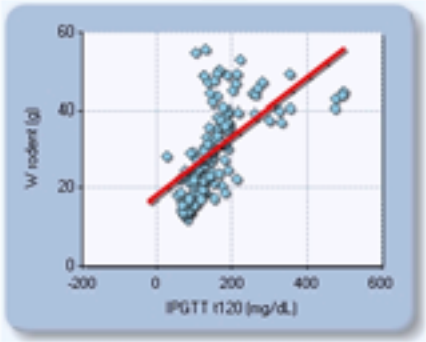
**This page will allow the user to calculate correlations between various datasets and/or experiments. The user will select the filter criteria for the data he/she wants for each group and click the "Calculate" button. Graphical representation will be performed.**

**Select a saved DataSet:** [No selection] *New* **DB**

**Select an Experiment:** Abel: Glucose Tolerance Testing in Laboratory Mice.

Calculate

**There are a total of 889 measurements in this experiment**




| | |
|---|---|
| Correlation: | 0.58 |
| R Squared: | 0.33 |
| Covariance: | 539.9 |
| Total Points Assay 1: | 127 |
| Total Points Assay 2: | 127 |

| Select the Assay for Group 1 | | Select the Assay for Group 2 | |
|---|---|---|---|
| ○ IPGTT t000 (mg/dL) | ○ IPGTT t060 (mg/dL) | ○ IPGTT t000 (mg/dL) | ○ IPGTT t060 (mg/dL) |
| ○ IPGTT t005 (mg/dL) | ◉ IPGTT t120 (mg/dL) | ○ IPGTT t005 (mg/dL) | ○ IPGTT t120 (mg/dL) |
| ○ IPGTT t015 (mg/dL) | ○ W rodent (g) | ○ IPGTT t015 (mg/dL) | ◉ W rodent (g) |
| ○ IPGTT t030 (mg/dL) | | ○ IPGTT t030 (mg/dL) | |

**Select Filter criteria**

☑ **Strains**

- ☑ B6.V-Lep$^{ob}$/J
- ☑ BKS.Cg-m +/+ Lepr$^{db}$/J
- ☑ C57BL/6J
- ☑ C57BLKS/J
- ☑ FVB-Tg(UCP1-DTA)
- ☑ FVB/NJ

**Sex**



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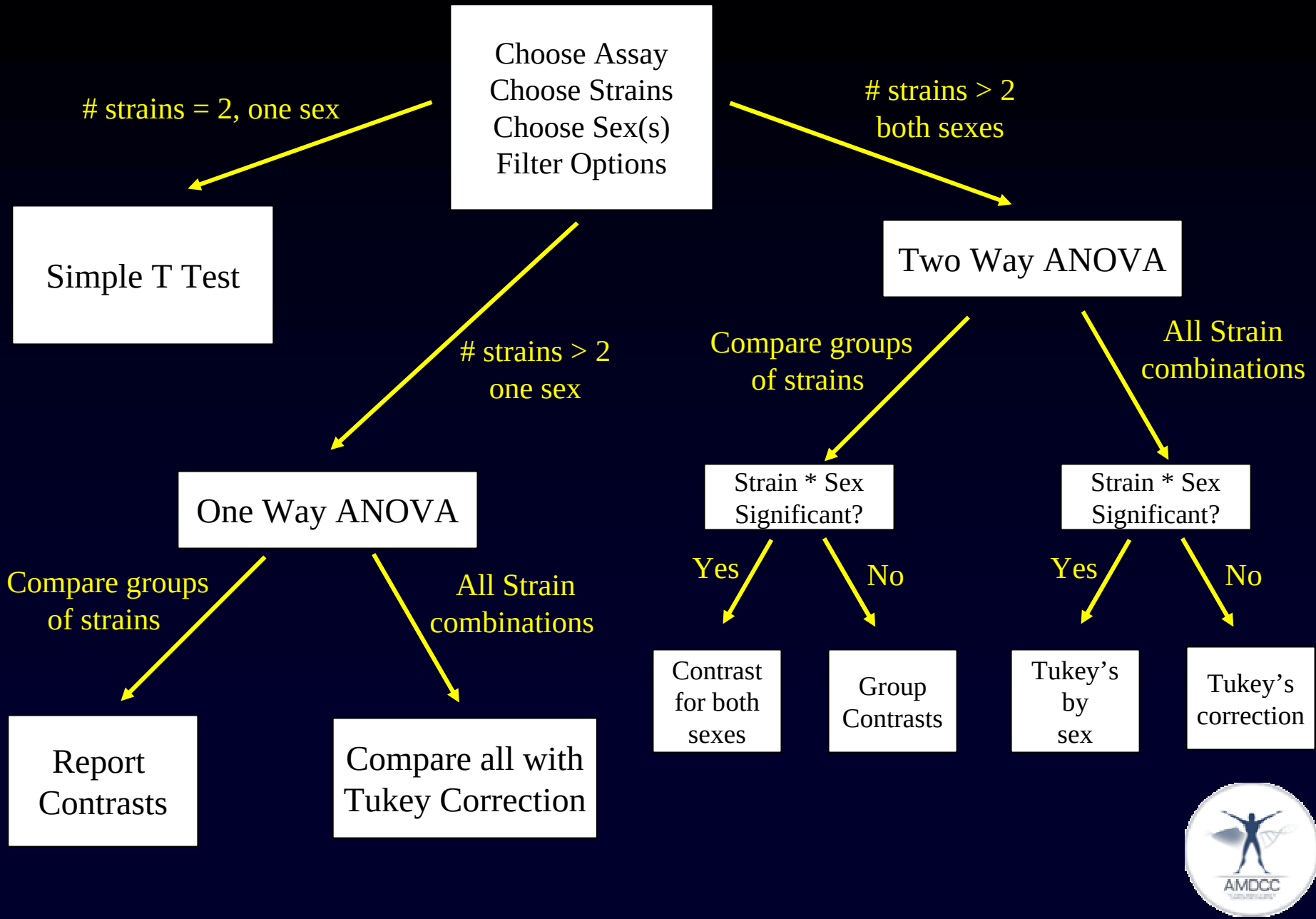
AMDCC

