



CALIFORNIA STATE SCIENCE FAIR 2012 PROJECT SUMMARY

Name(s) Christiane H. Pham	Project Number S0522
Project Title It Runs in My Blood! The Relationship between Malaria Resistance and the Duffy Antigen	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The main purpose of the project is to determine the nature of malaria resistance and analyze how the differences in the gene affect it. The gene is called the Duffy antigen/chemokine receptor (DARC), and its mutation has been attributed to resistance of the virulent disease, malaria. By figuring where the mutation occurs, better methods can be employed in order to combat this deadly disease.</p> <p>Methods/Materials Phylogenetic trees are generated using a computer program called ClustalX and FigTree using 40 DNA sequence samples in order to display using a graphic if any obvious differences are apparent. The DNA samples used were gathered from NCBI and included: 27 Homo sapiens, three Pongo pygmaeus, three Gorilla gorilla, one Pan paniscus, and six Pan troglodytes. The trees generated also show the relationship between Homo sapiens (humans) and other non-human primate DNA sequences in order to find the specific gene and see if these two share the same type of mutation.</p> <p>Results Obvious differences were observed in the phylogenetic trees that were generated. Evolutionary wise, all samples should line up in the relative same area on the tree, however some samples were outliers, suggesting there is a mutation, specifically, the target Duffy mutation. In a tree that compared all samples (human and non-human), the outliers in the human tree and non-human tree both shared differences, indicating the mutation could be a shared mutation.</p> <p>Conclusions/Discussion Malaria is an extremely dangerous disease caused by the parasite, Plasmodium falciparum or Plasmodium vivax. The Duffy antigen/chemokine receptor (DARC) is a binding element on the surface of the blood cell, and it is what the Plasmodium parasite uses to attach itself onto the red blood cell. Studies have shown that people that are lacking or have a mutation of the Duffy antigen do not have the components in order for Plasmodium to attach and propagate, allowing them to be resistant to malaria.</p>	
Summary Statement Using phylogenetic trees to view the relationship of Duffy antigen mutations and malaria resistance in various species.	
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