

## Experiment Design

### **Goal:**

Simultaneous Host and Parasite Expression Profiling Identifies Transcriptional Programs Associated with Susceptibility or Resistance to Cerebral Malaria

### **Description:**

The development and outcome of cerebral malaria (CM) reflects a complex interplay between parasite-expressed virulence factors and host response to infection. To simultaneously analyze transcriptional programs in both parasite and host over the course of infection, we created microarrays to concurrently detect transcripts in the genomes of both *Plasmodium berghei* and mouse. Analysis of RNA from brain, lung, liver, and spleen of mice infected with *P. berghei* ANKA showed that parasite gene expression is readily detected in whole organ RNA. Comparison of CM-susceptible (C57BL/6) and CM-resistant (BALB/c) mice showed that both host and parasite display distinct organ-specific transcriptional signatures in susceptible versus resistant animals. Host genes whose expression differs between CM-resistant and CM-susceptible mice, at either baseline or induced by infection, tend to relate to humoral and immune response, complement activation, or cell-cell interactions, suggesting differences in immune function that may directly underlie protection from or susceptibility to CM. *P. berghei*, in contrast, displayed differential expression of genes related to apparent biosynthetic activities, with the majority of transcriptional activity observed in the lung. These data show that analysis of host and parasite gene expression profiles by hybridizing infected host samples to a single microarray is feasible, and can facilitate dissection of complex host-pathogen interactions.

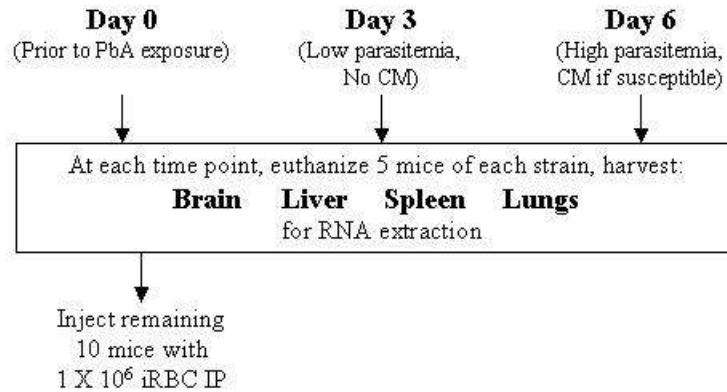
### **Keywords:**

*P. berghei* ANKA, BALB/c, C57BL/6, cerebral malaria (CM) model, cerebral malaria resistance/susceptibility, time course, oligonucleotide array, combination mouse/malaria array.

### **Experimental Factors:**

Time, *P. berghei* ANKA infection, genetic variation.

## Experimental Design:



### Hybridization Strategy:

	Day 0	Day 3	Day 6
Resistant	↑	↑	↑
Susceptible	↓	↓	↓

(for each tissue)

Date	Slide#	Array (serial #)	Hybridization	Label	
				Cy3	Cy5
10-Dec-04	Slide_0003	251276310005	Uninfected Brain / Infected Blood	C57 Brain Day 0	C57 Blood Day 3/6
10-Dec-04	Slide_0004	251276310007	C/B Brain Day 6	C57 Brain Day 6	BALBc Brain Day 6
10-Dec-04	Slide_0005	251276310004	C/B Brain Day 3	C57 Brain Day 3	BALBc Brain Day 3
10-Dec-04	Slide_0006	251276310009	C/B Spleen Day 0	C57 Spleen Day 0	BALBc Spleen Day 0
10-Dec-04	Slide_0007	251276310008	C/B Spleen Day 3	C57 Spleen Day 3	BALBc Spleen Day 3
10-Dec-04	Slide_0008	251276310006	C/B Spleen Day 6	C57 Spleen Day 6	BALBc Spleen Day 6
10-Feb-05	Slide_0009	251276310042	C/B Liver Day 3	C57 Liver Day 3	BALBc Liver Day 3
10-Feb-05	Slide_0011	251276310045	C/B Brain Day 0	C57 Brain Day 0	BALBc Brain Day 0
10-Feb-05	Slide_0010	251276310043	C/B Liver Day 6/0	C57 Liver Day 6	BALBc Liver Day 0
15-Feb-05	Slide_0012	251276310039	C/B Lung Day 6	C57 Lung Day 6	BALBc Lung Day 6
15-Feb-05	Slide_0013	251276310038	C/B Lung Day 0	C57 Lung Day 0	BALBc Lung Day 0
15-Feb-05	Slide_0014	251276310044	C/B Liver Day 0/6	C57 Liver Day 0	BALBc Liver Day 6
15-Feb-05	Slide_0015	251276310040	C/B Lung Day 3	C57 Lung Day 3	BALBc Lung Day 3

## Links:

<http://hugheslab.med.utoronto.ca/malaria/>