# Future Directions

1. Continue development of statistics modules to automate data analysis
2. Develop visualization and analysis modules for microarray data
3. Develop better charting capabilities
4. Additional training may be necessary for new features of website

# Provide both One way and Two ANOVA analysis.



showChart - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search

Address https://dev.amdcc.org/members/s

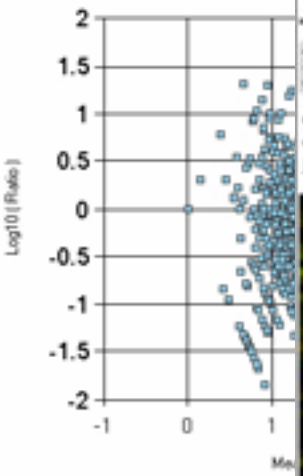
Google

Animal Models of Diab

MAIN DATA SEARCH DATA ANALYSIS

Scatter Plot and Heat Map Cha

**Scatter Plot**




**Heat Map Chart**

Red = Gain * (Ch2PixelInt / 256) / Norm

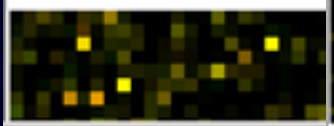
Green = Gain * (Ch1PixelInt / 256)

Blue = 0

Gain 8

Normalization 1.0

Change



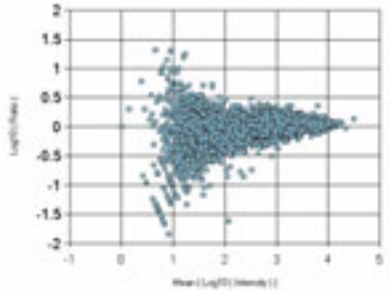
Done

Animal Models of Diabetic Complications Consortium

Logged in as Richard McIndoe
Edit profile

Scatter Plot and Heat Map Chart

Scatter Plot




Heat Map Chart

Red = Gain * (Ch2PixelInt / 256) / Normalization

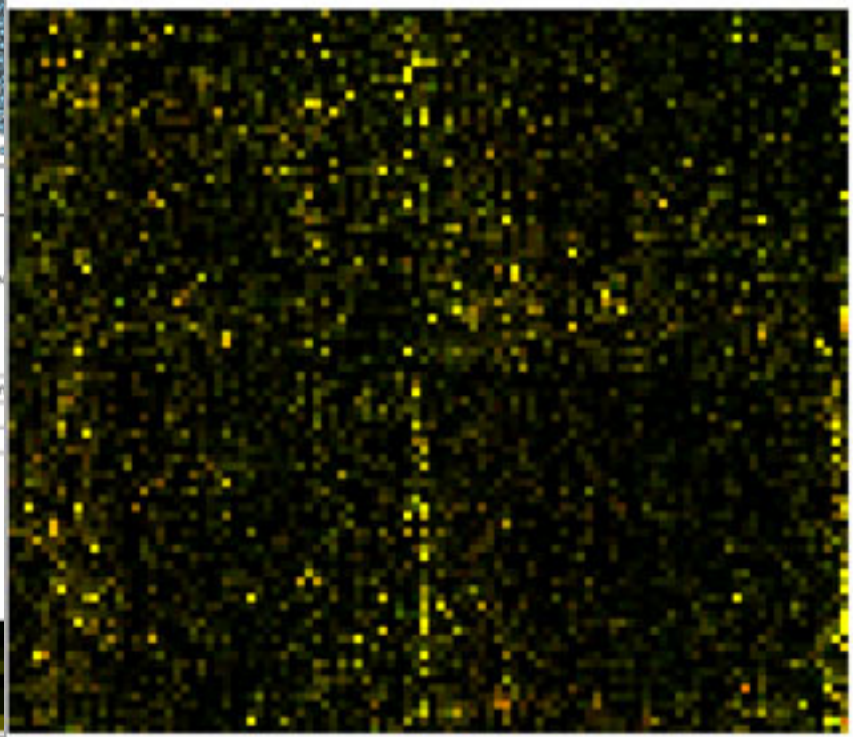
Green = Gain * (Ch1PixelInt / 256)

Blue = 0

Gain 8

Normalization 1.0

Change



NIDDK

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Local intranet

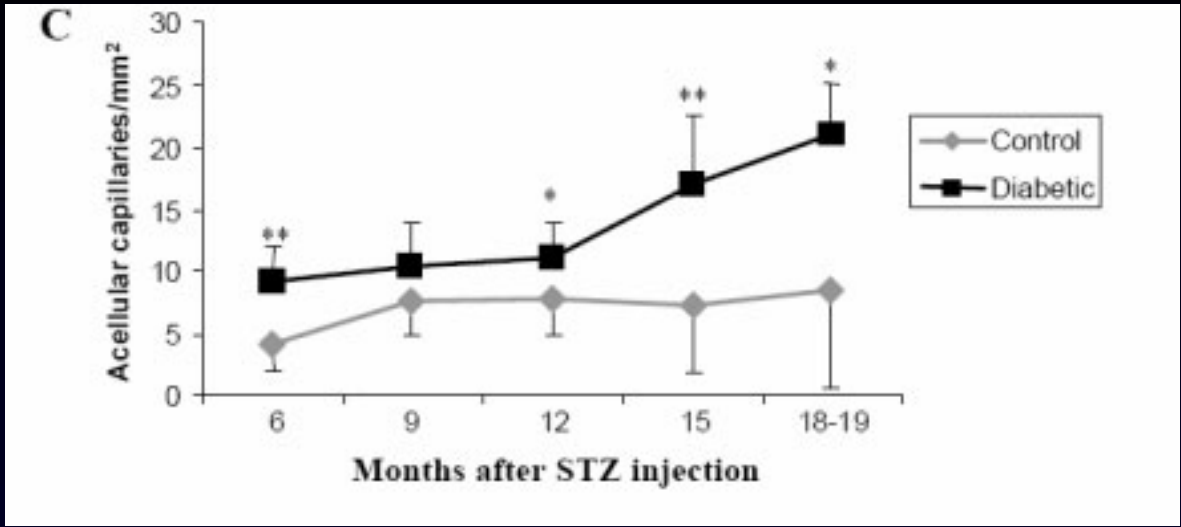
Microarray analysis modules to be created:

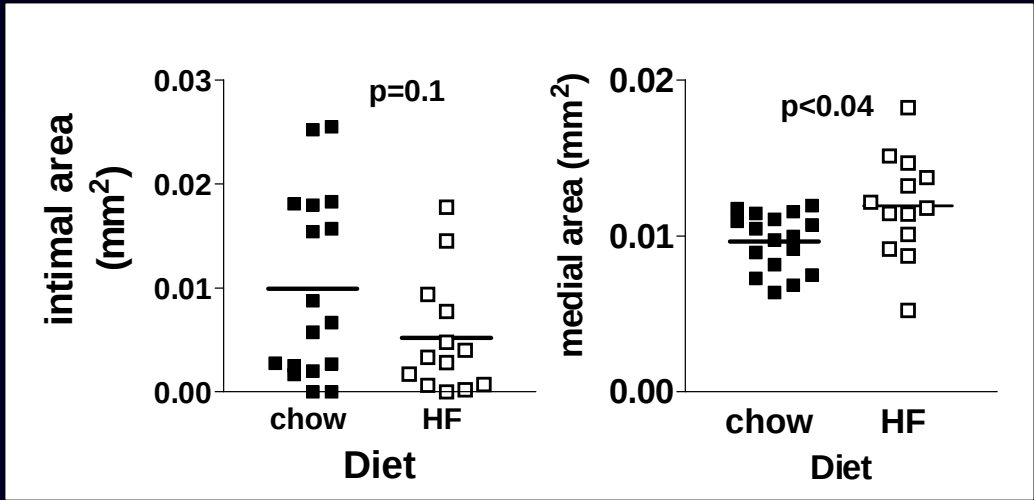
- Basic clustering techniques
- Significance analysis
- Principal Component analysis

Will also need to create visualization modules for each of these.

Will also want to expand the plotting and functional.

# Increase flexibility of charting options



# The End

**If you have any problems, questions or concerns don't hesitate to email us.**
**Use any of the following addresses:**

**General web:**
**amdcc_web-l@lists.amdcc.org (Listserv)**

**Data, assays, experiment help:**
**spatel@mail.mcg.edu (Sachen Patel)**

**Website**
**kobrien@mail.mcg.edu (Ken O'Brien)**